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# **G-450C/G-650C/G-1000C**

**User Manual**

**Manual del usuario**

**Mode d'emploi**

**Betriebsanleitung**

**Istruzioni per l'uso**

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**VERTEX STANDARD CO., LTD.**

## Safe and Correct Use of the Equipment

Thank you for purchasing a Vertex Standard product.

Please read this user manual thoroughly before using the product and operate in accordance with the instructions. After reading, please keep the manual in a safe place for reference.

### Meaning of Symbols



#### **Warning**

Indicates that failure to follow the associated instructions could result in death or serious injury.



#### **Caution**

Indicates that failure to follow the associated instructions could result in injury or physical damage.

### Meaning of Symbols Used in Diagrams



Indicates that the associated instructions must always be followed to ensure safe operation of the equipment.



Indicates unsafe operations that should never be performed.

## **Warning**



Please read this user manual thoroughly and familiarize yourself with the correct installation procedure before starting installation.

Installing this product requires work to be undertaken high above ground. Performing work with which you are unfamiliar can lead to fatal accidents due to falling.

Similarly, failing to install the product correctly can be a cause of the antenna and associated equipment collapsing, resulting in a fatal accident or damage to houses or other property. Accordingly, always check all safety considerations before starting work.



Ensure that the size of the antenna attached to this product is within the specifications listed in this manual. Attaching an antenna that is larger than allowed by the specifications can be a cause of the antenna and associated equipment collapsing, resulting in a fatal accident or damage to houses or other property.



When working high above ground, ensure that there are no people at ground level. Dropping tools, bolts, or other parts could result in death or serious injury.



Always wear a safety harness when working high above ground. Failure to use a safety harness can be a cause of death or serious injury.



Ensure that the bolts and other fasteners used for installation are tightened securely. Failure to tighten bolts and other fasteners sufficiently can be a cause of the antenna and associated equipment collapsing, resulting in a fatal accident or damage to houses or other property.



Never disassemble or modify the unit.

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Note that Vertex Standard accepts no liability for any injuries sustained in association with the use of this product or for damage or accidents of any kind resulting from the use or misuse of this product by the customer or third parties expect where required by statutory obligations.



# Caution



When installing this product, take care not to jam your fingers between parts or cut fingers on edges of parts.



If the condition of the equipment is abnormal such as emitting smoke or an unusual smell, continuing to use the equipment may result in fire or malfunction.

In such cases, turn off the power immediately and unplug from the power socket.

After checking that the equipment is no longer emitting the smoke or unusual smell, return the product to the vendor or to your nearest Yaesu Musen office or service center for repair.



In the event of foreign material getting inside the controller, turn off the power immediately and unplug from the power socket.

Continuing to use the product in this condition can result in fire or malfunction.



Do not use the product with a power supply voltage other than the specified voltage as this can cause fire or electric shock.



If the product is to remain unused for a long period of time, unplug the power cable from the socket for safety.



Do not operate continuously for more than 3 minutes. The equipment can be operated for up to 5 minutes but operation must be halted and the motor rested for at least 15 minutes afterwards.



There are no serviceable parts inside the rotator or controller; therefore, never open these units.



Do not place the controller in an unstable position such as on an unsteady or sloping surface as this can cause the controller to fall or tip over causing injury.



Do not place heavy objects on the power cable and do not excessively bend or pull the cable. Damage to the power cable can cause fire or malfunction.



Do not place the controller in direct sunlight or close to heaters as this can cause the box to distort or discolor.



Do not place the controller in humid or dusty environments as this can cause fire or malfunction.



Do not place the controller in enclosed or poorly ventilated positions such as in a bookshelf as this can cause fire or faults.



Do not place the controller on carpet or bedding as this can cause heat to build up internally resulting in fire.



Do not place heavy objects on top of the controller as this can cause the controller to fall or tip over causing injury.



Do not place small metal objects such as paper clips on top of the controller as these can fall into the controller causing fire or malfunction.



Do not wipe the controller with solvents such as thinner or benzene as this can cause the box to distort or discolor.

To clean the controller, gently wipe with a cloth moistened with a neutral detergent and clean off with a dry cloth.



Do not turn on the power supply until rotator and controller setup is complete.

# Packing List (Check before using the product)

	G-450C/650C	G-1000C
Rotor	1	1
Controller	1	1
Connection Cable (25m, 6-core cable)	1	1
U Bolts	2	-
Mast Adjustment Plate	2	-
Mast Clamps	2	2
M8x16 Screws	4	4
M8x25 Screws	-	4
M8x70 Screws	-	4
M8x95 Socket Head Cap Screw	-	1
Hex. Nuts	4	4
Square Nut	-	1
Spring Washers	8	14
Flat Washers	4	4
User Manual	1	1

This equipment complies with the following standard.

EMC Directive 89/336/EEC

EN50081-1:1992

EN50082-1:1992

LVD 73/23 EEC

EN60065:1993

## Specifications

	G-450C	G-650C	G-1000C
Rotation Torque (@ AC 230V)	600kgf-cm		800kgf-cm
Braking Torque (@AC 230V)	3000kgf-cm	5000kgf-cm	6000kgf-cm
Maximum Vertical Load (Continuous Load) (Instantaneous Load)	100kg or less		200kg or less
	300kg		800kg
Mast Outside Diameter	$\phi 32$ to $\phi 63$ (center protrudes by $\phi 48$ to $\phi 52$ )		$\phi 38$ to $\phi 63$
Rotation Range	450°		
360° Rotation Time (@AC 230V, Approx.)	63 sec. @ 50Hz, 51 sec. @60Hz		55 sec.
Braking Type	Mechanical stopper	Mechanical and electrical stoppers	
Antenna K Coefficient	100	180	230
Wind Loading Area (Pole Type) (Tower Type)	0.5m <sup>2</sup> ×0.5m		0.75m <sup>2</sup> ×0.6m
	1m <sup>2</sup>	2m <sup>2</sup>	2.2m <sup>2</sup>
Maximum Continuous Duty	3 minutes		
Operating Temperature Range (Controller) (Rotor)	0 ~ 40°C		
	-20 ~ 40°C		
Rotor Dimensions and Weight	$\phi 186 \times 263$ , approx. 3.5kg		$\phi 170 \times 300$ , approx. 3.5kg
Controller Dimensions and Weight	190 (W) × 125 (H) × 150 (D), approx. 2.7kg		
Power Supply Voltage	AC220-240V, 50-60Hz		
Power Supply Current Consumption	0.25A		0.4A

# Cautions on Use

- Always use M8×16 screws when mounting the rotor to the tower or roof tower.
- Take care not to make any scratches when tightening fastenings as these can cause rust.
- Do not suddenly reverse the rotation during operation as this places a large load on the internal parts.
- Do not operate continuously for more than 3 minutes. The equipment can be operated for up to 5 minutes but operation must be halted and the motor rested for at least 15 minutes afterwards.
- The G-450C/-650C is designed to enable centered rotation when using a mast diameter between  $\phi 48$  and  $\phi 50$ .

Please use a  $\phi 48$  and  $\phi 50$  mast whenever possible.

When using other than a  $\phi 48$  to  $\phi 50$  mast, nearly centered rotation can be achieved using the mast adjustment plates provided.

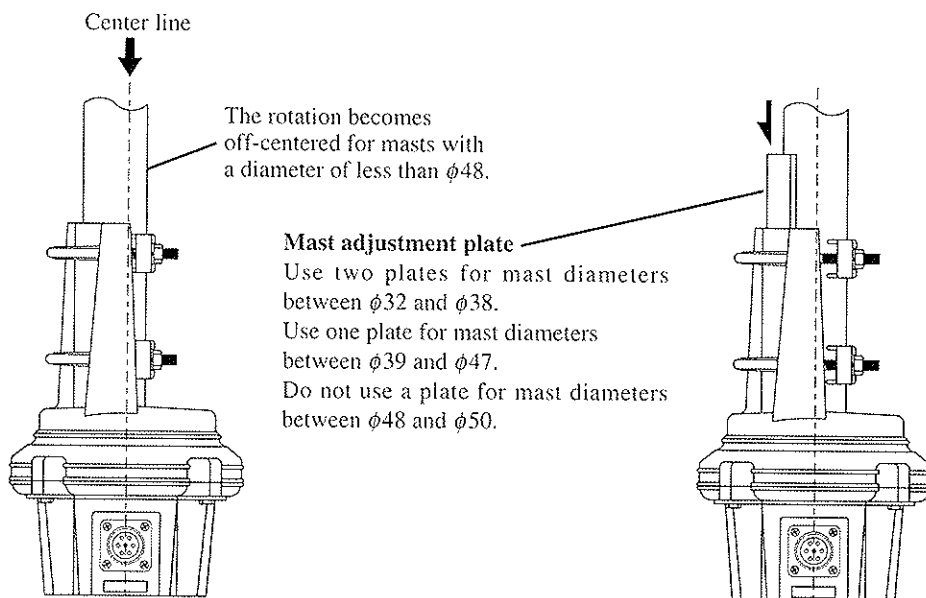
Mast diameter  $\phi 32$  to  $\phi 38$  ... Use two plates.

Mast diameter  $\phi 39$  to  $\phi 47$  ... Use one plate.

Mast diameter  $\phi 48$  to  $\phi 50$  ... Do not use plate.

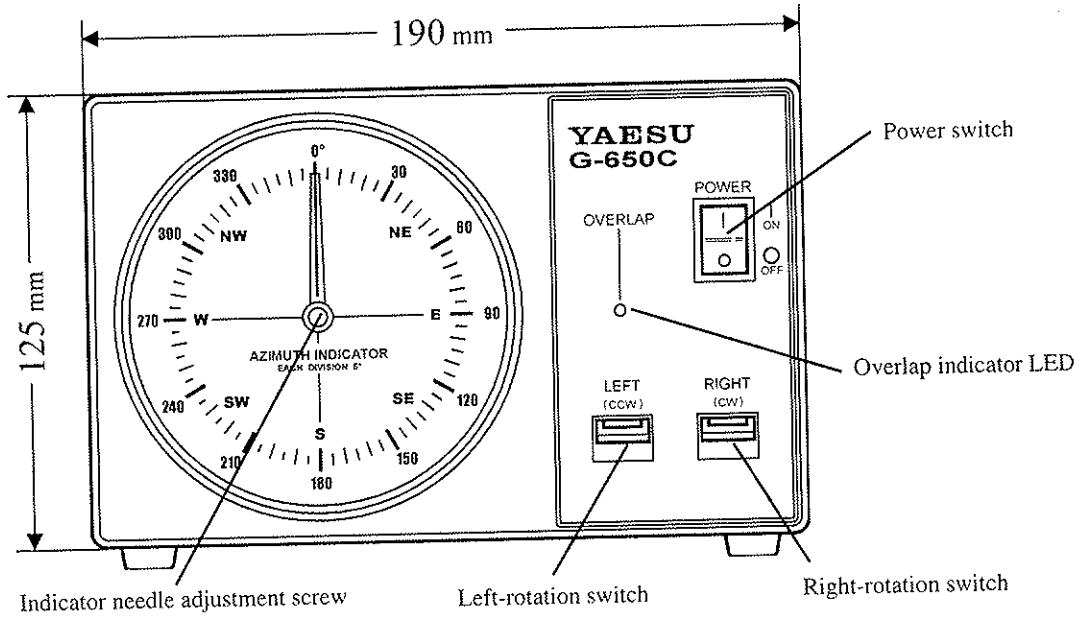
\* Insert the mast adjustment plate(s) between the mast and the clamps on the rotor.

Using a mast with a diameter greater than  $\phi 51$  results in off-center rotation. The amount of off-center increases with increasing diameter such that the rotation of a  $\phi 60$  mast is off-center by approximately 8mm.

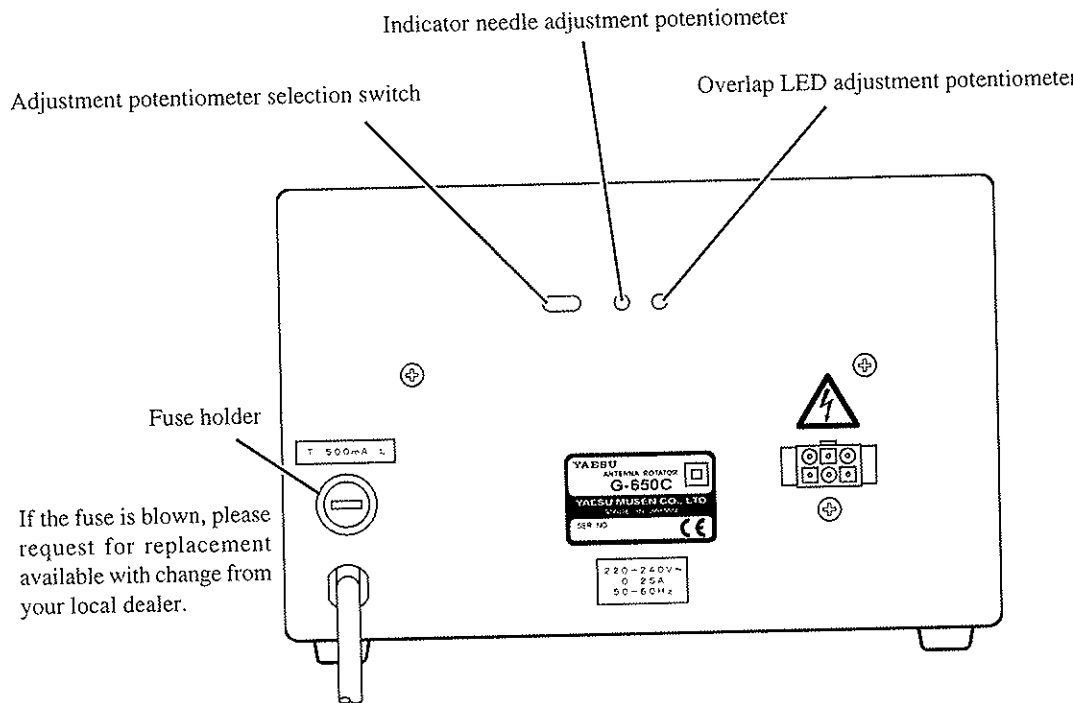


# Names and Dimensions of Each Part

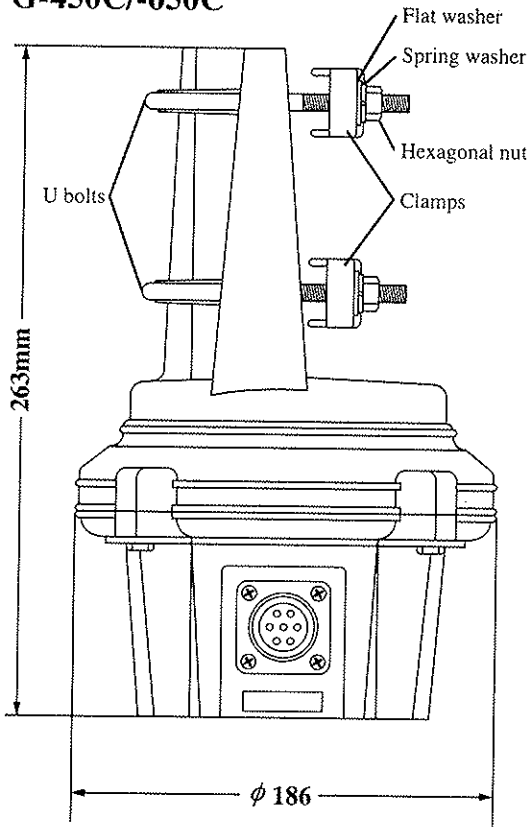
## Controller Front Panel



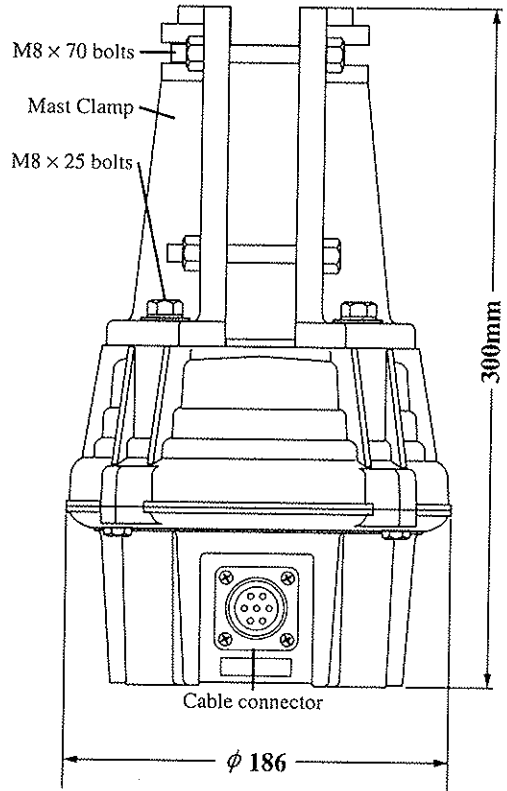
## Controller Rear Panel



## Rotator Unit G-450C/-650C

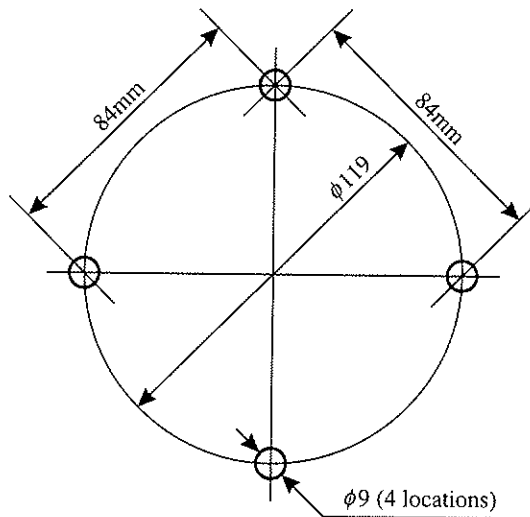


## G-1000C



English

## Rotator Attachment Dimensions





# Which Antennas can be Attached?

The types of antennas that can be attached to this product differ widely depending on the installation method and the terrain and wind strength of the location.

The following describes suitable antennas assuming wind speeds up to 30m and standard installation methods. However, as the size of the antenna being mounted is a major factor in relation to safety, give full consideration to the conditions where the antenna is to be installed and select equipment with an adequate safety margin.

## ● Pole-Mounted Antennas

The attached antenna must have a mounted weight (combined weight of antenna and attached mast) of **10kg or less** and the result of multiplying the "antenna wind loading area (m<sup>2</sup>)" by the "height of antenna mast (m)" must be **0.25 or less**. (See Table 1 and Figure 1.)

$$(\text{Antenna weight}) + (\text{Mast weight}) = 10\text{kg or less}$$

$$(\text{Antenna wind loading area}) \times (\text{Height of antenna mast}) = 0.25 \text{ or less}$$

Refer to the catalog or other information provided by the antenna manufacturer for the antenna weight.

### Example

For a 50MHz band, 5-element (wind loading area (see Table 1) = 0.3m<sup>2</sup>) antenna, the antenna can be attached provided the mast is 0.8m or shorter ( $0.3 \times 0.8 = 0.24 < 0.25$ ).

As the weight of a typical antenna is 4 to 5kg, the antenna can be mounted.

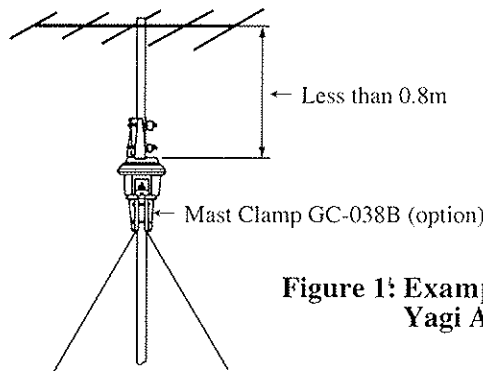


Figure 1: Example of a 50MHz Band, 5-Element Yagi Antenna

Table 1: Wind Loading Areas for Common Antennas (Typical)

Band (MHz)	Elements	Area (m <sup>2</sup> )	Band (MHz)	Elements	Area (m <sup>2</sup> )	Band (MHz)	Elements	Area (m <sup>2</sup> )
7	2-element	2.2	28	3-element	0.3	50	4-element	0.25
7	1-element, w/loading coils	0.2	28	4-element	0.42	50	5-element	0.3
7	2-element, w/loading coils	0.6	28	5-element	0.6	50	6-element	0.37
7	3-element, w/loading coils	1.1	28	2-element, Swiss Quad	0.3	50	2-element, Swiss Quad	0.3
14	3-element	0.7	7/14	3-element, trapped	0.5	144	10-element	0.2
14	4-element	1.2	7/14	4-element, trapped	0.8	144	10-element, stacked	0.44
14	5-element	1.7	14/21	3-element, trapped	0.4	144	10-element, × 4	0.95
21	3-element	0.45	14/21	4-element, trapped	0.5	144	10-element, × 4 × 2	2.0
21	4-element	0.6	21/28	3-element, trapped	0.3	430	12-element	0.06
21	5-element	0.8	21/28	4-element, trapped	0.4	430	12-element, stacked	0.12
21	6-element	1.3	14/21/28	3-element, trapped	0.4	430	12-element, × 4	0.3
21	2-element, Swiss Quad	0.3	14/21/28	4-element, trapped	0.5	430	12-element, × 4 × 2	0.6

## ● Tower-Mounted Antennas

The antenna wind loading area must be less than the rated value (G-450C =  $1\text{m}^2$ , G-650C =  $2\text{m}^2$ , G-1000C =  $2.2\text{m}^2$ ) and the antenna “K” coefficient must not exceed the value set by Yaesu Musen (G-450C = **100**, G-650C = **180**, G-1000C = **230**).

**K** = Antenna rotation radius (m) × Total antenna weight (including mast) (kg)

Use the antenna rotation radius and weight values provided by the antenna manufacturer.

### Example

This example attaches a 14MHz band, 3-element antenna (rotation radius = 7.5m, weight = 14kg, wind loading areas =  $0.7\text{m}^2$ ) and a 21MHz/28MHz band, 3-element trapped antenna (rotation radius = 3.5m, weight = 13kg, wind loading areas =  $0.3\text{m}^2$ ) to a 5kg mast.

- The antenna “K” coefficient is:

Antenna coefficient of 14MHz band, 3-element antenna

$$K^1 = \text{Rotation radius (7.5m)} \times \text{Weight (14kg + 2.5kg)} = 123.75$$

Antenna weight  
Mast weight (5kg/2)

Antenna coefficient of 21MHz/28MHz band, 3-element trapped antenna

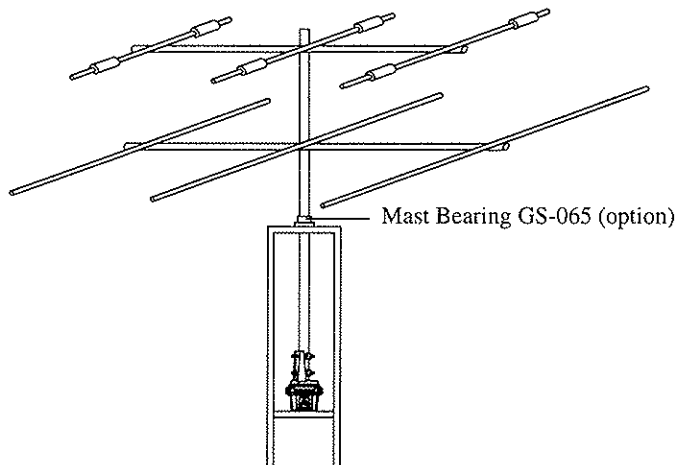
$$K^2 = \text{Rotation radius (3.5m)} \times \text{Weight (13kg + 2.5kg)} = 54.25$$

$$\text{Total antenna “K” coefficient} = K^1 + K^2 = 123.75 + 54.25 = 178$$

- Wind loading areas

$$0.7 + 0.3 = 1.0$$

As the antenna “K” coefficient is higher than 100, the antenna can be mounted to the G-650C/-1000C but not to a G-450C.



# Mounting the Antenna

## ● Indoor Steps

1. Temporarily connect the rotator unit and controller using the supplied connection cable.
  2. Check that the power switch on the controller is **OFF** then plug the controller power cable into the mains socket.
  3. Turn the power switch to **ON**.  
Check that the lamp on the controller illuminates.
  4. Hold down the left rotate (**LEFT**) switch and continue until the rotator reaches the position where it automatically stops. (Left rotation is counter-clockwise viewed from above.)
  5. When the rotator has stopped rotating, release the left rotate (**LEFT**) switch and check that the indicator needle on the controller points to  $0^\circ$  (N: north).  
If the needle is out of alignment, turn the needle adjustment screw (see Figure 1) and align the needle with  $0^\circ$ .
  6. Mark the rotator so that you can see the amount of rotation.
  7. Hold down the right rotate (**RIGHT**) switch and continue rotating to the right for one full rotation ( $360^\circ$ ) until the rotator reaches the position of the mark.  
Check that the indicator needle on the controller has also made one full rotation ( $360^\circ$ ) and points to  $0^\circ$  (N: north).  
If the needle is out of alignment, set the adjustment potentiometer selection switch (see Figure 2) to the right-hand side then adjust the indicator needle adjustment potentiometer (see Figure 2) until the needle points to  $0^\circ$ .
  8. After aligning the needle to  $0^\circ$ , set the adjustment potentiometer selection switch back to the left-hand side.
  9. Hold down the right rotate (**RIGHT**) switch again and rotate to the right. Check that the overlap LED (see Figure 3) illuminates when the rotation exceeds approximately  $360^\circ$ .  
The position at which the LED illuminates can be adjusted using the overlap LED adjustment potentiometer (see Figure 4).
- Advice** The rotor and the indicator needle on the controller continue to rotate to the right for approximately  $90^\circ$  if you continue to press the right rotate switch while the overlap LED is illuminated. However, as you are now in the overlap warning range, you should change to the left rotate switch once the overlap LED illuminates.
10. Press the left and right rotate switches two or three times and check that operation is normal.
  11. Use the right rotate (**RIGHT**) or left rotate (**LEFT**) switch to move the indicator needle back to  $0^\circ$ .
  12. Turn the power switch **OFF**. This completes the indoor steps.

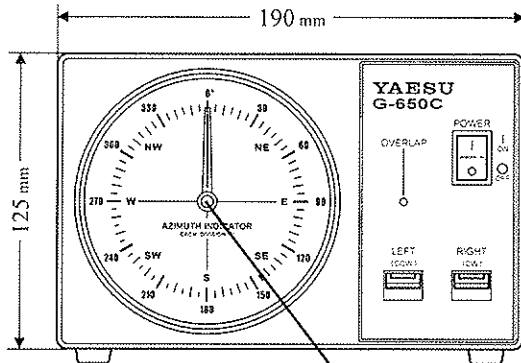


Figure 1

Indicator needle adjustment screw

Adjustment potentiometer selection switch

Indicator needle adjustment potentiometer

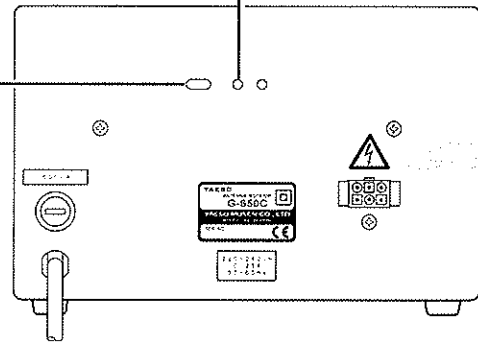


Figure 2

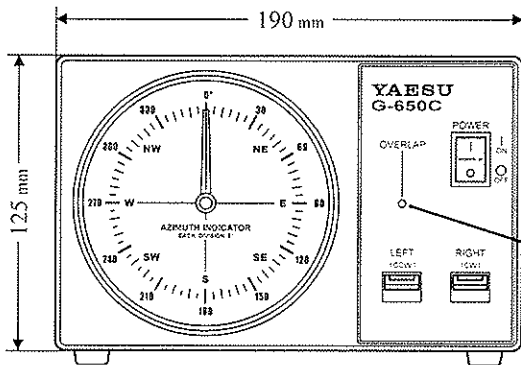


Figure 3

Overlap LED

Overlap LED adjustment potentiometer

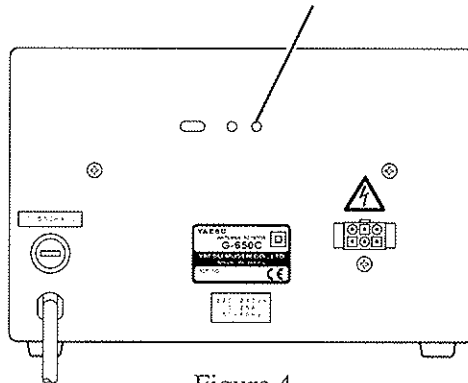


Figure 4

## ● Outdoor Steps

The procedure for installing the rotor depends on the type of tower used. The following describes the installation procedure for a roof tower.

### G-450C/-650C

1. Attach the rotor to the center of the roof tower mounting plate using M8×16 screws and spring washers. (See Figure 5.)

2. Attach the bearing to the top of the roof tower. (See Figure 6.)

**Caution** Check that the roof tower mounting plate and bearing mounting plate are parallel. Mounting the two plates out of alignment (as in Figure 7) causes an unbalanced force on the rotor and may result in damage to the rotor.

3. Insert the antenna mast through the bearing from above and set in the rotor mast clamps. (See Figure 8.)

**Advice** If the diameter of the mast is less than  $\phi 48$  to  $\phi 50$ , use the mast adjustment plates provided. (See page 5.)

4. Partly tighten the bearing screws to center the antenna mast in the bearing.

5. Check that the antenna mast rotates freely when the mast clamps are slightly loosened and that the gage matches the thickness of the antenna mast, then tighten the mast clamps.

**Caution** Do not overtighten the screws. Tighten until the spring washer becomes flat then further tighten by about one half or one turn only.

6. Tighten the bearing screws and tighten the lock nuts.

**Advice** The best results can be obtained if the relative positions of the antenna, bearing, and rotor are as shown in Figure 9 with no unnecessary forces applied to the rotor.

7. Install the antenna on the antenna mast.

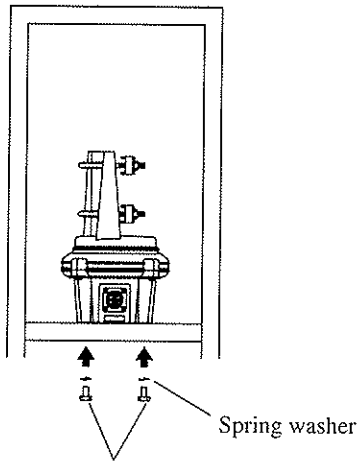
**Advice** Use a compass or similar to align the antenna direction precisely with north (N).

8. Provide sufficient slack in the coaxial cable from the antenna that the antenna can rotate completely without placing any tension on the cable. (See Figure 10.)

9. After completing the above steps, test the installation by operating the rotor and checking that the antenna rotates as intended.

**Caution** If the distance (spacing) between the antenna and bearing is large, provide a stay (support) using a stay bearing.

As installing a stay may cause the centerlines of the bearing and rotor to become out of alignment, check the roof tower attachment and the stay (support) alignment to ensure that the mast is straight.



M8 × 16 (length: 16mm)  
Figure 5

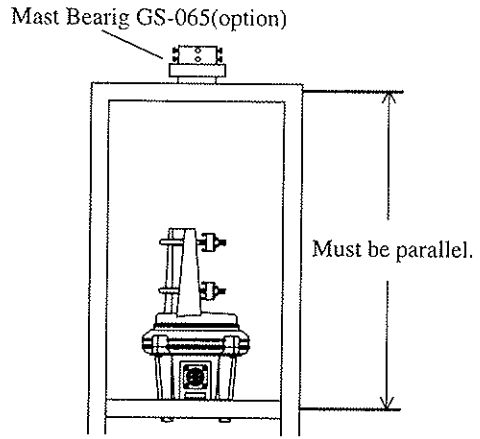


Figure 6

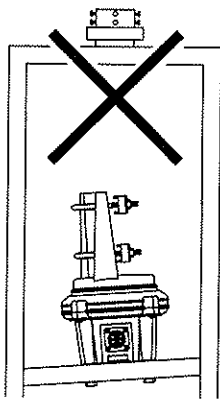


Figure 7

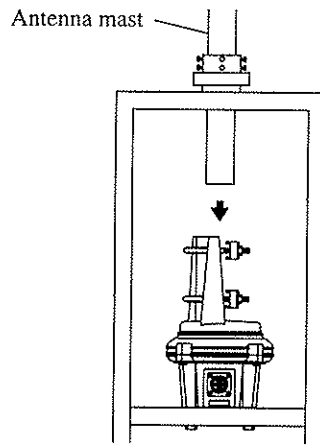


Figure 8

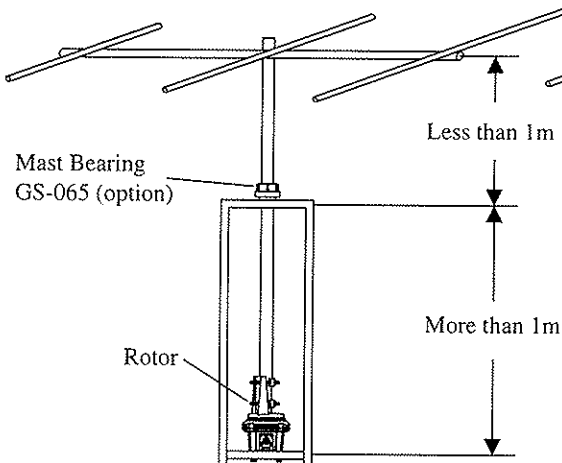


Figure 9

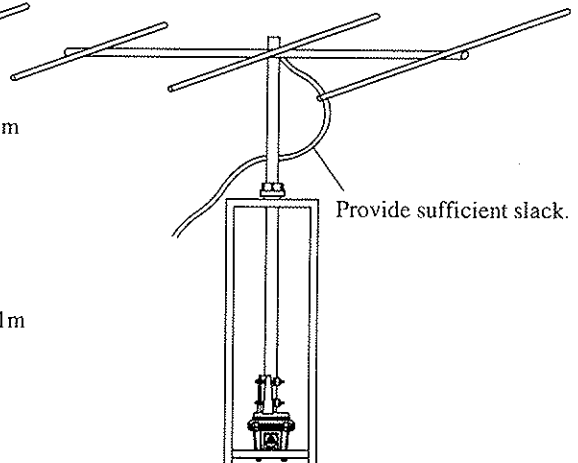


Figure 10

## G-1000C

**Important!!** Before mounting the mast to the rotator, a single hole must be drilled through the bottom of the mast to accommodate an anti-twist support bolt used in the base support clamp halves.

1. Drill a 9-mm diameter hole through both walls of the mast, centered 50 mm from the mast bottom. (See Figure 11) Ensure the drill is maintained perpendicular and centered when making the holes, to ensure proper alignment of the holes in the mast with those in the base support clamp.
2. Attach the rotor to the center of the roof tower mounting plate using  $M8 \times 16$  screws and spring washers. (See Figure 12.)
3. Attach the bearing to top of the roof tower. (See Figure 13.)

**Caution** Check that the roof tower mounting plate and bearing mounting plate are parallel. Mounting the two plates out of alignment (as in Figure 14) causes an unbalanced force on the rotor and may result in damage to the rotor.

4. Partly tighten the mast clamps ① to the rotator housing using four  $M8 \times 25$  bolts ②, spring washers and flat washers. (See Figure 16.)
5. Insert the antenna mast through the bearing from above (See Figure 15), then partly tighten the four  $M8 \times 70$  screws ③ with spring washers, flat washers and nuts ④. (See Figure 16.)

**Advice** One side of the clamp has ridges on either side of the bolt holes: the bolts should be inserted from this side, so the ridges hold the bolt head from turning.

6. Partly tighten the  $M8 \times 95$  screw ⑤ with nut. (See Figure 16.)
7. Tighten the all screws (except  $M8 \times 95$  screw) so that the gap on each side of the mast remains the same. Markings are provided on the top of the rotor to assist this process.

**Caution** Do not overtighten the screws. Tighten until the spring washer becomes flat, then tighten further by about one half to one full turn only.

8. Tighten the bearing and tighten the lock nut.

**Advice** The best results can be obtained if the relative positions of the antenna, bearing, and rotor are as shown in Figure 17, with no unnecessary forces applied to the rotor.

9. Install the antenna on the antenna mast.

**Advice** Use a compass or similar device to align the antenna direction precisely with true north (N).

10. Provide sufficient slack in the coaxial cable from the antenna so that the antenna can rotate freely without placing any tension on the cable. (See Figure 18.)

11. After completing the above steps, test the installation by operating the rotor and checking that the antenna rotates as intended.

**Caution** If the distance (spacing) between the antenna and bearing is large, provide a stay (support) using a stay bearing.

As installing a stay may cause the centerlines of the bearing and rotor to go out of alignment, check the roof tower attachment and stay (support) alignment to ensure that the mast is straight.

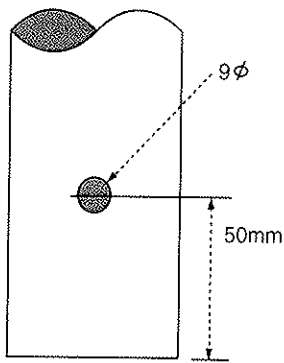
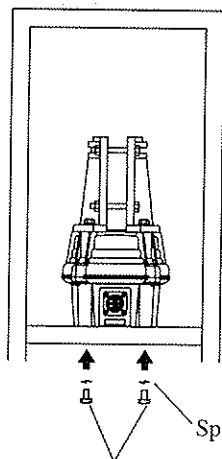


Figure 11



M8 × 16 (length: 16mm)  
Figure 12

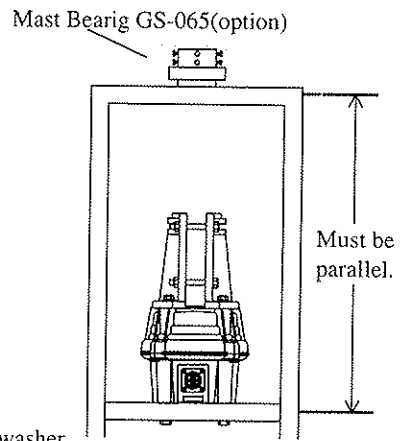


Figure 13

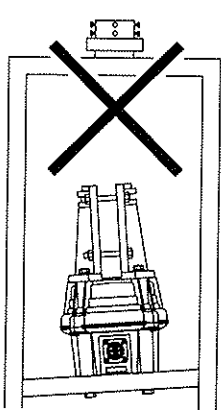


Figure 14

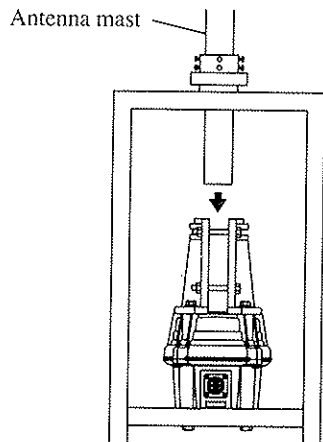


Figure 15

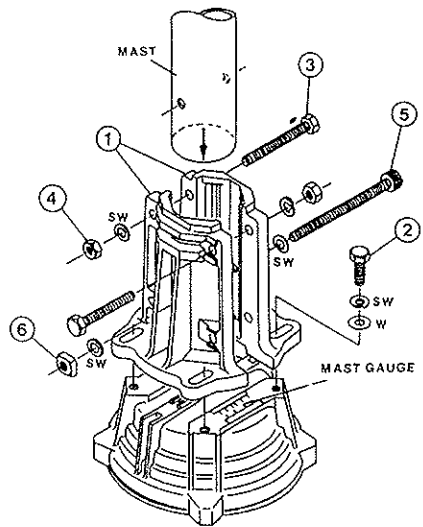


Figure 16

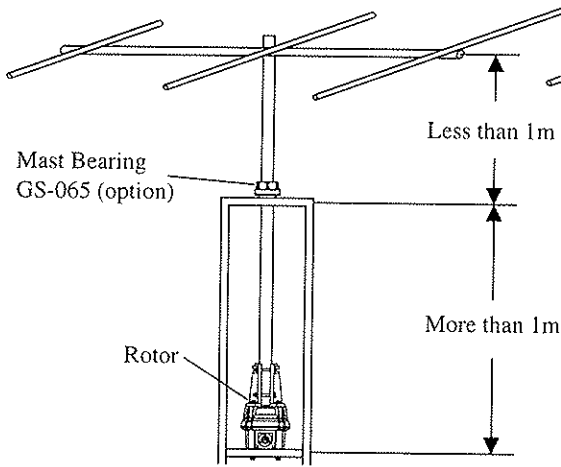


Figure 17

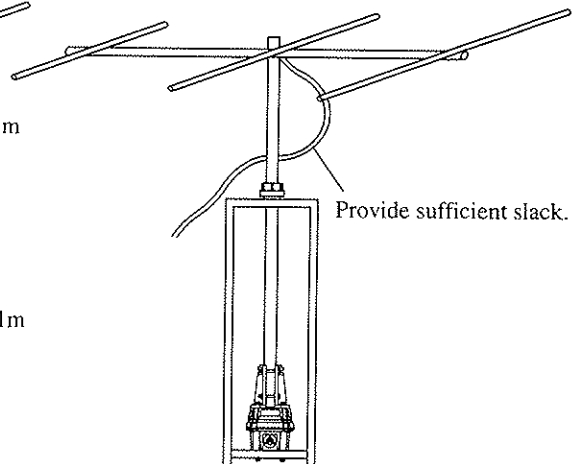


Figure 18



# Option

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Absorber Joint	<b>GA-2500</b>
Universal Bearing	<b>GS-680U</b>
Stay Bearing	<b>GS-050</b>
Mast Bearing	<b>GS-065</b>
Mast Clamp	<b>GC-038B</b>
Control Cable (40m)	<b>C-40MWP</b>