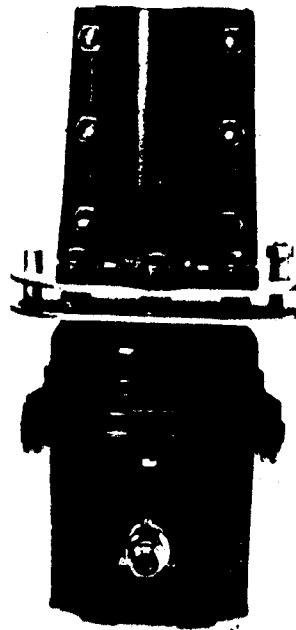
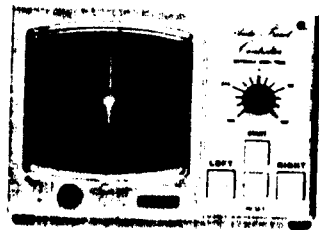


INSTRUCTION MANUAL

FOR

MODEL 1300MSAX

|||||  
**EMOTATOR**  
|||||



**EMOTO ANTENNA MFG., LTD.**

## THE WORLD RENOWN "EMOTATOR"

You are now the proud owner of the famed EMOTATOR Amateur Radio Antenna Rotator, made by Emoto Anenna Mfg. Ltd.

We are a specialized antenna rotator manufacturer, producing for amateur radio, Ocean Vessel, and for industrial applications such as local radios T.V. broadcasting stations, news media, electric power companies, Weather bureaus, and local and foreign ship building industries and many other industrial applications.

Please read this instruction manual carefully before starting the operation.

The Emotator will definitely help you as a fine assistant to contact friends throughout the world.

### CAUTION

1. Installation must be made as per photograph on the front page. You can not operate the EMOTATOR with top and bottom reverse or horizontally.
2. The wiring of 6-conductor cable must be made properly. At least, check the wiring 2-times before starting operation.
3. When connect the 6-conductor cable, please choose high quality solder.

### CONTENT IN A PACKAGE

Rotor	1
Controller	1
Mast clamp	2
10 mm $\phi$ x 100 Bolt with Nut & Spring Washer for Mast clamp	6
10 mm $\phi$ x 25 Bolt with Nut & circle Washer for mounting mast clamp	6
8 mm $\phi$ x 18 Bolt with spring Washer for mounting Universal coupling	6
8 mm $\phi$ 18 Bolt with spring Washer for installation	6
8-Pin connector Plug.	1
7-Pin metal connector Plug with rubber cover.	1
Universal coupling (P/N. 453)	1
Instruction Manual.	1

## CONSTRUCTIONS AND SPECIFICATIONS.

Equipped a Rotor with a Universal Coupling and a large diameter Mast Clamp Bracket(ranging from 50mm  $\phi$  - 80mm  $\phi$ ) to rotate a large size Antennas. Also, Rotation mechanism is incorporated in a diecast housing.

The special friction braking system(patented) has been taken to stop antennas at any direction freely with no braking noise.

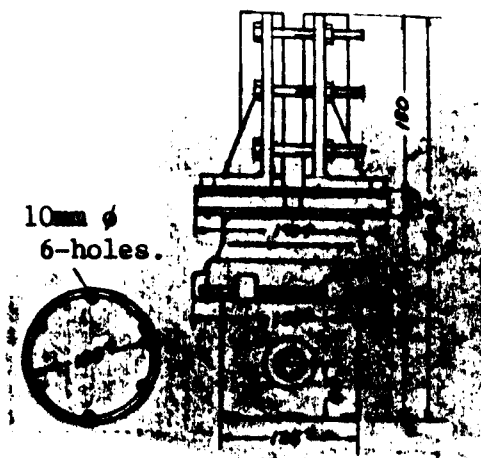
Recommend the EMOTATOR model 1300MSAX for sharp beam antennas like VHF, UHF and SHF.

The circle controller is equipped with an auto-preset function and terminal for computer control or remote control.

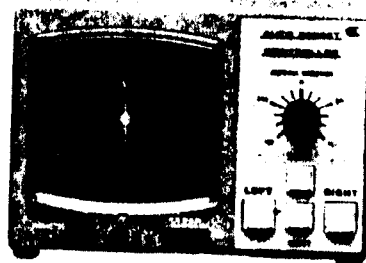
### MAIN SPECIFICATIONS

Electric Power Supply:	115V, <u>220V</u> , 240V AC, 50/60Hz 130VA.
Operating voltage:	AC 100V.
Rotation torque:	3000 Kg/cm
Braking torque:	25000 Kg/cm
One Rotation time:	95/77 Sec.
Allowable Antenna Wind Surface:	3.0 M <sup>2</sup>
Allowable Antenna GD <sup>2</sup> :	1800 Kg/M <sup>2</sup>
Applicable Mast Diameter:	60 - 80mm.
Allowable weight of Antennas:	800 Kgs.
Connecting cable:	6-Conductor vinyl cabtyre cable. (1-conductor must be over than 0.5 square mm)
Rotor Weight:	6 Kgs.

### 1300MSAX TOTOR

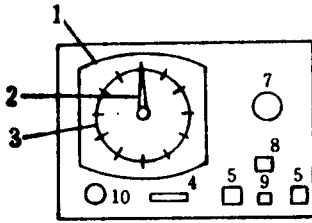


### CONTROLLER



## FRONT PANEL OF THE CONTROLLER AND OPERATION

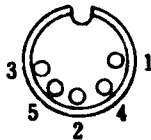
### FRONT PANEL



1. Front Panel Frame - Removable from outside. Remove the front panel frame when you change the direction plate to a map or when you adjust the direction of antennas and the needle pointer.
2. Needle Pointer - By pulling the center axle of the needle Pointer, needle pointer can be removed and rotation shall be made by finger. Rotate with antennas relatively.
3. Direction Plate - After removed 1 and 2, changeable to a Map.
4. Power Switch.
5. Rotation Button - When pushed this button, Antennas start rotation.
7. Preset Knob - The scale figure round the knob is an angle scale which the center of all rotation angle (360 degree) is set as "0". Turn the knob to the angle where you wish to stop your antennas and push the START BUTTON to start rotation.
8. Start Button - This is a button for starting the preset rotation.
9. Reset Button - Push this button when you wish to stop the antennas on the way of preset rotation.
10. Remote connecting Socket - By using this socket, remote control of the antenna rotation or automatic pursuit the moving object by Micor-Computer through an interface is available.

### REMOTE CONNECTING SOCKET

Please refer figure in left.



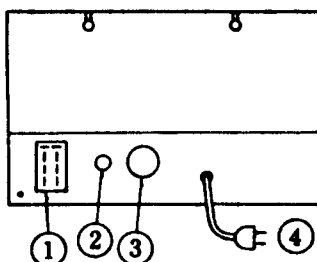
No.1 Pin - Data output. Output is made by changing direction degree to a voltage. Changing voltage is 0.06V - 5V(+/-0.12V) If you input the memory through an A/D converter, connection with a Micro-computer of digital display etc are available.

No. 2, 3 & 5 Pin - These are RIGHT, RESET, LEFT operation Pin, and the operation is made with TTL level LOW.

No. 4, Vcc - Can be used as a power source for an external compact electric equipment of DC 8V, 0.35A.

### EXPLANATION OF BACKSIDE PANEL OF THE CONTROLLER

#### BACKSIDE.



Please refer a figure in left.

1. Cable connecter, 8-pin Square type.
2. Needle Pointer rotation degree adjustment Volume - Use to adjust one rotation of needle pointer and Rotor.
3. Fuse Holder - Insert 1 Amp. fuse.
4. Electric Power Cable.

## VARIOUS ANTENNA ERECTION METHODS

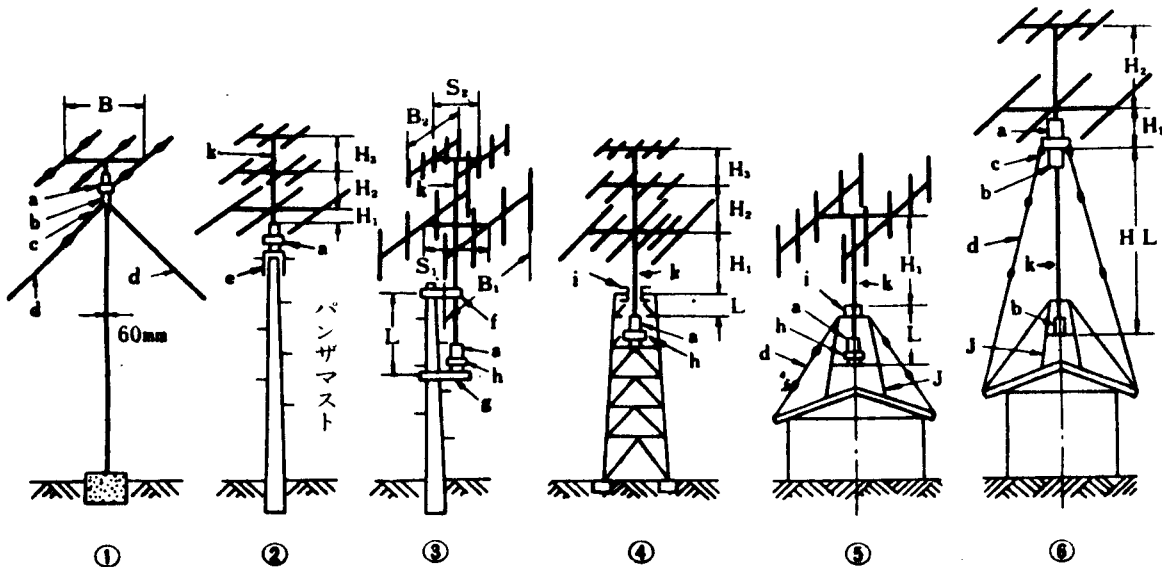
Almost any type of antenna tower can be used like those indicated in the drawings below such as the steel pipe(1), the Panza mast(2), (3), the steel Frame tower(4) and the roof span(5), (6).

These can be selected freely according to the building site and budget. Mounting of antenna masts can be broadly divided into the independent mast type which rotates attaching the antenna Mast directly to the Emotator mast clamp as in the case of (1), (2) and (6), and the rotary antenna mast type which supports the middle of the antenna mast with bearings as in the case of (3), (4) and (5).

In these systems, since the force that would bend the Emotator is no longer acting, the height of the antenna (H) can be considerably high. However, for the total height above the bearings ( $H_1 + H_2 + H_3$ ), even when a water pipe with an outer diameter of 60mm (or a 1" gas pipe) is used, it is safe not to extend more than 3.5 Meters. In these diagrams, although normally the dimensions of L are set at 1.5 - 2 Meters, please do not attach bearings additionally in the center of L.

When the antenna appears weak and unstable with only a mast support at the upper portion, increasing the size of the antenna mast to make it stronger is a preconsideration. In addition, in cases where the diameter of the mast is narrow in comparison to the size of the antenna, the tightened portion of the clamp tends to slip easily resulting in over-tightening of the bolts causing secondary problems. Fig. (5) shows an example of using a roof span for erecting an antenna. Although this varies with the structure, it is safe to have the dimensions of H be a maximum of 3 times L. In the last, do not forget taking a ground from Tower, Panza mast and steel pipe. Especially, in the case of (5), (6) Roof Tower, to prevent a damage by lightning, electric shock and fire, take a ground from metal section with more than 2mm diameter wire.

### ANTENNA ERECTION METHODS.



a. 1300MSAX.  
b. Mast Clamp.  
c. Stay clip.  
d. Stay Wire.

e. Panza Mast Cap.  
f. Mast Bearing.  
g. Emotator Support.  
h. Universal coupling.

i. Stay Bearing.  
j. Roof Tower.  
k. Antenna Mast.

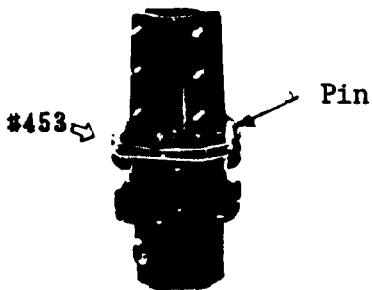
## ROTARY ANTENNA MAST SYSTEM AND UNIVERSAL COUPLING

Mounting system (3), (4) and (5) are mounted in the center of the mast by using the bearing adaptor. this is called the Rotary antenna Mast system.

When the Rotator is installed in a tower, as in this case, it must be fixed tightly with bolts on the rotator mounting plate in the tower.

This mounting surface must be perfectly flat and the top tower hole must be concentric with the axis of rotation of the top part of the Emotator.

For example, predetermine the surface level when using this mounting system. as per illustration in left, if the reclination is more than 1mm, the Mast can not be mounted and clamped into position.



If the Emotator is mounted on a reclined position, the mounted mast will be mounted at an angle (P2) instead of (P1). This is the reason why it has been stated earlier that the surface must absolutely level.

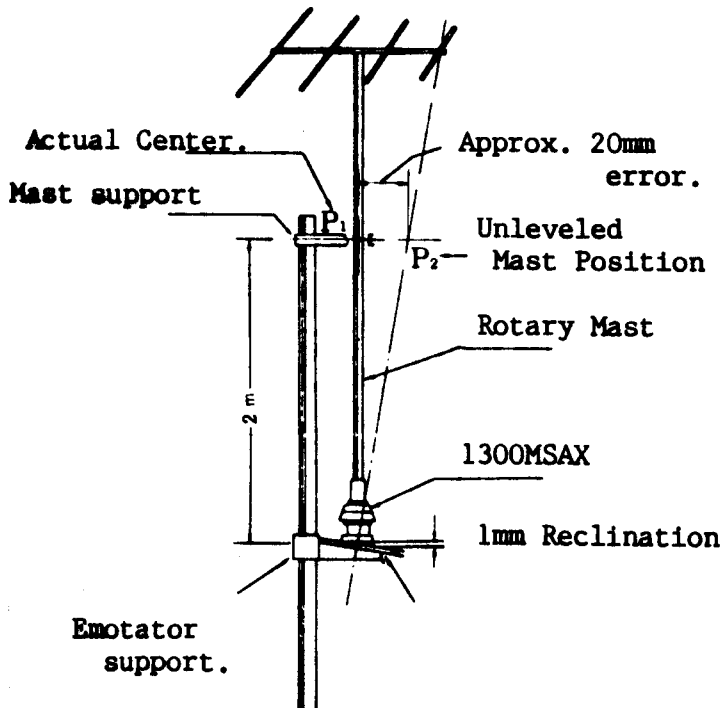
Do not force the Mast and the Emotator to be installed in this type of position. The 1mm reclination at the bottom of the Emotator will show approx. 20mm misalignment at the tip of the 2 meter length mast.

Forcing this type of mounting will cause permanent damage to your Emotator.

Part No. 453 Universal coupling has being attached to model 1300MSAX Emotator to solve this problem and use #453 Universal coupling at between rotating unit and Mast clamp.(See left).

Especially, universal coupling must be used when you take a Rotary Antenna Mast system.

When install an antenna mast, the center of antenna mast and the center of rotating unit must be in concentrically.



SIZE OF USEFUL ANTENNA FOR 1300MSAX AND ANTENNA FLY WHEEL EFFECT

1300MSAX Emotator rotates various antennas which are used for amateur radio, example 14 MHz 4-elements, Tri-band 6-elements, 21MHz 5-elements and 144MHz 10-elements etc.

However, following 2 factors must be taken into considerations.

1. Allowable Wind Surface Area.

Total allowable wind surface area of antennas which you plan to use must be must be smaller than allowable wind surface area of 1300MSAX Emotator. When you take the independent mast system, mount antennas on just above the Emotator.

2. Antenna fly wheel effect.

A simple explanation of this should be given here. For example, an automobile is speeding at a given speed and the transmission is set at "Neutral" and you still note that the engine power is not moving the rear two tires, but the automobile will keep running. this is called the inertia running, and the same effect is present on the rotating antenna system. Once it starts to rotate, even if the power source is cut-off, the antenna and the Emotator will keep rotating for a while. This is called the fly wheel effect (GD<sup>2</sup>). The antenna system in the fly wheel rotation stage should not be stopped abruptly as it will generate a big force. The largeness of the fly wheel effect will depend on the antennasystem, the larger antenna, the larger GD<sup>2</sup>. It is very simple to taking into consideration an antenna system by checking the GD<sup>2</sup>.

For example,	KIND OF ANTENNA	GD <sup>2</sup>	A
	7M2EVP	240	1.0
	T4E	200	0.6
	144M10E4P	80	0.8
	<b>TOTAL:</b>	<b>520Kg/M<sup>2</sup></b>	<b>2.4</b>

\*GD<sup>2</sup> of 1300MSAX is 1800 Kg/M<sup>2</sup> and A (Wind surface area is 3.0 M<sup>2</sup>. Therefore, these antennas can be used safely with 1300MSAX.

FLY WHEEL EFFECT (GD<sup>2</sup>) AND WIND SURFACE (A) OF VARIOUS ANTENNA.

	A	GD <sup>2</sup>	A	GD <sup>2</sup>	A	GD <sup>2</sup>	A	GD <sup>2</sup>	A	GD <sup>2</sup>	A	GD <sup>2</sup>
HF	1.0	7M2EVP 240	1.8	7M3EVP 460	2.2	7M2EF 800	3	7M3EF 1500	2	7M2ECQ 450	3	7M3ECQ 700
	0.8	14M3EF 160	1.2	14M4EF 330	1.75	14M5EF 750	2.2	14M6EF 1200				
	0.4	21M3EF 40	0.8	21M5EF 200	1.5	21M7EF 800	0.3	21M2EHV 20	0.4	21ZEHQ 40	1.3	21M6EF 650
	0.31	28M4EF 35	0.7	28M5EF 60	0.3	28M2EHV 18	0.31	28M2EHQ 35			2.5	21M6EF 1600
HF	0.5	7.14M3EVP 190	0.8	7.14M4EVP 200	0.35	14.21M3E 150	0.4	14.21M4E 160	0.55	14.21M5E 400	0.3	21.28M3E 150
	0.4	T3E Jr 60	0.5	T3E 160	0.6	T4E 200	0.7	T5E 380	0.8	T6E 420	0.5	T2ECQ 58
	0.3	4E 3.2	0.6	4E2S 6.4	0.6	4E2P 65	0.2	2EHV 12	0.28	2EHQ 30	0.5	4EHQ 200
144MHz	0.35	5E 40	0.7	5E2S 80	0.7	5E2P 300	0.4	6E 50	0.8	6E2S 100	0.8	6E2P 350
	0.14	8E 1.0	0.3	8E2P 6	0.6	8E2P2S 12	0.6	8E4P 50	1.2	8E4P2S 100		
	0.18	8E 2	0.36	8E2P 8	0.85	8E2P2S 16	0.85	8E4P 66	1.7	8E4P2S 130		
	0.2	10E 3.5	0.4	10E2P 11	0.8	10E2P2S 22	0.8	10E4P 80	1.6	10E4P2S 160		
430MHz	0.22	12E 5	0.5	12E2P 30	1.0	12E2P2S 60	1.0	12E4P 100	2.0	12E4P2S 200		
	1.5	11E8P 520	0.22	X8E 3.1	0.45	X8E2P 12	0.3	X10E 5	0.6	X10E2P 19		
	0.05	10E 0.35	0.1	10E2P 1.4	0.25	10E2P2S 4	0.2	10E4P 5.8	0.4	10E4P2S 12	0.06	12E 0.5
	0.25	12E2P2S 4	0.3	12E4P 10	0.6	12E4P2S 20	0.15	15E2P 3.6	0.3	15E2P2S 7.5	0.6	15E4P 8.5
	1.5	25E2P2S 110	2.2	25E4P2S 465								

\*Note.  
 A = Wind Surface M<sup>2</sup>.  
 GD<sup>2</sup> = Fly wheel feect Kg/M<sup>2</sup>.  
 E = Number of element.  
 P = Number of parallel stack.  
 S = Vertical stack.  
 CQ = Cubical Quad.  
 HV = HB9CV.  
 HQ = Swiss Quad.  
 VP = Short Beam.  
 Jr = Junia type.  
 F = Full size  
 X = Cross Element  
 T = Tri band.

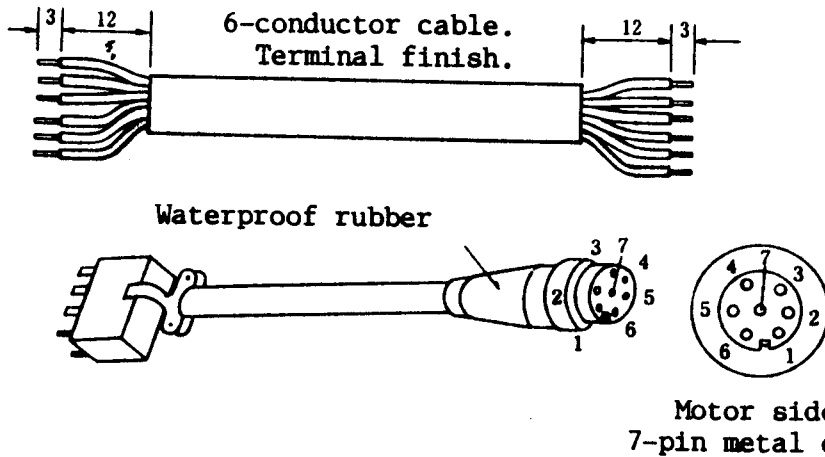
## HOW TO CONNECT 6-CONDUCTOR CABLE AND CONNECTER PLUGS.

Use 6-conductor cable to connect rotating unit and the controller. At that time, select the cable of 0.5 square mm over/1-conductor cable enable to extend up to 100 meters.

The tip of both end of 6-conductor cable must be processed as per illustrated below. Then connect 8-pin rectangular plug at one end, and connect 7-pin metal connecter at the other end.

The pin numbers have being marked on each pin of the connecter. Therefore, connect the same pin number each on both end of the connecter with the same conductor. No. 7 & No. 8 Pin are unnecessary to connect.

do not forget puting the protection cover and waterproof rubber on a way of the 6-conductor cable before soldering the connecter.



## ADJUSTMENT OF DIRECTION OF NEEDLE POINTER AND ANTENNA

When finished the all of wiring and installation, adjust the needle pointer direction and the antenna direction by the following way. (Before install the Emotator in a Tower, recommend you electrical test)

1. Switch on the power switch. The needle pointer stop at the same direction with the direction of rotating unit.
2. Push the LEFT button to rotates antenna till motor stop automatically.
3. At the motor stopped position, adjust needle pointer at "SOUTH" by finger. Also, adjust the antenna direction to the "SOUTH" by loosen screws of the mast clamp, and retighen the screws.
4. Then, push the RIGHT button and watch the antenna rotation, and stop the antenna at the "SOUTH" position after one rotation.
5. Now, the needle pointer of the controller must show the "SOUTH". If the needle pointer is not in correct position, adjust the needle pointer at "SOUTH" positon by Volume control on the back side of controller.



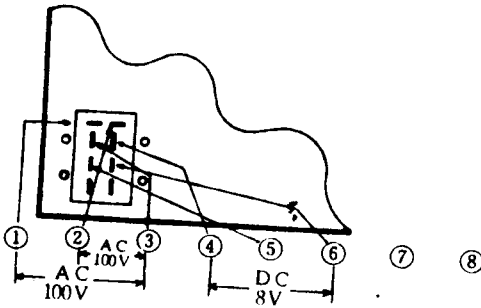
TROUBLE OF THE EMOTATOR.

Trouble of the Emotator can be distinguished to an Electrical Trouble and a mechanical Trouble. The most electrical trouble occur when installed the Emotator newly or mistake of wiring when replaced the control cable.

In very few occasion, electrical trouble occur by strike of lightning.

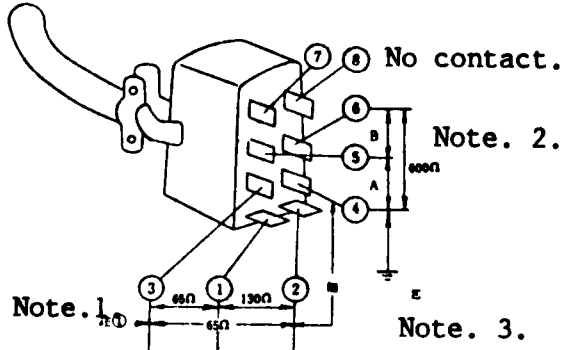
By using a Tester, some of electrical trouble can be found.

BACK OF CONTROLLER.



- The normal voltages between each pins are:-
- Pin. 1 - 3: AC 100V when pushed RIGHT button
  - Pin. 3 - 2: AC 100V when pushed LEFT Button.
  - Pin. 4 - 6: DC 8V.
  - Pin. 4 - 5: DC2-3V. When you measure, needle pointer rotate to left.
  - Pin. 5 - 6: DC2-3V. When you measure, needle pointer rotate to Right.

CONNECTING WITH ROTOR.

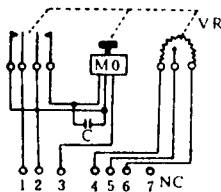


- Note. 1. There maybe infinity one side when limit switch in rotor is working.
- Note. 2. A + B should be 600 ohm. When A=220 ohm, B is 380 ohm.
- Note. 3. E means a ground or Earth. Must take an earth from metal part of the Emotator, Tower or connector.

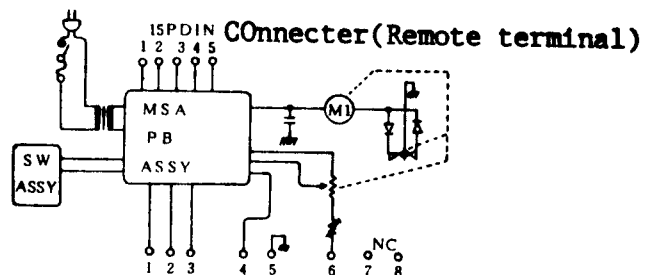
If there are any something wrong, it is a mechanical trouble.

ELECTRICAL CIRCUIT DIAGRAM.

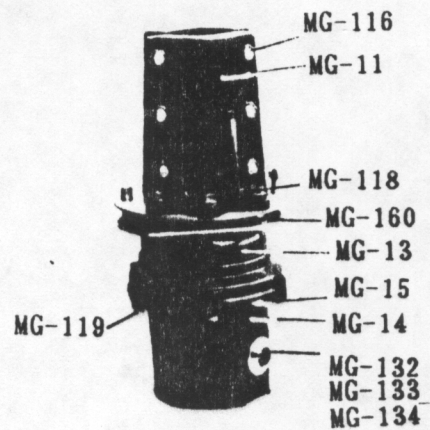
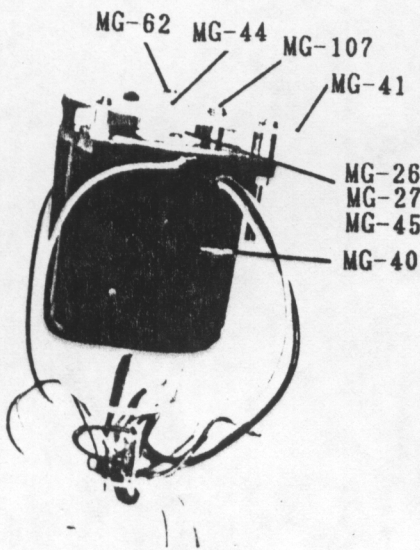
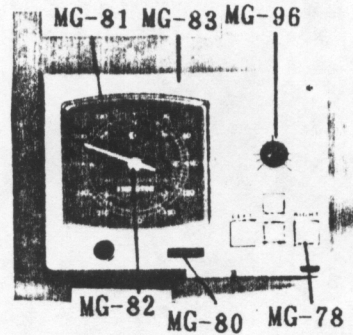
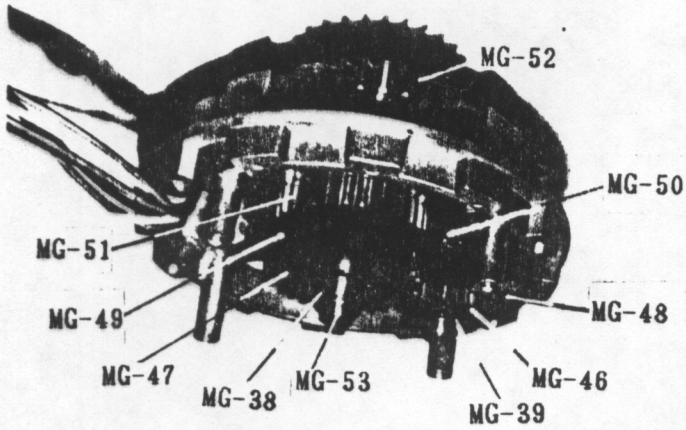
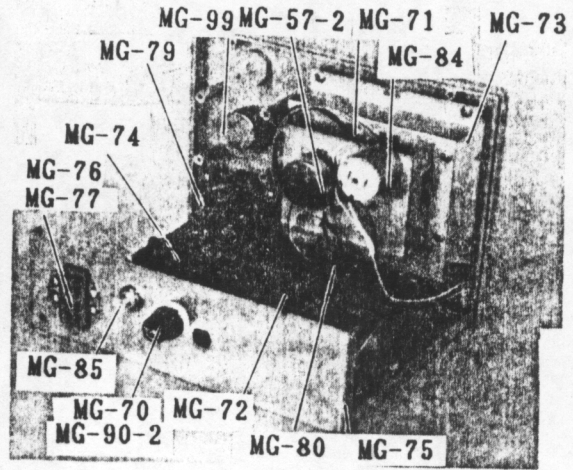
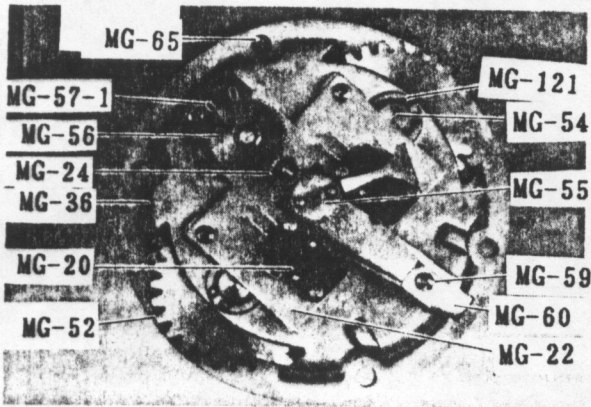
ROTOR



CONTROLLER



PARTS NUMBER AND POSITIONING.



THE EMOTATOR MODEL 1300MSAX PARTS LIST

<u>PART NO.</u>	<u>DESCRIPTIONS.</u>	<u>PART NO.</u>	<u>DESCRIPTIONS.</u>
MG-11	Mast Bracket.	MG-60	Stop Lever
MG-13	Gear Case.	MG-62	Push Nut.
MG-14	Motor Case.	MG-64	10uF Capacitor.
MG-15	Ring.	MG-65	6 $\phi$ x 30 Bolt
MG-20	Micro Switch.	MG-66	6 $\phi$ x 12 Bolt
MG-22	VR base.	MG-70	3 A. Fuse
MG-24	VR idle Gear.	MG-71	8V Lamp
MG-26	Brake spring.	MG-72	Transformer
MG-27	Brake case.	MG-73	Servo Assembly
MG-31	9.5mm Dia. Ball.	MG-74	P.C.B. Assembly
MG-35	Motor Frame.	MG-75	Chassis.
MG-36	Gear Frame.	MG-76	8 pin female connecter for Chassis.
MG-38	12mm Dia. Large Spacer.	MG-77	8 pin male connecter for cable.
MG-39	12mm dia. small Spacer.	MG-78	Operation Knob.
MG-40	Motor.	MG-79	Switch Assembly.
MG-41	Motor plate.	MG-80	Power Switch.
MG-42	4 x 10 Bolt.	MG-81	Needle pointer protection frame
MG-44	Pinion Gear.	MG-82	Needle pointer.
MG-46	No. 1 Gear.	MG-83	Controller Panel.
MG-47	No. 2 Gear.	MG-84	D.C. Motor.
MG-48	No. 3 Gear	MG-85	Direction Adjust Volume.
MG-49	No. 4 Gear	MG-90-2	Fuse Holder.
MG-50	No. 5 Gear	MG-96	Preset Knob.
MG-51	No. 6 Gear	MG-99	Preset Volume.
MG-52	No. 7 Gear	MG-107	5 $\phi$ x 30 Bolt
MG-53	12 $\phi$ x 56, shaft.	MG-108	8 $\phi$ x 18 Bolt for installation.
MG-54	12 $\phi$ x 29 Shaft.	MG-116	10 $\phi$ x 100 SUS Bolt
MG-55	VR drive Gear.	MG-118	10 $\phi$ x 25 SUS Bolt
MG-56	VR Gear	MG-119	6 $\phi$ x 20 Bolt
MG-57-1	N600 ohm Volume.	MG-121	12 $\phi$ S-ring.
MG-57-2	600 ohm Long shaft VR	MG-132	7-pin female connecter for Rotor.
MG-58	Limit Switch Ass'y	MG-133	7-pin male connector for cable.
MG-59	Limit Switch spring.	MG-134	Waterproof rubber cover.
MG-45	Brake Rotor.	MG-160	8 $\phi$ x 18 Bolt for Universal Coupling. mounting.