

Shop 8, 41-51 BATHURST STREET  
GREYSTANES N.S.W. 2145  
Australia

*Telescopes & Binoculars, discounted!*



*Andrews Communications Systems*

**LEE ANDREWS** Managing Director

ABN 58 001 968 752

P.O. Box 240, Pendle Hill N.S.W. 2145

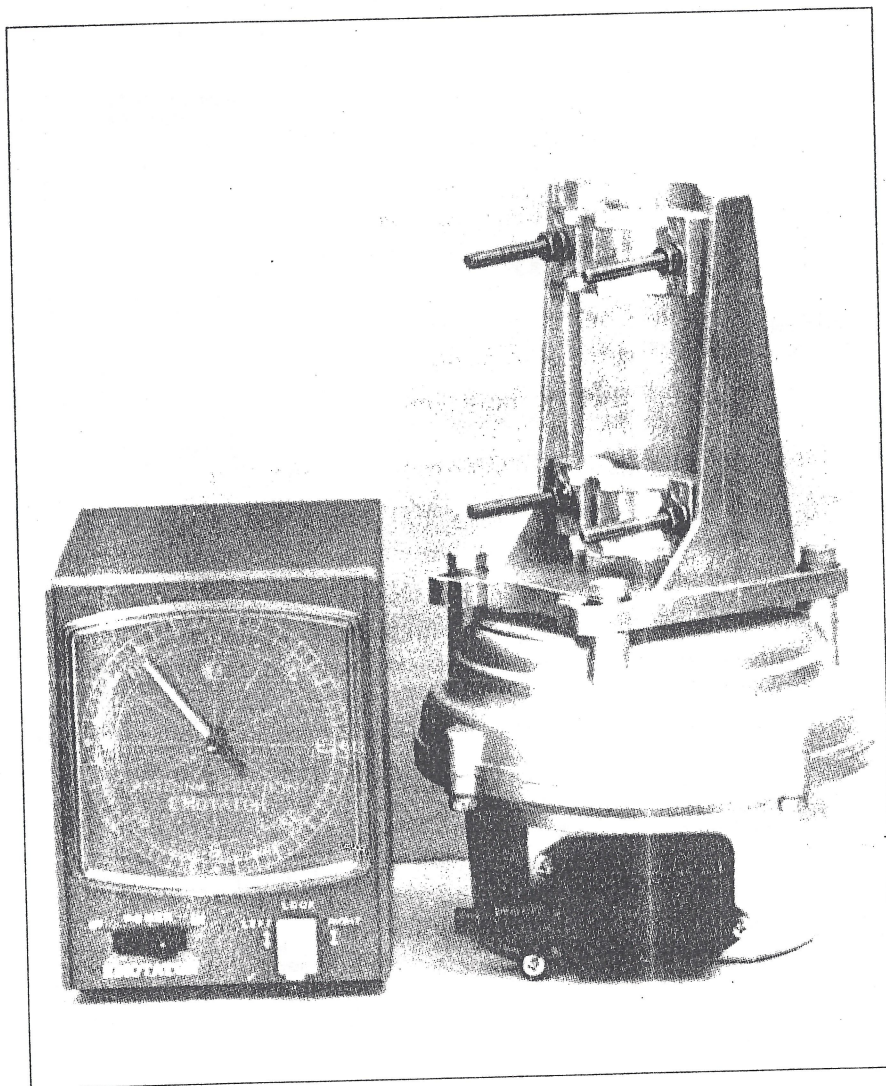
Telephones: (02) 9636 9060 (02) 9688 4301

Facsimile: (02) 9688 1995

Web: [www.andrewscom.com.au](http://www.andrewscom.com.au)

**EMOTATOR**

# MODEL 105TSX Instruction Manual



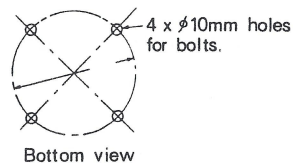
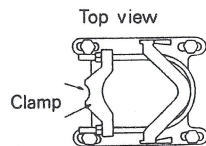
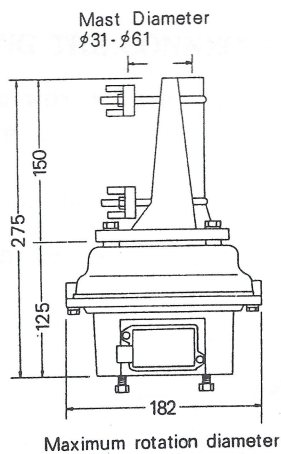
**EMOTATOR Corporation**

## SPECIFICATIONS AND DIMENSIONS.

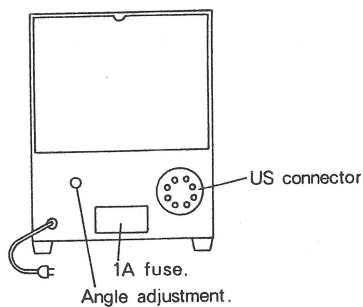
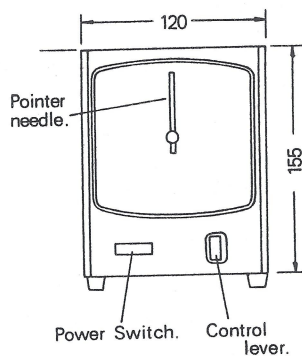
### Model 105TSX specifications.

Electrical Input	: 117V, 220V, 240V AC, 50/60Hz, 50VA.
Motor Voltage	: DC 24V.
One Rotation Time	: 50sec.
Rotation Torque	: 600Kg/cm.
Braking Torque	: 3000Kg/cm when connected with the controller.
Allowable Antenna GD <sup>2</sup>	: 100Kg/m <sup>2</sup> .
Allowable Wind	: 1m <sup>2</sup> .
Surface Area	
Connecting cable	: 5-conductor. Core wire with a cross sectional area of 0.5mm <sup>2</sup> or greater.
Mast Diameter	: $\phi$ 31mm - $\phi$ 61mm.

### Dimensions.

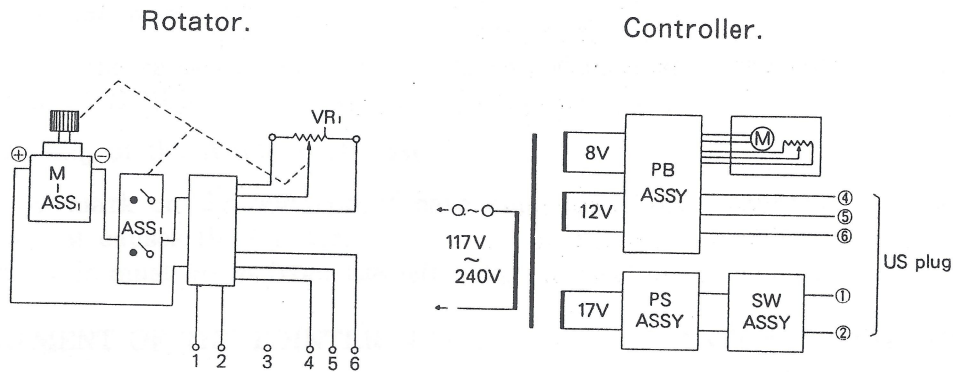


Unit : mm



## ELECTRICAL CIRCUIT.

Electrical circuit block diagrams are shown.

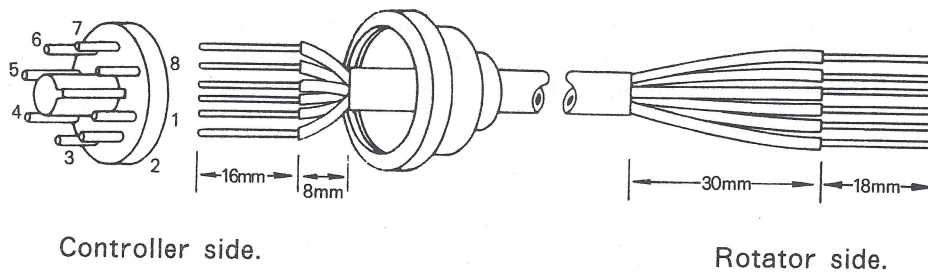


## PREPARING THE CONNECTING CABLE AND WIRING.

Use a core wire with a cross sectional area of  $0.5\text{mm}^2$  or greater Vinyl or plastic coated core wires within a vinyl or plastic sheath is recommended.

### 1. Fitting of the cable.

Perform the terminations on both ends of the cable as shown.



Controller side.

Rotator side.

### 2. Connection of the US Plug.

When connecting of the cable to the Rotator is complete, connect the wires to the US Plug.

For example, connect each pin to the colour core wire as follows.

Pin No. 1. Green,	Pin No. 5. White.
2. Yellow,	6. Red .
3. Free.	7. Free.
4. Black.	8. Free.

Connecting Pin Nos. 3, 7, and 8 are spares, and nothing is connected to them.

- A. Insert the Cap of US Plug over the cable.
- B. Insert the core wires of the cable into the pins and solder.
- C. Cut the tips of the core wire of the cable protruding from the US Plug's pin holes and screw on the Cap of the US Plug.

### 3. Connection with the Rotator.

Connect the same pin number with the same number on the rotator terminal board. THE NUMBER MUST MATCH.

### 4. Mounting of the Waterproof Case.

Arrow mark on the waterproof case must show top, otherwise rain comes in and it causes the trouble.

The cable must go in from the left side.

## ADJUSTMENT OF THE POINTER NEEDLE AND THE ANTENNA DIRECTION.

When all installation and wiring has been completed, adjust the direction of needle pointer and antenna in the following order.

1. Turn on power for the controller, and confirm that the needle pointer is set in the same direction as the direction of the rotating unit.
2. Push the control lever to the 'LEFT' or 'RIGHT', and confirm that the rotating unit and the needle pointer coincide.
3. Push the control lever to the 'LEFT' and rotate until the pointer needle stops. At this time, if the pointer needle does not show 'SOUTH', remove front cover of controller and adjust the direction of the pointer needle to the 'SOUTH'.
4. In this state, adjust the direction of the antenna to the due 'SOUTH' and fix the antenna.
5. Next, whilst pressing the control lever to the 'RIGHT', closely watch the rotation of the antenna (without looking at the controller display) and release the lever after 360 degrees rotation of the antenna.
6. If the pointer needle of the controller does not show 'SOUTH', adjust the volume control at the rear of the controller until the pointer needle indicates 'SOUTH'.

Now, the calibration of direction is finished.

## 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).

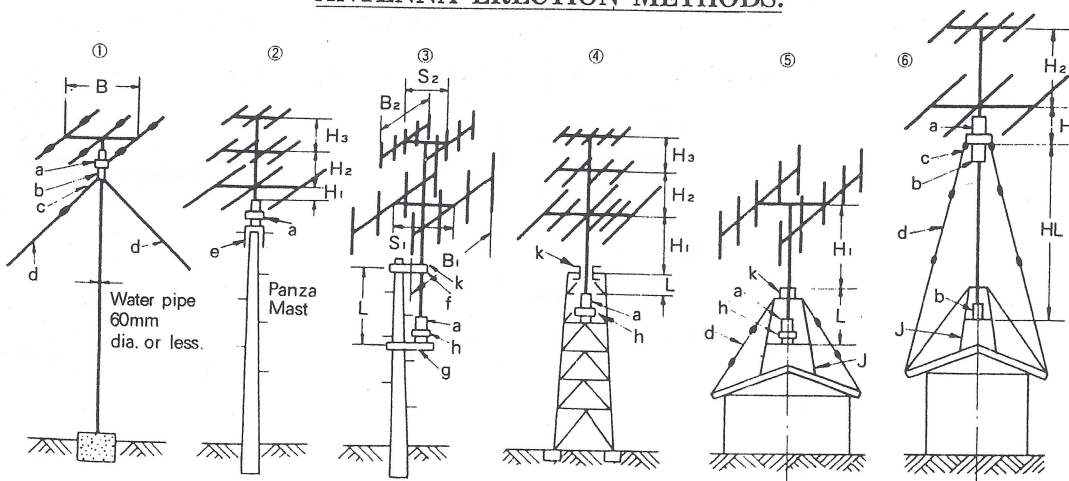
These can be selected freely according to the building site and budget. Mounting of antenna masts can be broadly divided into the independent mast type which rotates the antenna mast by directly attaching to the Emotator upper mast clamp as in the case of (1), (2) and (6), and the rotary antenna mast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

In the case of rotary antenna mast types (3), (4) and (5), the force that would bend the Emotator is no longer acting, so 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 2" 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 small 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) shown 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'.

Lastly, do not forget to ground the Tower, Panza mast or steel pipe. Especially, in the case of (5), (6) Roof Tower, to prevent damage by lightning, electric shock and fire, ground the metal section with larger than 2mm diameter wire.

### ANTENNA ERECTION METHODS.



a. Emotator b. Mast Clamp c. Stay Clip d. Stay Wire e. Panza Mast Cap f. Mast Support  
g. Emotator Support h. Universal coupling i. Stay Bearing j. Roof Span k. Mast Bearing.

## 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.

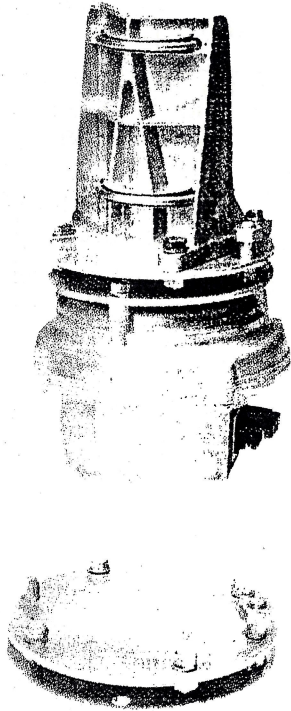
When the Rotator is installed in a tower, as in this case, it must be fixed tightly with bolts on the rotator mounting plate in the tower.

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 below, 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.



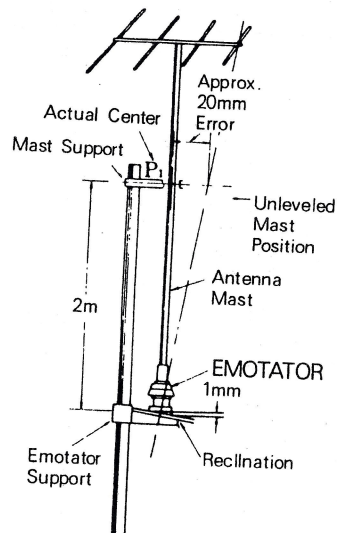
#452

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 meter length mast.

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

Owing to these circumstances, we recommend that our model No. 452 Universal Coupling be used to overcome these unforeseen problems.



## SIZE OF ACCEPTABLE ANTENNA FOR 105TSX AND ANTENNA FLY WHEEL EFFECT.

The capacity of 105TSX and the useful antenna size is determined by the usage conditions.

105TSX has been designed to be used for amateur radio antennas and in wind speeds of 30 meter/sec.

When selecting the antenna, check the wind surface area (A) and fly wheel effect (GD<sup>2</sup>) of the antenna you plan to use, and use any antenna of the permissible value (A 1.0m<sup>2</sup>, GD<sup>2</sup>=100Kg/cm) or less. In order to maintain a desirable level of safety, select an antenna of about 50% of the permissible values.

Caution: Wind surface area (A) and fly wheel effect (GD<sup>2</sup>) must each be within the permissible values.

The various antennas GD<sup>2</sup> and Wind surface area A.

	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>
H F Band	7M2EV <sub>p</sub>	0.3	140	7M3EV <sub>p</sub>	1.8	455	7M2EF	2.2	750	7M3EF	3	1500
	14M3EF	0.6	70	14M4EF	1.2	250	14M5EF	1.75	700	14M6EF	2.2	1100
	21M3EF	0.4	19	21M5EF	0.65	200	21M2EHV	0.3	18	21M2EHQ	0.4	40
	28M4EF	0.31	35	28M5EF	0.53	50	28M2EHV	0.25	15	28M2EHQ	0.31	35
H F Multi Band	7.14M3EV <sub>p</sub>	0.5	190	7.14M4EV <sub>p</sub>	0.8	200	14.21M3E	0.35	150	14.21M4E	0.4	160
	T3E <sub>Jr</sub>	0.3	25	T3E	0.4	75	T4E	0.5	125	T6E	0.55	180
50MHz Band	4 E	0.3	3.2	4E2S	0.6	6.4	4E2P	0.6	65	2EHV	0.2	12
	5 E	0.35	40	5E2S	0.7	80	5E2P	0.7	300	2EHQ	0.28	30
144MHz Band	6 E	0.14	1.0	6E2P	0.3	3.5	6E2P2S	0.6	7.0	6E4P	0.6	35
	8 E	0.18	2	8E2P	0.35	7	8E2P2S	0.8	14	6E2S	0.8	100
	10 E	0.2	3.5	10E2P	0.4	9.5	10E2P2S	0.8	20	6E2P	0.8	350
	12 E	0.21	2.5	12E2P	0.4	10	12E2P2S	0.84	22	2EHQ	0.28	30
	11E8P	1.5	520	×8E	0.22	3.1	×8E2P	0.45	12	6E4P2S	1.2	70
432MHz Band	10 E	0.05	0.35	10E2P	0.1	1.4	10E2P2S	0.2	3	8E4P2S	1.6	110
	12 E	0.06	0.5	12E2P	0.1	2	12E2P2S	0.25	4	10E4P	0.85	65

A=Wind Surface M<sup>2</sup>, GD<sup>2</sup>=Fly wheel effect Kg/cm<sup>2</sup>, E=No. of Element, P=No. of stack (Parallel), S=Vertical Stack, CQ=Cubical Quad, HV=HB9CV Antenna, HQ=Swiss Quad, V<sub>p</sub>=Short Beam, Jr=Junior type, W=Wide Space, X=Cross Element, T=Tri Band, F=Full Size.

### CALCULATION.

For example, when you plan to use a Triband 3-element beam (T3Ejr) and two 144MHz 8-element beams in parallel (144M8E2P), by stacking using a single mast, calculate the value of (A) and (GD<sup>2</sup>) of each antenna and add them up.

	<u>A.</u>	<u>GD<sup>2</sup></u>
1. (T3Ejr) .....	0.3	25
2. (144M8E2P) .....	0.35	7
<hr/>		
Total :	0.65	32

The permissible values for 105TSX are, A=1.0 and GD<sup>2</sup>=100, both values of above examples are within the permissible value and antenna can be used safely with 105TSX.

### TROUBLESHOOTING.

Trouble with the Rotator can be classified as follows: Electrical trouble mechanical trouble.

Electrical troubles for the most part occur as the result of mistakes made when installing the Rotator, or when changing the cables, etc. There is also a remote chance of a lightning strike.

Mechanical troubles occur as the result of long periods of use, or during the typhoon season. It is possible to detect to some degree the location of the faulty part by visual inspection.

When trouble happened, check the 105TSX in the following order. Normal value of electrical circuit of rotating unit is shown.

1. When the motor does not drive, something may be wrong with Pin No. 1 or Pin No. 2. Check the resistance value of each part in order (1), (2), (3) ...

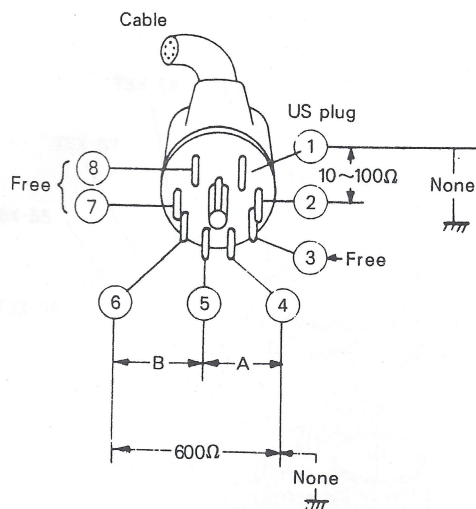
2. When the needle pointer does not move at all or does not move smoothly, something may be wrong with Pin No. 4, 5 or 6.

Check the condition of the core wires within the cable connecting the rotator to the controller. Also, confirm the wiring and soldering of the US Plug has been performed correctly.

Note: If there are connections from Pin No. 1 or 2 to any one of Nos. 4, 5 or 6 on terminal board, then VR1 will burn.



\*RESISTANCE VALUE OF EACH PART.



1. Tolerance of each resistance value is  $\pm 20\%$ .
2.  $A + B = 600 \text{ ohm}$ . When  $A = 220 \text{ ohm}$ ,  $B$  will be  $380 \text{ ohm}$ .
3. 'E' means the earth. Between the earth and other points 'None' means infinity and there is no electrical connection.
4. Testing between the earth and other points must be made.

If there is no abnormality with above testing, it may be mechanical trouble.

SPARE PARTS LIST

TSX-11	Mast blacket	TSX-50	No. 5 Gear
TSX-12	Strap	TSX-55	VR Counter Gear Assy
TSX-13	Gear Case	TSX-57	N-600 ohm Potentiometer
TSX-14	Motor Case	TSX-58	Limit Switch Assy
TSX-15	Ring	TSX-68	8 Pin US Plug
TSX-16	U Bolt	TSX-69	8-Pin US Socket
TSX-18	With S.W 6×20 Bolt	TSX-70	1 Amp Fuse
TSX-19	With S.W R.W 8×25 Bolt	TSX-71	8 Volt Pilot Lamp
TSX-31	9.5 Steel Bolt	TSX-72	Transformer
TSX-32	Waterproof Case Assy	TSX-73	Servo Mecha Assy
TSX-33	6P Terminal Board	TSX-74	Print Board Assy
TSX-35	Frame Plate	TSX-78	Operation Knob
TSX-36	Gear Frame	TSX-79	Operation Switch Assy
TSX-38	Spacer	TSX-80	Power Switch
TSX-39	Motor Assy	TSX-81	Needle Pointer Cover
TSX-46	No. 1 Gear	TSX-82	Needle Pointer
TSX-47	No. 2 Gear	TSX-85	Needle ADJ Poteniometer
TSX-48	No. 3 Gear	TSX-86	for foundation 8×20 Bolt
TSX-49	No. 4 Gear	TSX-60	Stopper Lever

