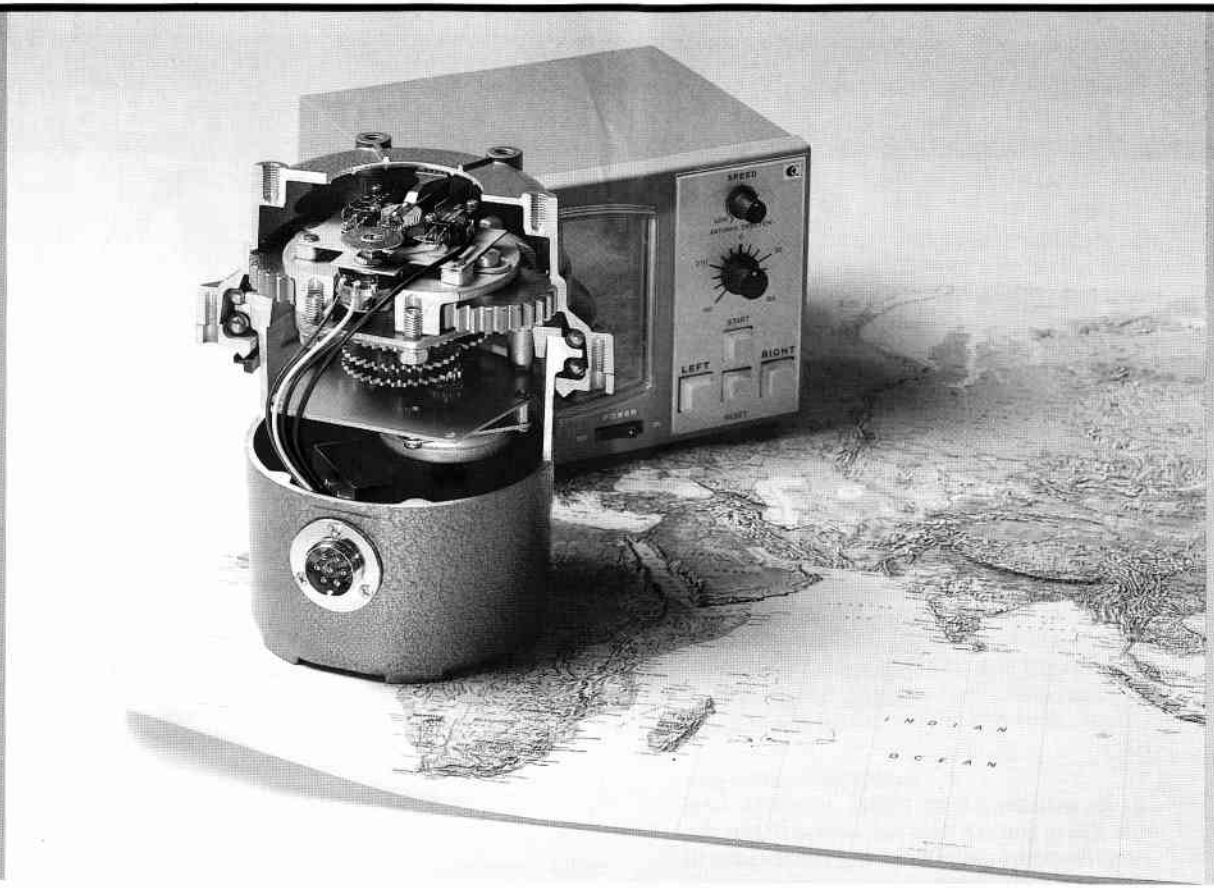
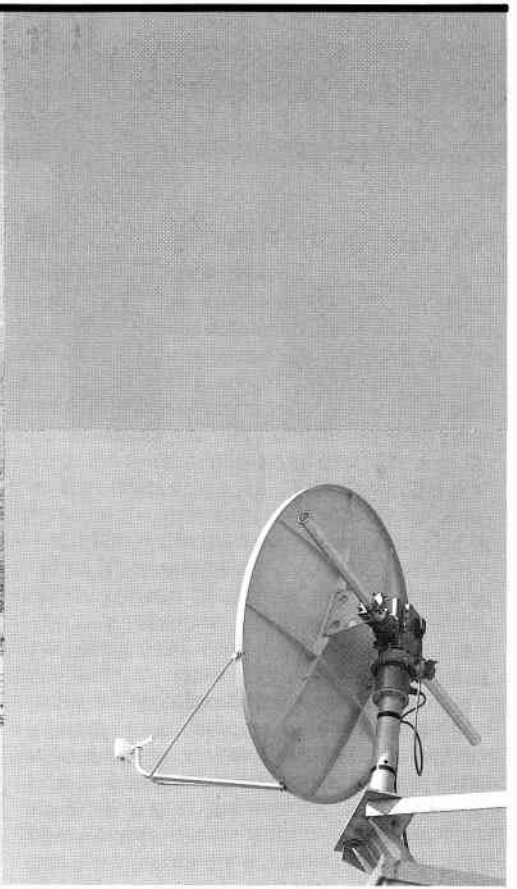
EMOTATOR

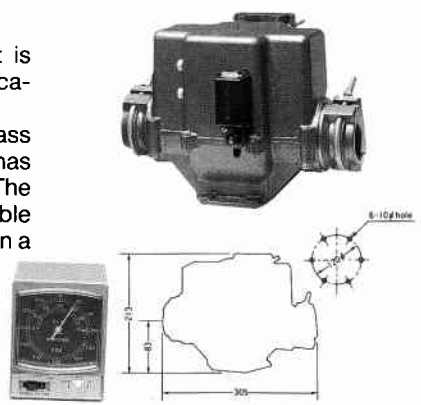




ELEVATION ANGLE EMOTATOR THAT IS A MUST FOR SATELLITE COMMUNICATIONS

EV700X

This is an elevation angle Emotator that is absolutely necessary for satellite communications.
The horizontal boom of the antenna can pass through up to a diameter of 50mm and it has strongest boom clamp with both side. The body adds further convenience by being able to be installed either on a level surface or on a vertical pipe.

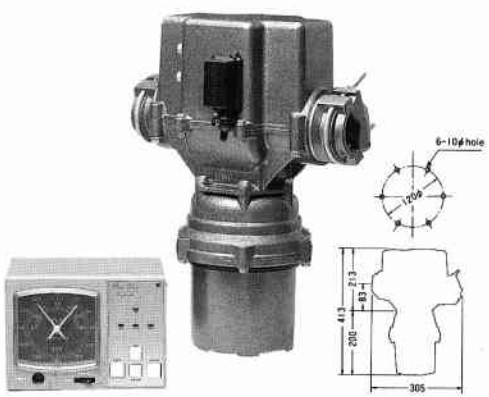


Dimension of controller: with UCK
W = 120mm
H = 155mm
D = 170mm

EV700D5X

Artificial satellites pass through space in three dimensions. The EV-700D5X has been designed to handle this. The D_5 model is a combination of the EV700X Emotator +1105 and is specially for elevation angle applications. Therefore, refer to the table of properties for the mechanical properties of each of the respective models. The controller is housed in a single cabinet for easier operation and azimuth and elevation angle are displayed using a concentric, dual-needle display. Of course, these models are also equipped with remote terminals for computer control of both azimuth and elevation angle.

Dimension of controller:
W = 200mm
H = 140mm
D = 170mm



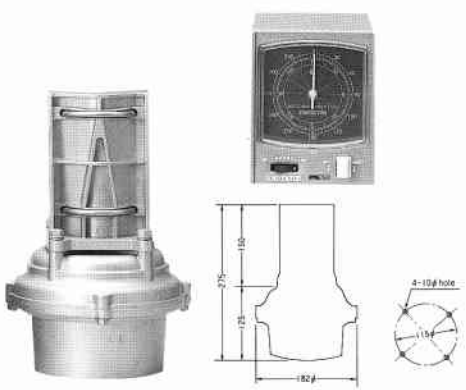
RELIABILITY AND HIGH PERFORMANCE— THE STARTING POINT & GOAL OF EMOTATOR

105TSX

GD²100kgm²

The rotating unit has been newly designed for superior dependability and strength. In addition, the controller features large, easy-to-read scale display. Wiring of cables has also been made easier through the use of a bi-level terminal board. An Auto-Preset is available as an option for the 105TSX that allows quick and easy connections.

Controller size:
W = 120mm
H = 155mm
D = 170mm
Controller: with UCK

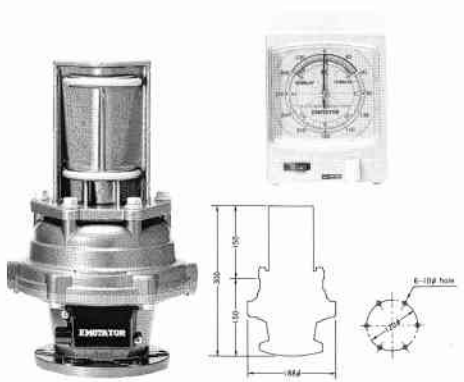


747SRX

GD²400kgm²

Model 747SRX is a multi-purposes, easy to operate and rugged Antenna rotator. Example, it rotate HF Tri-band 5-elements antenna easily. Rotation speed is high and total rotation angle is 470°. Exert it power at contests or Satellite communications.Connection terminal for computer has being equipped.

Maximum rotation angle = 470°
Maximum rotation speed = 35/sec.
Controller size:
W = 120mm
H = 155mm
D = 170mm
Controller: with UCK



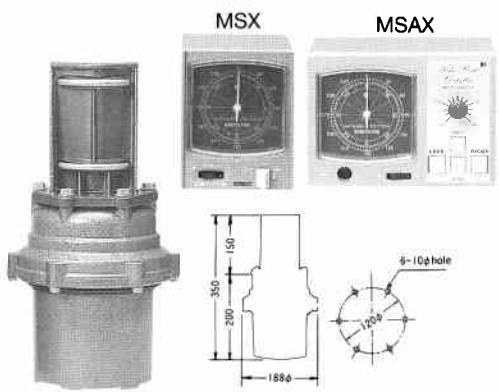
1105series

GD²700kgm²

The Model 1105 Employs a Large Gear for Unmatched Ruggedness as well as a Safe Design.

This model employs a double gear and a twin drive. Since this results in powerful rotational force as well as control ability, there is no need to worry about the angle when stopping allowing you to accurately stop the unit in any arbitrary direction. This makes it optimal for HF/VHF multi-level stacks.

Controller size:
MSX; W = 120mm
H = 155mm
D = 170mm
Controller: with UCK
MSAX; W = 200mm
H = 140mm
D = 170mm



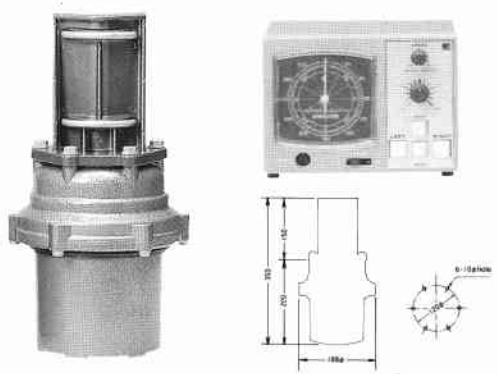
1200FXX

GD²1000kgm²

The Model 1200FXX Features Rugged Speed Control

This model is perfect for UHF, VHF and SHF multi-element, multi-Level antennas to HF multi-element, large antennas boasting high-speed and unmatched power. The controller has a built-in inertia control circuit and features variable speed and a preset function. What is more, the use of semiconductor power switching results in improved motor efficiency. Of course, it is also equipped with a remote terminal which makes possible connection with a computer.

Controller size:
W = 200mm
H = 140mm
D = 170mm



LARGE EMOTATOR FOR ULTIMATE SAFETY

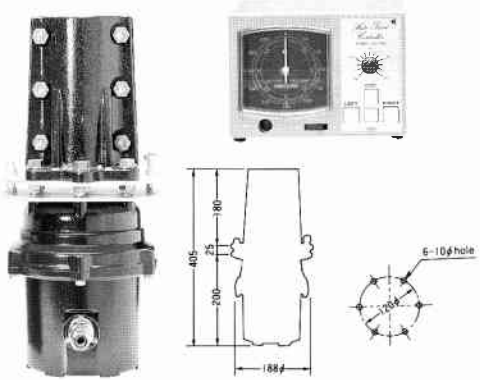
201 DC OPERATION SERIES

1300MSAX

GD²1800kgm²

This model comes with a large-diameter antenna mast clamp (ranging from ∅60 to ∅80) and a universal coupling for eliminating strain between the antenna tower and the mast. As specially-forged steel is used for the gears which are subject to the most force, it is able to withstand a large external force by use of a double gear and twin drive. This model also features a powerful braking function which employs a registered utility design (No. 1523419).

Braking torque: 25000kgcm
Rotation torque: 3000kgcm
Allowable wind surface area: 3.0m²
Consumption current: 130VA
Controller size: W = 200mm
H = 140mm
D = 170mm

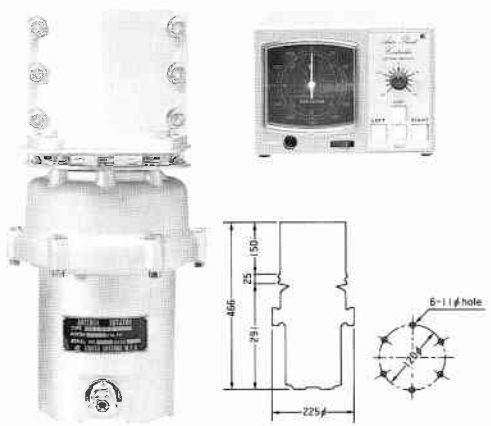


1800FSX

GD²3000kgm²

Since a triple planetary reduction gear is combined in the speed reduction unit, it is only natural that the final gear is twin drive. Moreover, the unit also effectively incorporates a large gear of specially forged steel. This allows it to easily accommodate log-periodic antennas of truss booms and 7MHz 4ELE full-sized antennas. In the case of multi-stack antennas, since the mast is extremely long, a diameter of at least 100mm is required in terms of safety. This model is provided with mast clamp equipped with a universal coupling that has a variable range from ∅90-∅140mm.

Braking torque: 30000kgcm
Rotation torque: 4000kgcm
Allowable wind surface area: 3.5m²
Controller size: W = 200mm
H = 140mm
D = 170mm

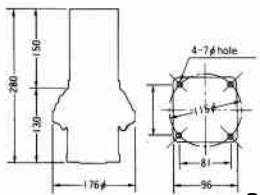


201SAX/AAX

GD²60kgm²

In this series a 360° circle controller (201SAX) or compact design controllor (201AAX) has been used on an EMOTATOR specially designed for outdoor expedition operation. It uses a DC 12V that is directly connected to a battery.

Controller size:
SAX: W = 120mm
H = 155mm
D = 170mm
AAX: W = 150mm
H = 55mm
D = 150mm



SAX
Controller with UCK

AAX
Controller with UCK

ALL EMOTATOR SPECIFICATIONS

Model	EV-700X	EV700D5X	105TSX	747SRX	1105MSX MSAX	1200FXX	1300MSAX	1800FSX	201SAX 201AAX
Allowable antenna GD²(kgm²)	500	500 (700)	100	400	700	1000	1800	3000	60
Allowable wind surface area (m²)	2	2 (2.5)	1.0	2.0	2.5	2.5	3.0	3.5	0.7
Braking torque (kg/cm)	5000	5000 (10000)	3000	7000	10000	18000	25000	30000	1500
Rotation torque (kg/cm)	3000	3000 (800)	520	700	800	2000	3000	4000	200
One rotation time (sec.)	*3 85/70	*3 85/70	65/55	35	75/65	Variable Max. 40	95/75	95/80	65/55
Rotating angle indicator	Circle	Circle	Circle	Circle	Circle	Circle	Circle	Circle	Circle/Meter
Applicable mast diameter (mm)	50	50	31~61	40~61	40~61	40~61	60~80	90~140	31~61
Allowable weight of antenna (kg)	100	100 (400)	300	500	400	800	800	1000	300
Connecting cable	6-conductor	6-conductor	6-conductor	5-conductor	6-conductor	5-conductor	6-conductor	6-connector	6-connector
Weight of rotating part (kg)	6.8	6.8 (5.1)	3.5	4.2	5.1	5.2	6	18	3.5

*UCK (Universal Control Knob)
This is a control knob we developed and it features a Semi Auto-Preset function. By putting the knob at LOCK position, antenna continues the rotation without pushing the knob and the tuning of rig can be made the while.

*1. For a circle controller, Servo mechanism has being used and it indicates a rotation of 360 degree.
*2. As a connecting cable, 0.5mm²/1-conductor vinyl cabtyre cable is recommended.
*3. A rotation time of EV-700X and EV-700D5X are the rotation time of 180°.

VARIOUS MAST CLAMPS

#1211 Mast Clamp for 105TSX under side.

#1212 Mast Clamp for type 105. Applicable Mast diameter ranging from ∅30 to ∅61 U-Bolts and clamp are attached.

#1217 Mast Calmp for type 747, 1105 and 1200. Applicable Mast diameter ranging from ∅30 to ∅61. U-Bolts are attached.

#1219 Mast Clamp for Model 1300MSAX. Appliable Mast Diameter ranging from ∅60 to ∅80.

#1254 Applicable Mast Diameter ranging from ∅60 to ∅80 for type 1105, 1200 and 1300MSAX. Equipped with a Universal coupling.

#1255 Extra large Mast Clamp with a Universal coupling for type 1200, 1300 and 1800. Applicable Mast diameter ranging from ∅90 to ∅140.

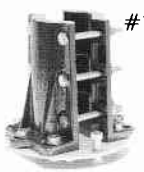
#305A Stay Clip. Kit of 4 Pcs.


#1211


#1212


#1217


#1219


#1254


#1255

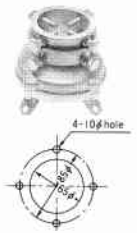

#305A

Mast Clamps

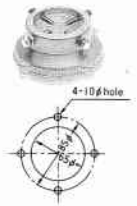
Part No.	Usage	Available mast dia.
305A	Stay clip, 4 pcs/set	
1211	Lower For 105, 201	Min.∅30~Max.∅61
1212	Upper For 105	Min.∅40~Max.∅61
1217	For 747, 1105, 1200	Min.∅30~Max.∅61
1219	For 1300	Min.∅60~Max.∅80
1254	For 1105, 1200, 1300	Min.∅60~Max.∅80
1255	For 1200, 1300, 1800	Min.∅90~Max.∅140

MAST BEARING INSTALLAION DIMENSIONAL DRAWING

Model 300 Stay Bearing
This is used when affixing a guy to a rotary mast. The diameter of the through mast ranges from ∅28-62. Tension for a guy is a maximum of 200kg and total tension is a maximum of 300kg. Also comes with Dacroplated bolts.



Model 303 Mast Bearing
This is used when the mast passes through the flat surface at the top of the tower. The through diameter ranges from ∅28-62. Uses stainless steel bolts.



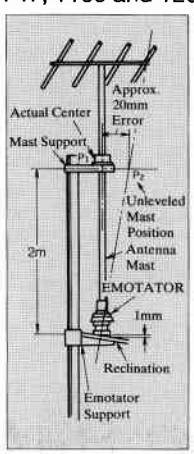
#350 Mast Bearing
Through Mast Diameter ∅60-115
Maximum radial Load 1000kg.
Maximum vertical Load 500kg.
Weight: 5kg
Stainless steel bolts are attached

#360 Mast Bearing
Through Mast Diameter ∅100-155
Maximum radial Load 1000kg.
Maximum vertical Load 1000kg.
Weight 5.5kg. Stainless steel Bolts are attached.

REJECTION OF THE ANTENNA MAST DEFLECTION

Universal Coupling

When Rotary antenna mast system like Fig. 3 . 4 . 5 . 8 . 9 . of VARIOUS ANTENNA ERECTION METHODS has been taken, like picture, 1mm reclination at the bottom of the Emotator will show an approx. 20mm misalignment at the tip of the 2 meter length mast. (P1 point pivot is the ideal center, but in the most circumstances, P2 will be the pivot center)
If forced in using this type of mounting, it will cause permanent damage to your Emotator. Owing to these circumstances, we recommed that a Unviersal Coupling be used to overcome these critical problems that may occur and suggest that Model 452 for type 105, Model 451 for type 747, 1105 and 1200 Universal coupling be used, and Model 454 for 1800 FSX.




#451 #452 #453 #454

VARIOUS ANTENNA ERECTION METHODS AND THEIR RESPECTIVE ADVANTAGES AND DISADVANTAGES

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.

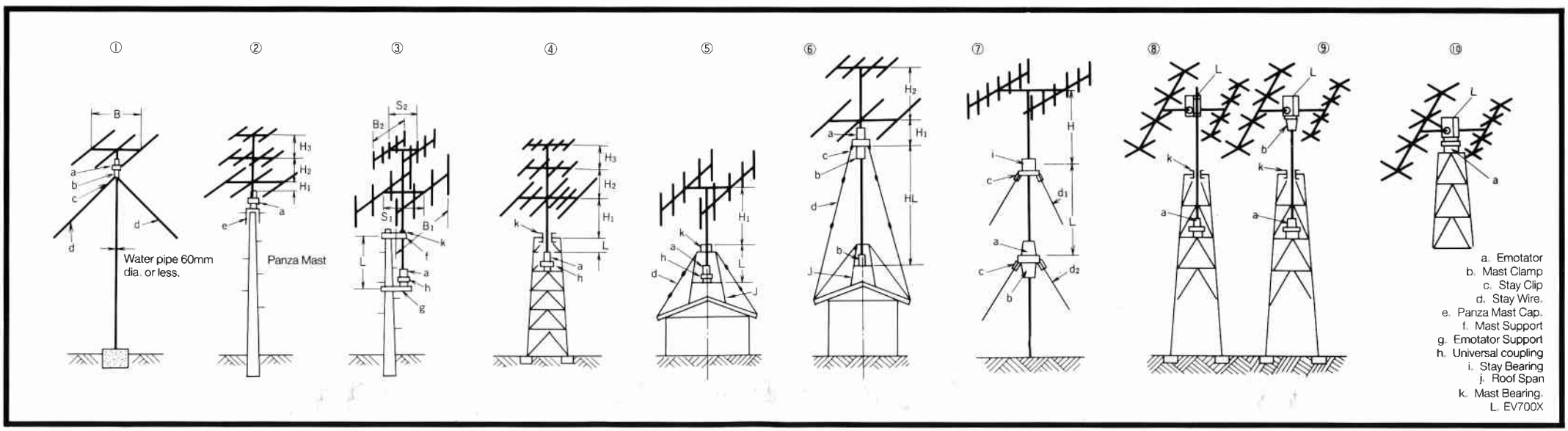
In these systems, since the force that would bend the Emotator is no longer acting, the height of the antenna (H) can be considerably high. However, for the total height above the bearings ($H_1 + H_2 + H_3$), even when a water pipe with an outer diameter of 60mm (or a 1" gas pipe) is used, it is safe not to extend more than 3.5m. In these diagrams, although normally the dimensions of L are set at 1.5-2m, 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 overtightening 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. When desiring to make H higher, select a roof span with a higher back as shown in the method of Fig. (6). In the erection method shown in Fig. (7), when the antenna, bearing, antenna mast, coaxial cable, Emotator and stay lines are all mounted, the structure becomes very heavy. When mounting in a horizontal position and raised vertically, an excessive bending moment acts on the Emotator which may lead to damage to the mast clamp. Caution should be used here. This is also true of Figs. (1) and (6). In Fig. (7), the way in which stay d_1 is stretched on the upper level requires the most care. If the center of the bearing becomes tilted to one side and one side is stretched excessively, rotational force will be insufficient and the antenna will not rotate, and possibly this may result in damage to the mast clamp. Figs. (8), (9) and (10) are examples of installation of an Emotator for elevation antennas. As shown in the diagrams, there are three types of installation methods. In either case, mount the antenna boom to the stack boom so that the center of gravity of the antenna coincides with the center of the rotation of the elevation angle.

SELECTING THE THICKNESS OF THE ANTENNA MAST

Factors that are involved when determining the thickness and strength of an antenna mast include the size of the antenna, wind pressure and the total of the heights H_1, H_2 and H_3 of the antenna mast. Antenna masts which are safe and do not "bow", bending from the upper end of the mast clamp in the case of the independent mast types (1), (2) and (6) in the diagrams below, and from the place where bearing K is located in the rotary mast types (3), (4), (5) and (7), are necessary. Although there are methods which determine the thickness by logical calculations, as a general standard, when H1 and H_2 are from 0.5-1.0m, a water pipe with an outer diameter of ∅60 or a double-walled pipe with the same diameter is required. When the total of $H_1 + H_2 + H_3$ is 3.5m or more, a ∅140 pipe is required in order to be able to withstand wind speeds of 50m/sec. Please consult with one of our dealers or contact our firm directly for further details.

ANTENNA ERECTION METHODS



NUMERICAL GD² THAT GUARANTEES A LEVEL OF SAFETY THAT ONLY AN EMOTATOR CAN DELIVER
SHOULD YOU SELECT AN EMOTATOR BASED ON THE ANTENNA? OR SHOULD YOU SELECT AN ANTENNA BASED ON THE EMOTATOR?

Numerical GD² that Guarantees a Level of Safety that only an Emotator can Deliver.

You really do not need a lot of difficult technology if all you want to do is rotate the antenna. However, an antenna must always be located outdoors on a high place. As a result, the antenna is constantly exposed to wind, rain, snow, typhoons, lightning and even smoke.

Emotator has been researched and developed based on surveys of not only the climate in Japan, but climates throughout the world. Following acquisition of data including the boom length, number of elements and weight of all type of antennas of manufacturers from around the world, a numerical value referred to as GD^2 has been created in order to allow safe rotation under the environmental conditions which the antenna is to be used. By selecting an Emotator that matches your own antenna based on this GD^2 value, the antenna will be able to demonstrate its full capabilities. Next, an explanation will be given on how to select an Emotator that matches the size of various antennas by using the GD^2 value. However, since this explanation applies to standard products, in the case the antenna is located at a height 40m above ground or more, or in regions where there are high winds, use a GD^2 value that is roughly halved while increasing the safety factor. In general, there is a fixed compatibility between the size of an antenna and the strength of the Emotator. The GD^2 value that we have developed logically deals with this compatibility. Since each respective Emotator has its own established allowable GD^2, the GD^2 of an antenna that is equal to or less than that will be logically compatible. The values for GD^2 according to band and type for commercially-available antennas are indicated in Table 1. Those not shown in the table can be calculated with the following formula.

$$GD^2 \fallingdotseq W \times \frac{L^2 + B^2}{12} \quad (1) \qquad GD^2 \fallingdotseq W \times \frac{4 \times r^2}{12} \quad (2)$$

Where: W: Weight of antenna (kg)
L: Length of longest element (m)
B: Length of boom (m)
r: Maximum radius of rotation (m)

When the calculated values from (1) and (2) differ, take the larger value.

For reference purposes, an example calculation is indicated below. Example: a HF, VHF and UHF Antenna tripple stack is constructed as shown in Fig. (1).

i) Lower HF antenna, shown in Fig. 2: W = 24.4kg, L = 8.86m, B = 5.48m

$$GD^2 \fallingdotseq 24.4 \times \frac{8.86^2 + 5.48^2}{12} \fallingdotseq 220 \text{kg/m}^2$$

ii) Middle UHF antenna, shown in Fig. 3: Calculated in the same manner. $GD^2 = 75 \text{kg/m}^2$

iii) Upper VHF antenna, shown in Fig. 4: $GD^2 \fallingdotseq 46 \text{ kg/m}^2$

The total GD^2 value for the antenna is 220 + 75 + 46 = 341kg/m². Therefore, it is possible to select the model 747SRX Emotator with a GD^2 of 400kg/m² which is greater than the total GD^2 value of the antenna. However, this is an estimate for installation at an altitude of 20m and wind speed of 30m/sec or less.

Therefore, in order to maintain a desirable amount of safety, in general a margin of about double that value is used.

Note: When the shape of the antenna varies, please refer to Figs. 5, 6 and 7 in regard to the constants W, L, B and r.

The various antennas GD^2 and wind surface area A.

	A GD²	A GD²	A GD²	A GD²	A GD²	A GD²	A GD²
HF Band	7M2EVp	7M3EVp	7M2EF	7M3EF	7M2ECQ	7M3ECQ	
	1.0 240	1.8 460	2.2 800	3 1500	2 450	3 700	
	14M3EF	14M4EF	14M5EF	14M6EF			
	0.8 160	1.2 330	1.75 750	2.2 1200			
	21M3EF	21M5EF	21M7EF	21M2EHV	212EHQ	21M6EF	21M8EF
	0.4 40	0.8 200	1.5 800	0.3 20	0.4 40	1.3 650	2.5 1600
	28M4EF	28M5EF	28M2EHV	28M2EHQ			
	0.31 35	0.7 60	0.3 18	0.31 35			
HF Multi Band	7.14M3EVp	7.14M4EVp	14.21M3E	14.21M4E	14.21M5E	21.28M3E	21.28M5E
	0.5 190	0.8 200	0.35 150	0.4 160	0.55 400	0.3 150	0.6 210
	T3EJr	T3E	T4E	T5E	T6E	T2ECQ	
	0.4 60	0.5 160	0.6 200	0.7 380	0.8 420	0.5 58	
50MHz Band	4E	4E2S	4E2P	2EHV	2EHQ	4EHQ	
	0.3 3.2	0.6 6.4	0.6 65	0.2 12	0.28 30	0.5 200	
	5E	5E2S	5E2P	6E	6E2S	6E2P	
	0.35 40	0.7 80	0.7 300	0.4 50	0.8 100	0.8 350	
144MHz Band	6E	6E2P	6E2P2S	6E4P	6E4P2S		
	0.14 1.0	0.3 6	0.6 12	0.6 50	1.2 100		
	8E	8E2P	8E2P2S	8E4P	8E4P2S		
	0.18 2	0.36 8	0.85 16	0.85 66	1.7 130		
	10E	10E2P	10E2P2S	10E4P	10E4P2S		
	0.2 3.5	0.4 11	0.8 22	0.8 80	1.6 160		
	12E	12E2P	12E2P2S	12E4P	12E4P2S		
	0.22 5	0.5 30	1.0 60	1.0 100	2.0 200		
	11E8P	X8E	X8E2P	X10E	X10E2P		
	1.5 520	0.22 3.1	0.45 12	0.3 5	0.6 19		
430MHz Band	10E	10E2P	10E2P2S	10E4P	10E4P2S	12E	12E2P
	0.05 0.35	0.1 1.4	0.25 4	0.2 5.8	0.4 12	0.06 0.5	0.1 2
	12E2P2S	12E4P	12E4P2S	15E2P	15E2P2S	15E4P	15E4P2S
	0.25 4	0.3 10	0.6 20	0.15 3.6	0.3 7.5	0.6 8.5	1.2 17
	25E2P2S	25E4P2S					
	1.5 110	2.2 465					

A = Wind Surface M², GD^2 = Fly Wheel Effect kg. m², E = No. of Element, P = No. of Stack (Parallel), S=Vertical Stack, CQ=Cubical Quad, HV=HB9CV Antenna, HQ=Swiss Quad, Vp=Short Beam, Jr=Junior Type, X = Cross Element, T = Tri Band, F = Full Size

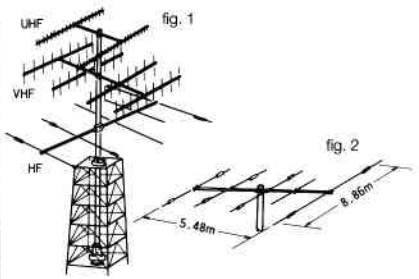


fig. 1

fig. 2

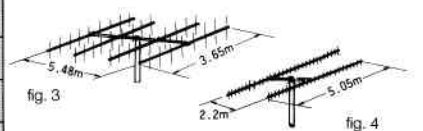


fig. 3

fig. 4

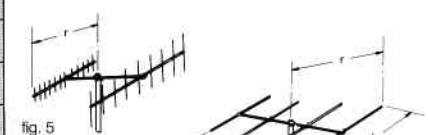


fig. 5

fig. 6

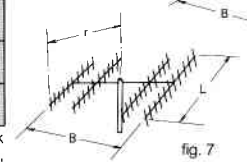


fig. 7

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