

G-2800SDX

INSTRUCTION

MANUAL



YAESU MUSEN CO.,LTD

C.P.O.BOX 1500

TOKYO,JAPAN

Yaesu G-2800SDX

Heavy-Duty Antenna Rotator & Controller



The Yaesu G-2800SDX is designed to rotate large tower-mounted amateur and professional antenna arrays under remote control from the station operating position. The clamshell rotator design utilizes 106 3/8-inch dual-stacked circumferential ball bearings to distribute load over the full diameter of the housing. This design minimizes stress and wear, and practically eliminates the possibility of destructive water entry: there is no shaft hole in the top of the housing.

Instead of the usual AC motor drive used in older rotator designs, the G-2800SDX uses a variable-voltage DC motor, obviating the need for a large starting capacitor with its potential for failure exposed to outside temperature variations. The factory-lubricated rotator unit is housed in melamine resin-coated die-cast aluminum, intended to provide maintenance-free operation under all climatic conditions. A mast alignment gauge on the rotator housing simplifies accurate mechanical alignment during installation.

The handsome desktop controller matches the design of modern transceivers, providing 360° radial indication of actual antenna bearing azimuth. You can select rotating speeds from 45 to 150 seconds per (360°) rotation, and can preset a desired heading for the rotator, to which it then turns automatically.

When a fast rotating speed is selected, special "auto slow start" and "auto slow stop" features avoid sharp jolts to the antenna array and tower. Activating the rotator causes it to begin turning at slow speed, and accelerate up to full speed after one second. As the antenna approaches the desired heading rotation automatically slows before bringing the antenna to a gentle stop. The operator may select the stopper heading (the bearing through which the rotator cannot be turned) most convenient for his location and operation, allowing full rotation through north, south or both, if desired. In any case, 90° overlapping rotation allows rotation through the selected stopper heading (450° total rotation).

The rotator is intended for mounting inside a support tower (not supplied), at least 1 meter from the top, with an optional (Yaesu model GS-680U) thrust bearing above. This kit includes one mast clamp and related hardware, plus plug connectors for both the rotator and controller to simplify installation and servicing. A six-conductor cable of the necessary length (station to antenna) is optional.

The GS-23 Computer Control Board is available as an option for installation in the controller, allowing positioning of the antenna by a personal computer, via an RS-232 serial interface.

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Specifications

Voltage requirement:

110~120 or 220~240 VAC

Power consumption: 230 VA peak**Motor voltage:** 8 to 24 VDC**450° rotation time (Approx.):** 60 sec. to 190 sec.**Braking torque:** 25,000 kg-cm (1808 ft-lbs)**Rotation torque:**

800~2500 kg-cm (57.9~181 ft-lbs)

Maximum continuous duty: 5 minutes**Rotation range:** 450° +5/−0°**Maximum vertical load:**

300 kg/1200 kg momentarily (661/2645 lbs)

Wind loading area: less than 3m²**Control cable:** 6 conductors: #20 AWG or larger**Mast outside diameter:**

48~63mm (1-7/8 to 2-1/2 inches)

Weight: Rotator - 6.0 kg (13.2 lbs)

Controller - 3.8 kg (8.4 lbs)

Optional Accessories

GS-680U Universal Thrust Bearing

GS-23 Computer Control Board (RS-232C Serial)

Please read this manual through carefully before installing the rotator, to acquaint yourself with the procedures that will be required, and to ensure that you have all necessary items for your installation.

Unpacking & Inspection

When unpacking the rotator make sure you find the following items:

Item	Quantity
Controller Unit	1
Rotator Unit	1
Mast Clamp	1 (pair)
Round Cable Plug	1 ass'y
Rectangular Cable Plug	1 ass'y
M8×18 mm Hex Bolts	4
M8×30 mm Hex Bolts	4
M8×70 mm Hex Bolts	6
M8×95 mm Socket Head Cap Screw	1
Split Washers	14
Flat Washers	10
M8 Nuts	7
Spare Fuse (qty. 1)	(117V: 3A, 220V: 2A)
Plastic Dial Heading Sheet	1

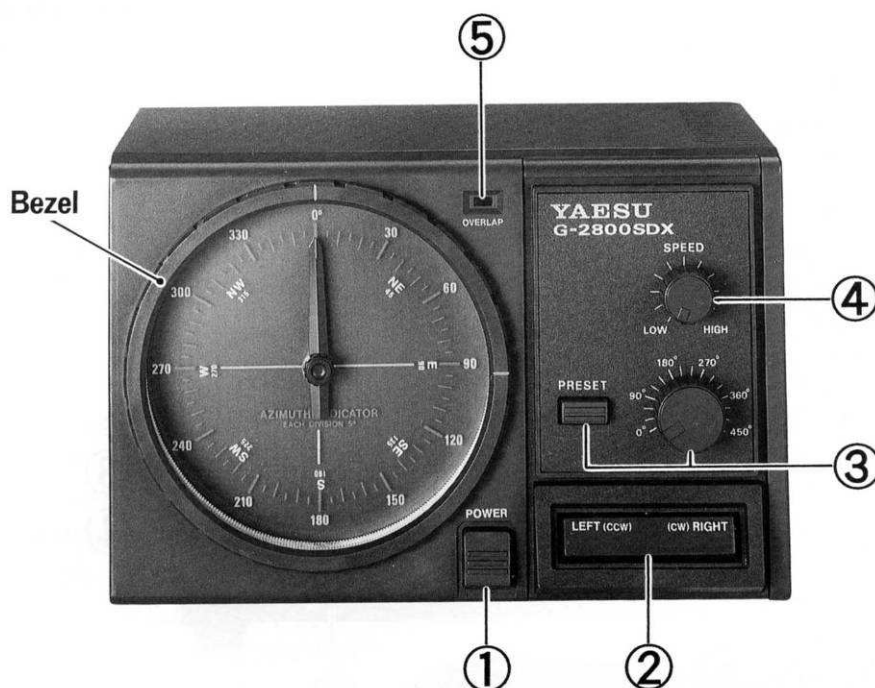
If any of these items are missing or damaged, save the packing material and notify the shipping company (or the shop where you bought it).

Note that control cable is not included, as the length must be determined case-by-case. Contact your Yaesu dealer to obtain the length of cable your installation requires.

Before proceeding with installation, confirm that the AC voltage label on the rear of the Controller matches your local line voltage: either "117V" for 110 to 120 VAC, or "220V" for 220 to 240 VAC. If the range does not match, return the controller (only) to the selling dealer for replacement. (Different power transformers are installed for the different voltage ranges).

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Controller Front Panel



(1) **POWER** Switch

Press this switch to turn the controller on to rotate the antenna. Turn it off when the rotator is not in use.

(2) **LEFT/RIGHT** Seesaw Switch

Press the **LEFT** side of this switch to rotate the antenna counterclockwise (CCW). Press the **RIGHT** side to rotate the antenna clockwise (CW).

(3) **PRESET** Switch and Control

Set this control to the desired antenna heading (according to the angular scale around this control), then press the (momentary) **PRESET** switch to activate automatic rotation to the desired heading. You can press the **LEFT/RIGHT** switch to abort preset operation.

(4) **SPEED** Control

Set this control for the desired rotating speed between approximately 45 and 150 seconds per 360° revolution.

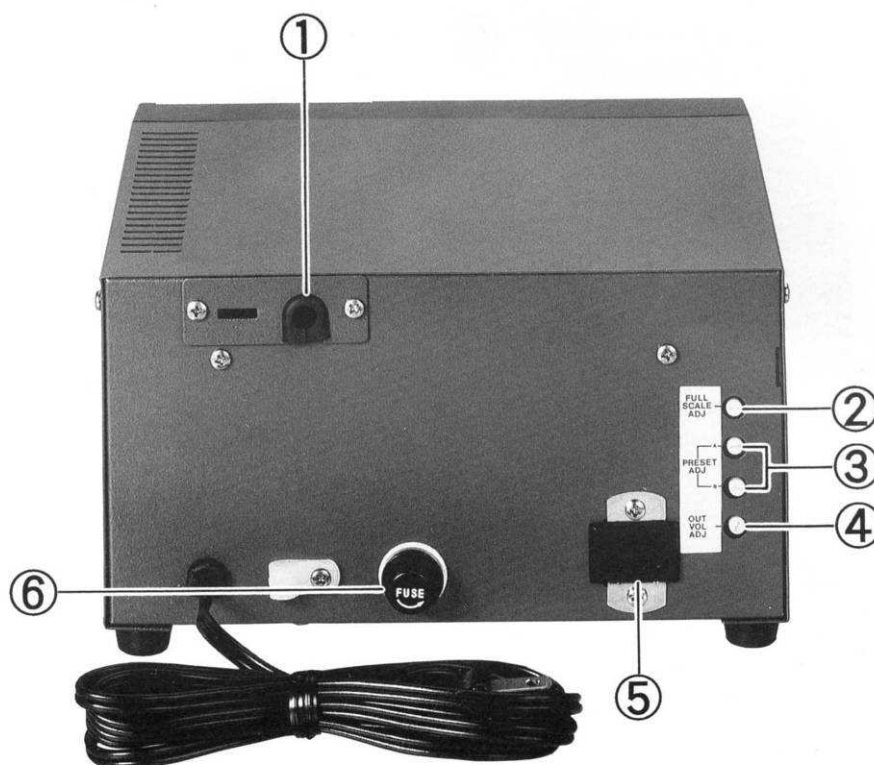
(5) **OVERLAP** Indicator

This red LED glows when the antenna is rotated beyond about 360° (to 450°) from its fully counterclockwise position. Check this indicator before rotating the antenna clockwise, and turn the antenna counterclockwise to the desired position if the indicator is on.

The rotator motor is rated for five-minutes intermittent duty. However, it can safely run continuously for as long as ten minutes providing that it be brought to rest for at least ten minutes afterwards.

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Controller Rear Panel



(1) RS-232C Cable Grommet

If the optional GS-23 Digital Interface Unit is installed, the RS-232C cable from the computer routes through this grommet, and is affixed in place by the nylon cable clamp below it.

(2) **FULL SCALE ADJ** Potentiometer

This control calibrates the maximum rotation angle (range) of the azimuth indicating needle to match the maximum angle of the rotator.

(3) **PRESET ADJ A & B** Potentiometers

These controls calibrate the angle of the **PRESET** control on the front panel to match the azimuth indicating needle. Pot A should be adjusted only near the 450° position, and pot B only near the 0° position.

(4) **OUT VOL ADJ** Potentiometer

This control presets the voltage range at pin 4 of the 8-pin External Control jack inside, for calibration of the A-to-D converter on the (optional) Digital Interface Unit.

(5) Rotator Control Cable Jack

The rotator cable connects to this 6-pin jack, using the supplied rectangular plug.

(6) **FUSE** Holder

A 3-A fuse must be installed here for AC mains voltages from 110 to 120V. A 2-A fuse must be installed for 220 to 240V.

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Control Cable Installation

Before installing the antenna and rotator, we recommend that you prepare the rotator control cable and test rotator operation thoroughly on the ground as described here. After this you should also check the alignment of the controller, as described in the following section.

Control Cable Preparation

Your control cable should have six stranded conductors of at least 0.5 millimeters diameter (#22 AWG) each if the cable is shorter than 40 meters (131 feet), or 0.75 millimeters (#18 AWG) if longer.

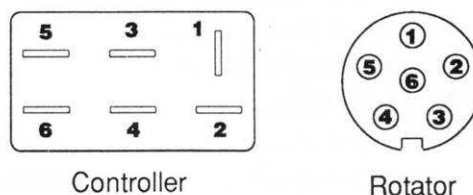
- ☐ Disassemble the two supplied cable plugs: slide the rubber boot off the round plug, remove the setscrew in the shell with a small screwdriver, and then unscrew the shell from the plug. On the rectangular plug, just remove the two small screws in the shell. Save the setscrew from the round plug and two small screws in a safe place until the last step.
- ☐ Slide the rubber boot and round shell over the rotator end of the cable, far enough to allow dressing the end of the cable. slide the rectangular shell over the other (controller) end of the cable.
- ☐ Using special care to avoid nicking the insulation of the individual wires, strip back 15 mm of the outer jacket of the cable from both ends, and then strip 5 mm of insulation from each wire.
 - ☐ Solder the wires to the round plug pins, noting the color of the wire and number of each pin (see the plug drawing on this page) for reference later. Confirm all solder joints are good and clean, as this part of the cable will be hard to access after installation. Don't slide the shell over the plug just yet.

Note

If your cable has different sizes of wire, connect the largest wires to pins 4 and 5, since these carry the motor current.

- ☐ Referring to your notes of the wire color at each pin on the round (rotator) plug, connect the wires to the pins of the rectangular (controller) plug so that the wire from each pin on the rotator plug connects to the pin with the same number on the controller, ie., 1 to 1, 2 to 2, etc. Don't slide the shell on yet.

Solder-End Views of Plugs



- ☐ Temporarily connect the round plug to the rotator, and the rectangular plug to the jack on the controller. Make sure that the **POWER** switch is in the off (■) position, confirm that your AC line voltage matches that of the controller, and then connect the cord to the AC power outlet.
- ☐ Turn on the **POWER** switch. The pilot lamps should light, and the direction indicator may move to the position of the rotator and stop.
- ☐ Press the **LEFT** side of the seesaw switch, and confirm that the top side of the rotator and indicator needle turn counterclockwise together. Then press the **RIGHT** side of the seesaw switch and confirm that the rotator and indicator turn clockwise. If rotation does not occur as described, recheck your cable connections
- ☐ If the rotator and indicator work as described, replace the plug shells, setscrew, two small screws and rubber boot removed in the first step.

Controller Checkout & Calibration

These procedures are most easily carried out after connecting the rotator cable, but before installing the rotator and antenna on the mast or tower. They may be repeated after installation to confirm controller calibration.

- ☐ Turn the **SPEED** control fully clockwise, and hold the **LEFT** side of the seesaw switch until the rotator turns counterclockwise as far as it will go, and stops. The indicator needle should now point precisely to 180°. If it does not, or if you want to change the starting angle, see *Reorienting the Azimuth Indicator* following the tracking alignment procedures.

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Azimuth Indicator Tracking Alignment

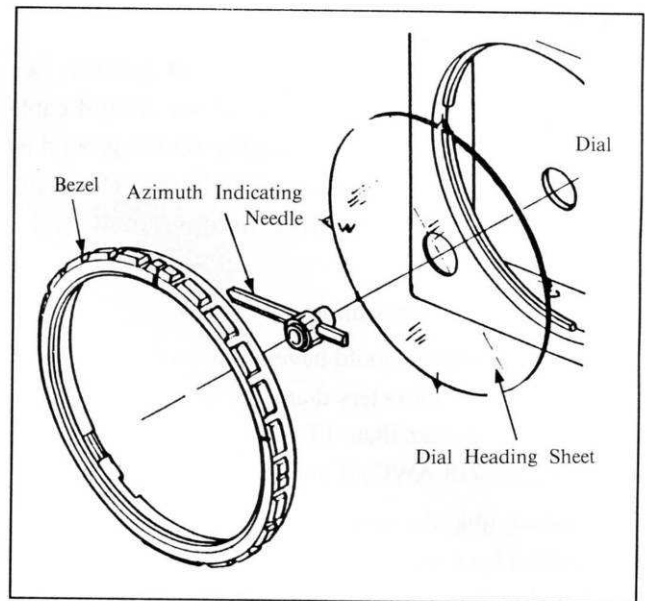
- ☐ Mark the position of the upper part of the rotator just above the cable socket (or not the bearing of the boom if the antenna is already installed). Then hold the **RIGHT** side of the seesaw switch until the rotator turns clockwise exactly 360° (according to your mark on the housing or actual antenna position).
- ☐ The indicator needle should now point to exactly the same position as in the first step above. If not, adjust the **FULL SCALE ADJ** potentiometer on the rear panel so that it does (check both the 0° and 360° positions several times, readjusting if necessary). The **OVERLAP** indicator, should come on at about 350° .
- ☐ Press the **RIGHT** switch again to continue clockwise rotation until the rotator reaches its end-stop. The indicator should now point to about 90° , and the **OVERLAP** indicator should be on.
- ☐ Turn the rotator back and forth to each end-stop several times, readjusting the potentiometer, if necessary, until the indicator matches the rotator angle at all settings.
- ☐ Change the **SPEED** setting and confirm that rotation speed changes accordingly.

PRESET Dial Tracking Alignment

- ☐ Set the **PRESET** control to 0° , and press the **PRESET** button (see the box below). Rotation should stop at 0° . If not, adjust the **PRESET ADJ B** (lower) potentiometer until it does (you may need to press **PRESET** after adjusting). If adjusting the potentiometer cannot bring the needle to 0° , recalibrate the **PRESET** knob as described on the next page.
- ☐ Set the **PRESET** control to 360° (cw position). Rotation should again stop at 0° . If not, adjust the **PRESET ADJ A** (upper) potentiometer until it (you may need to press **PRESET** after adjusting). If

Preset Mode Operation

Pressing the PRESET button activates the preset mode: the rotator will turn until the indicator matches the PRESET control, and resetting the control will start the antenna turning again automatically. Pressing the seesaw switch or turning power off will cancel the preset mode until the PRESET button is pressed again.



adjusting the potentiometer cannot bring the needle to 0° , recalibrate the **PRESET** knob as described on the next page.

Note

If you want to reposition the direction indicator or dial heading sheet after the antenna is installed, make sure the antenna is aimed in the same direction as the new needle heading.

- ☐ repeat the last two steps several times until the indicator responds reliably to presetting small angles when the rotator is near both ends of its range.

Reorienting the Azimuth Indicator

The azimuth indicating needle may be repositioned, if desired, so that the rotator stopping point is down (or right or left) instead of up (as shipped from the factory). Of course the rotator and antenna will have to be installed to match the resulting direction of the indicator, and the **PRESET** dial markings will no longer correspond with antenna bearing. A compass heading sheet is supplied for positioning north on the azimuth dial, as described in the next procedure. This procedure sets only the angle of the needle on the dial.

- ☐ Turn on the controller and press the seesaw switch to set the indicator needle to 0° (straight up). Then turn off the **POWER** switch.

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- ☐ Grasp the edge of the bezel around the bearing window, turn it 10° counterclockwise, and pull it off. Do the same with the cover glass.
- ☐ Gripping the small knob at the axis of the needle, pull the needle off and move it to the desired direction (we suggest only multiples of 90° -up, down, left or right, since the orange and blue markers on the bezel can only be installed in these directions). Press the needle back on the shaft.
- ☐ Replace the cover glass, and then the bezel so that the orange marker ends down aligned with the needle (unless also installing the dial heading sheet).

Installing the Dial Heading Sheet

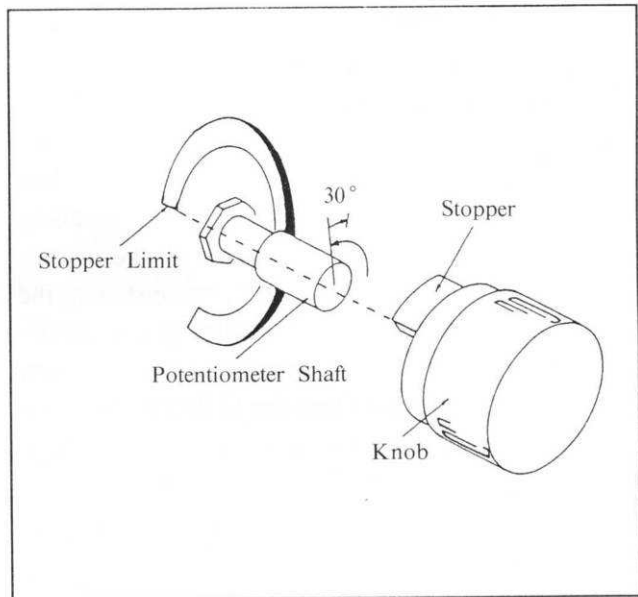
A clear plastic round dial heading sheet is provided with the kit, which can be installed with north at any position you desire. This is particularly useful when you need to have south at the top of the dial (or east or west) instead of north. To install the heading scale:

- ☐ Perform the first two steps of the above procedure, *Reorienting the Azimuth Indicator*.
- ☐ Note the position of the needle, then grasp it at its center, and pull it straight off.
- ☐ Determine which compass direction you desire to be upmost, and install the compass heading label sheet against the azimuth scale, so that the small teeth in the edges of the sheet lock around the edge.
- ☐ Replace the needle, cover glass and bezel in the same direction as they were before (see diagram on previous page).

PRESET Knob Calibration

Perform this procedure only if it is not possible to align the **PRESET** knob tracking using the A and B potentiometers on the rear panel, as described on the previous page.

- ☐ Pull off the **PRESET** control knob.
- ☐ Set the potentiometer shaft to the fully counterclockwise, and turn it 30° clockwise.
- ☐ Using care not to disturb the **PRESET** potentiometer, push the knob back on the shaft so that the knob stopper is aligned with the counterclockwise edge of the slot in the panel behind the knob, as shown above.



- ☐ Return to the **PRESET** Dial Tracking Alignment procedure on the previous page.

Rotator Installation

The G-2800SDX rotator unit is designed to accommodate large antenna arrays, but you should still confirm that your particular antenna/support configuration does not exceed the rotator loading specifications. The maximum safe load depends on the wind surface area, size and weight of the antenna(s), method and quality of mechanical installation, and maximum wind velocity at the installation site. If your antenna specifications do not include a figure for wind surface area, refer to the tables on the next page.

Caution!

The G-2800SDX rotator is designed for vertical mounting only. One half of the housing is marked "BOTTOM SIDE". Water and contaminants will damage the motor unit if it is mounted horizontally or upside-down.

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Mounting Considerations

Mount the rotator inside of the tower at least 1 meter (3 feet) below the top, and use our GS-680U universal (angle) tower bearing or equivalent at the top of the tower to support the vertical load. During installation, keep in mind that the bearing will need to be precisely aligned with the center of the rotator, so the mast is exactly vertical. We recommend against installing the rotator on the topmost plate of the tower, as the supporting capacity is much lower in such configuration. Also note that the G-2800SDX is too large to be safely mounted inline on a mast (without being affixed to the tower)

Ensure that the wind surface area of your antenna(s) plus supporting mast do not exceed 3m^2 (32ft^2). In addition to antenna wind loading and regardless of the type of installation, the overall size and weight of the antenna should be considered. As a general rule for the G-2800SDX, the product of the rotating radius and weight of the antenna should not exceed 950 kg-m (6870 ft-lbs).

Where multiple antennas are to be installed on the same mast, make sure to add the wind loading for each antenna, and the products of weight and radius for each when calculating the wind loading.

Make certain that the antenna attaches to the mast at the center of gravity of the antenna. That is, the antenna should be balanced, providing only downward force on the mast (when there is no wind). The G-2800SDX can support up to 300 kg (661 lbs) continuously, but depending on the strength of the rotator support platform in your tower, it may be better to let the thrust bearing

carry the weight.

During installation, don't forget to leave just enough slack in the coaxial cable feedline around the mast so that it can rotate 450° , plus a little extra. Also remember to carefully tape over the rotator cable connector where it attaches to the rotator, and also at the end of the rubber boot.

- ☐ Center the rotator precisely on the support plate in the tower, and affix it in place from the bottom with the four supplied short bolts and split washers.

Mast Bracket Assembly & Antenna Positioning

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 bracket halves:

- ☐ Drill a 9-mm diameter hole through both walls of the mast, centered 50 mm from the mast bottom (as shown on the next page). Ensure the drill is maintained perpendicular and centered when making the hole, to ensure proper alignment of the holes in the mast and those in the base support clamp.
- ☐ Loosely fasten the mast bracket halves ① to the rotator housing using four medium bolts, split washers and flat washers ②.
- ☐ Insert the mast into the bracket, and finger-tighten the four long bolts ③ with split washers, flat washers and nuts ④. Note that one side of the bracket 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.

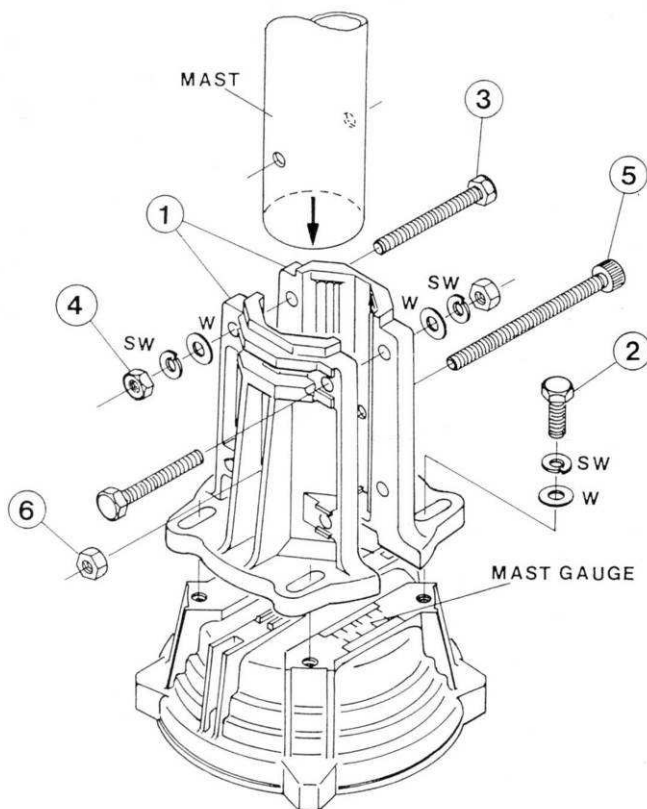
Wind Loading Areas of Common Aluminum Tubing Antennas

Full Size Monoband Yagis (no traps loading)																						
Band(MHz)	7	7	14	14	14	21	21	21	21	28	28	28	50	50	50	144	144	144	144	430	430	430
Elements	1	2	3	4	5	3	4	5	6	3	4	5	4	5	6	10	10x2	10x4	10x2 x4	12	12x2	12x4
Area(m ²)	0.2	2.2	0.7	1.2	1.7	0.45	0.6	0.8	1.3	0.3	0.42	0.6	0.25	0.3	0.37	0.2	0.44	0.95	2	0.06	0.12	0.3

Trapped or Loaded Mono-and multibanders and Swiss Quads												
Band(MHz)	7	7	7/14	7/14	14/21	14/21	21	21/28	21/28	14/21/28	14/21/28	28
Elements	2 (w/loading coils)	3 (w/loading coils)	3	4	5	3	Swiss Quad	4	5	6	3	Swiss Quad
Area(m ²)	0.6	1.1	0.5	0.8	1.7	0.5	0.3	0.6	0.8	1.3	0.3	0.3

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- ☐ Finger-tighten the longest bolt ⑤ with nut ⑥.
- ☐ With the rotator connected, set the controller so that it indicates precisely 0° (North). Then, using an accurate map and known landmarks, position the antenna (without using the controller) so that it points to true North. Alternatively, consult a Geodetic Survey map for your area to determine the Magnetic Deviation at your location, and then use a compass to position the antenna so that it points to true North (Magnetic North + Magnetic Deviation). Be careful not to disturb the antenna direction when tightening the mast bracket in the next step.
- ☐ When you are satisfied with the orientation of the antenna, center the mast on the top of the rotator, and begin tightening the bolts on each side alternately so that the gap on each side of the mast remains the same. Markings are provided on the top of the rotator to assist this process.
- ☐ Confirm that the mast and bracket are precisely centered on the rotator, and tighten the four bolts affixing the mast bracket to the top of the rotator. See the warning below.



Electrical Troubleshooting Data

Resistances between the pins of the rotator socket should be as follows:

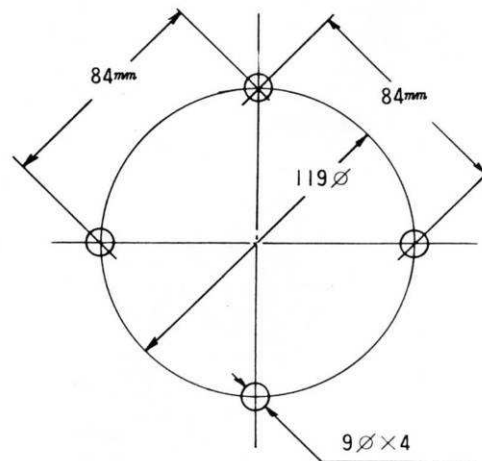
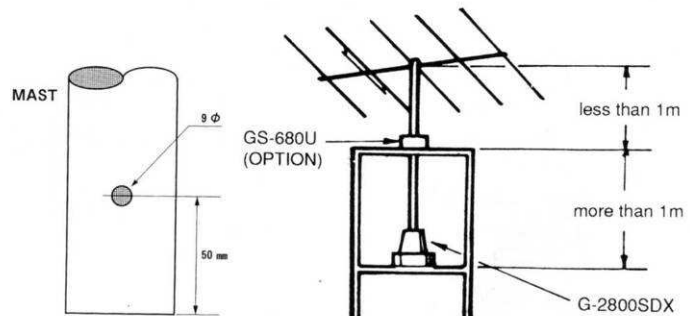
Pin 1 to pin 2: 0 to 500 Ω

Pin 1 to pin 3: 500 Ω

Pin 2 to pin 3: 0 to 500 Ω

Pin 4 to pin 5: 6 ohms with the rotator in mid-range, 18 ohms (polarized) with the rotator at either end of rotation.

At the controller socket, approximately 6 VDC should be present between pin 1 (+) and pin 3. Also, 8 to 24 VDC should be present between pins 4 and 5, with the actual voltage depending on the **SPEED** control setting, and the polarity determined by the **RIGHT** and **LEFT** switches. If the **PRESET** mode is active, voltage between pins 4 and 5 of the controller will vary.



Warning!

Take care not to overtighten the four bracket bolts. Do not torque the bolts beyond the point where the split spring washer flattens.

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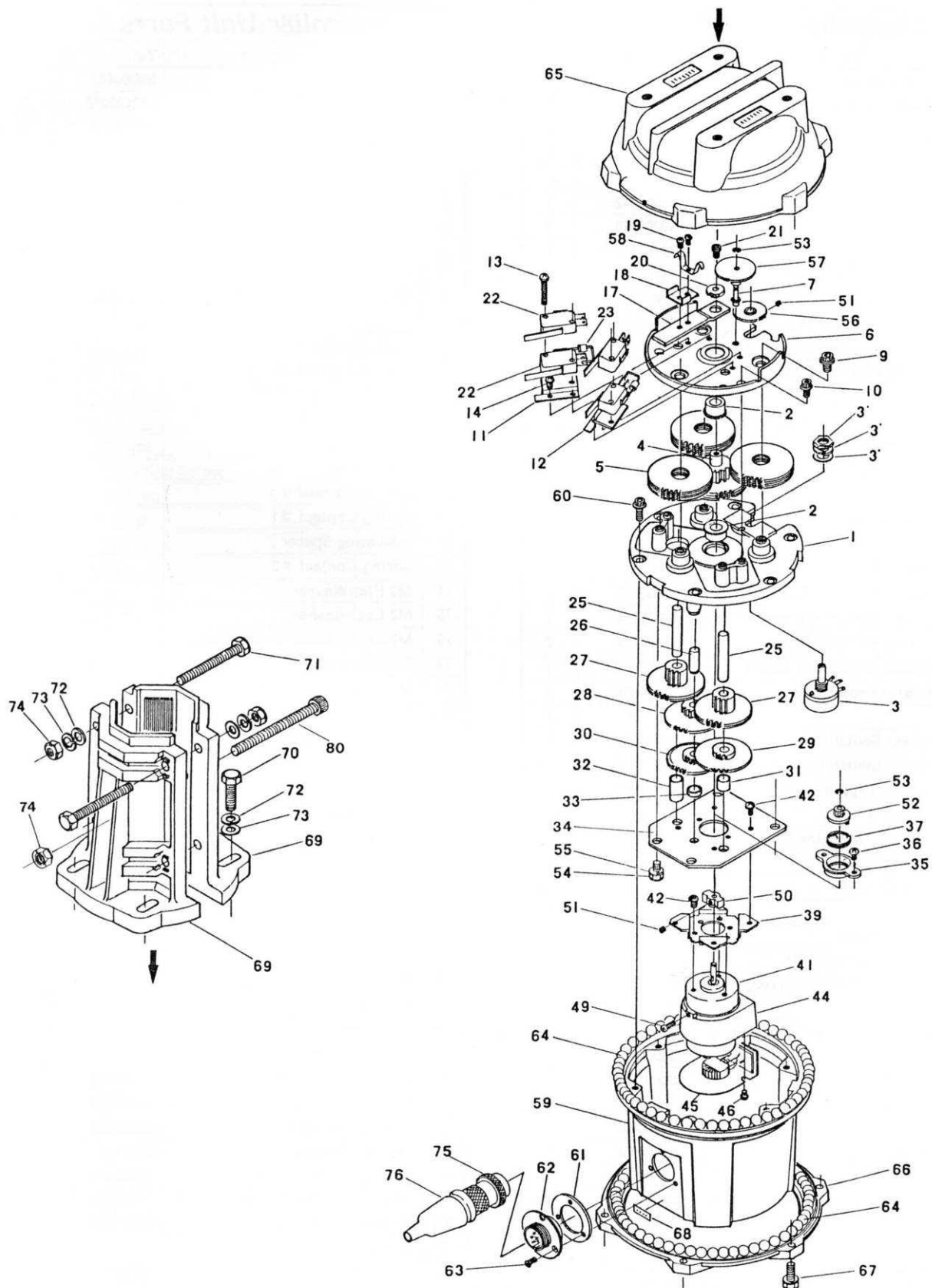
Rotator Unit Parts List

No.	Description	Yaesu P/N	Qty
1	Base	S8001193	1
2	Bearing	S8001194	2
3	Pot. (Azimuth Sensing)	S8100317	1
4	Gear Ass'y	S8001195	1
5	Idler Gear	S8001196	12
6	Gear Box Upper Plate (include No. 7)	S8001197	1
7	Gear shaft	—	1
8	Not used	—	—
9	M6×8 Frange Socket	S8001198	3
10	M5×8 Frange Socket	S8001199	4
11	Limit Switch Mounting Bracket #1	S8001200	1
12	Limit Switch Mounting Bracket #2	S8001201	1
13	M3×25 Screw	S8001202	4
14	M4×6 Screw	S8001203	4
15	Not used	—	—
16	Not used	—	—
17	Stopper	S8001204	1
18	Lever Push Plate	S8001205	1
19	M3×5 Screw	S8001206	2
20	VR Drive Gear	S8001207	1
21	M4×8 CAP Screw	S8001208	1
22	Limit Switch	N7090087	4
23	Diode (P-330J)	G2090601	2
24	Not used	—	—
25	Gear Shaft #2	S8001209	2
26	Gear Shaft #1	S8001210	1
27	Gear Ass'y	S8001211	2
28	Gear Ass'y	S8001212	1
29	Gear Ass'y	S8001213	1
30	Gear Ass'y	S8001214	1
31	Spacer	S8001215	1
32	Spacer	S8001216	1
33	Collar	S8001217	1
34	Gear Box Lower Plate	S8001218	1
35	Brake Drum	S8001174	1
36	M3×8 Screw	S8001219	2
37	Coil Spring	S8000948	1
38	Not used	—	—
39	Motor Mount Plate	S8001220	1
40	Not used	—	—
41	DC Motor (DME-44BS)	S8100381	1
42	M3×8 Screw	S8001221	7
43	Not used	—	—
44	Shield Box	S8000955	1
45	Shield Plate Ass'y	S8100315	1
}	}	}	}
49	M3×8 Screw	S8001222	1
50	Brake Spring Winder	S8000952	1

Rotator Unit Parts List

No.	Description	Yaesu P/N	Qty
51	M3×3 Set Screw (winder)	S8000953	2
52	Motor Pinion Gear	S8000947	1
53	"E" Ring Retainer	S8000946	2
54	M8×10 Bolt (include No. 55)	S8001223	4
55	M8 Split Washer		4
56	Gear Ass'y	S8001224	1
57	Gear #1	S8000069	1
58	Leaf Spring	S8001225	1
59	Case	S8001226	1
60	M5×15 Frange Socket	S8001227	6
61	Socket Gasket	S8000943	1
62	6-pin Socket	S8100313	1
63	3×10 Screw	S8001228	3
64	Ball Bearing	S8001229	103
65	Cover	S8001230	1
66	Housing Ring	S8001231	1
67	M6×20 Bolt	S8000645	6
68	Name Plate	S8001232	1
69	Mast Clamp	S8001233	2
70	M8×30 Bolt	S8001012	4
71	M8×70 Bolt	S8001008	6 4
72	M8 Flat Washer	S8001009	10 8
73	M8 Split Washer	S8001010	14 12
74	M8 Nut	S8001011	7 5
75	6-pin Plug (NCS256P)	S8100321	1
76	Connector Boot (Rubber)	S8001014	1
}	}	}	}
80	M8×95 Bolt	S8001234	1

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Controller Unit Parts List

No.	Description	Yaesu P/N	Qty
1	Front Panel	S8000440	1
2	Control Panel	S8000441	1
3	3×8 ⊕ Tapping Screw	S8000834	4
4	Control Panel Label Plate	S8001236	1
5	Not used	—	—
6	Speed Control Knob	S8000442	1
7	M7 Nut (Speed Pot.)	S8000859	1
8	M7 Washer (Speed Pot.)	S8000860	1
9	Speed Potentiometer	Q9000425	1
10	Preset Knob	S8000443	1
11	M7 Nut (Preset Pot.)	S8000861	1
12	M7 Washer (Preset Pot.)	S8000862	1
13	Preset Potentiometer	Q9000428	1
14	Preset Pushbutton	S8000444	1
15	CW, CCW & Preset Switch	N7090084 - 86	3
16	Preset Switch PC Board	Q9000488	1
17	3×8 ⊕ Tapping Screw	S8000863	2
18	Seesaw Button	S8000445	1
19	Seesaw Switch Spring	S8000446	1
20	3×8 ⊕ Tapping Screw	S8000835	1
21	Seesaw Switch Retainer Bracket	S8000447	1
22	3×8 ⊕ Tapping Screw	S8000836	1
23	Seesaw Switch Mounting Plate	S8000864	1
24	3×8 ⊕ Tapping Screw	S8000837	2
25	Seesaw Switch PC Board	Q9000488	1
26	3×6 ⊕ Tapping Screw	S8000865	2
}	}	}	}
34	Power Switch Button	S8000448	1
35	Power Switch Mounting Plate	S8000449	1
36	3×8 ⊕ Tapping Screw	S8000838	2
37	Not used	—	—
38	M3×8 ⊕ Machine Screw	S8000839	2
39	Power Switch	N7090080	1
40	Overlap LED	G2090418	1
41	Bezel	S8000450	1
42	Cover Glass	S8000451	1
43	Azimuth Dial Scale	S8000452	1
44	3×10 ⊕ Tapping Screw	S8000840	3
45	Spacer	S8000453	3
46	Dial Scale Mounting Plate	S8000454	1
47	M3×8 ⊕ Screw	S8000841	4
48	Indicator Needle	S8000455	1
49	Controller Gear #2	S8000456	1
50	Controller Gear #1a	S8000457	1
51	Insulator	S8000458	1
52	2mm "E" Ring	S8000842	1
53	Controller Gear #1b	S8001018	1
54	Large Pulley	S8000459	1
55	Gear Shaft	—	1
56	Small Pulley	S8000460	1

Controller Unit Parts List

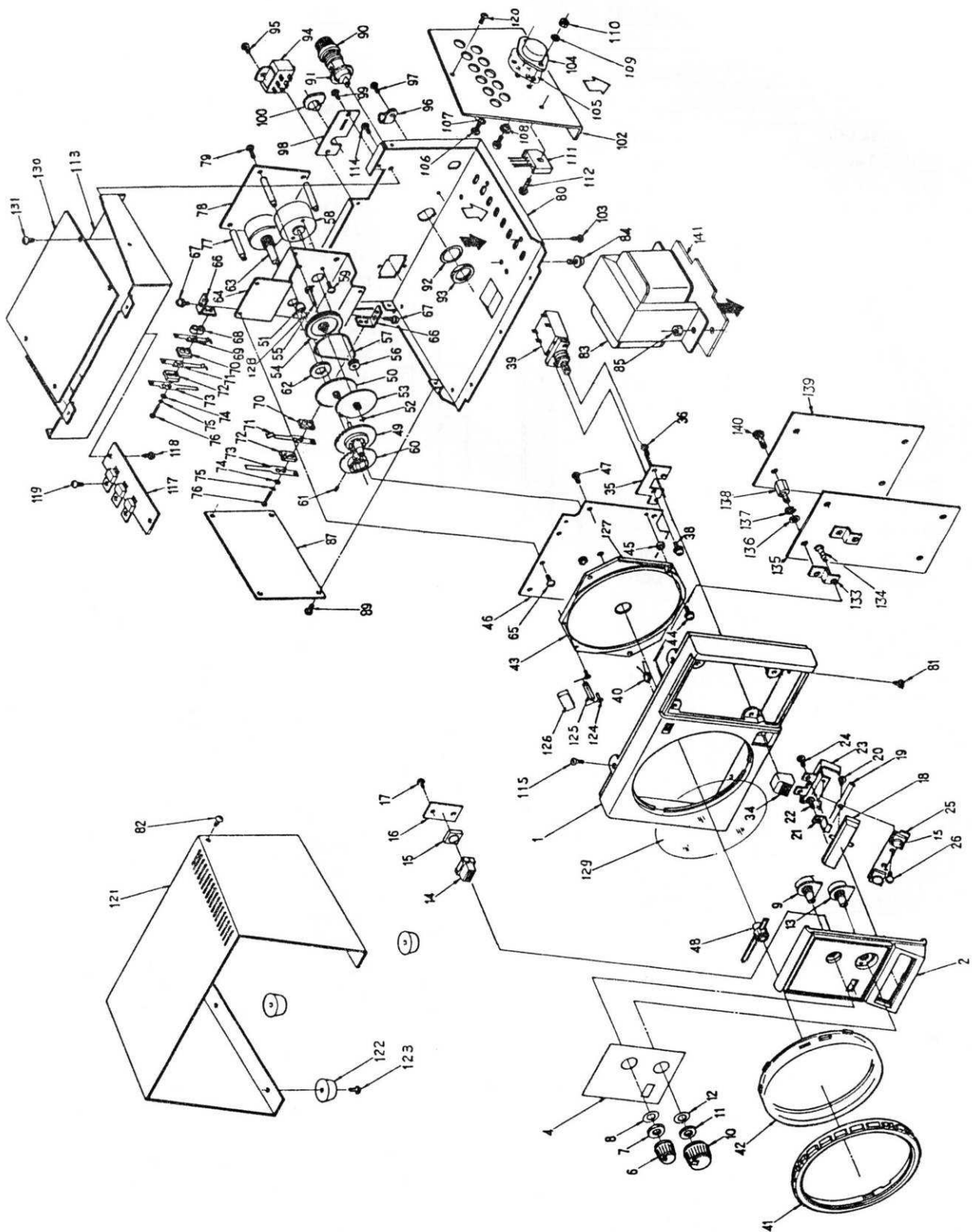
No.	Description	Yaesu P/N	Qty
57	Rubber Belt	S8000461	1
58	DC Motor	M2190016	1
59	M2.6×5 ⊕ Machine Screw	S8001019	2
60	Azimuth Potentiometer Gear	S8000462	1
61	M3×3 ⊕ Machine Screw	S8001020	1
62	Pot. Nut w/Washers	S8001021	1
63	Azimuth Potentiometer	S8100322	1
64	Rear Gearbox Cover (includes Nos. 55 & 77)	S8000463	1
65	3×6 ⊕ Tapping Screw	S8000843	4
66	3-P Leaf Switch Ass'y (includes Nos. 67 - 76) 2-P Leaf Switch Ass'y (includes Nos. 66, 67 & 70 - 76)	N7090083	1
67	M5×8 Machine Screw	—	2
68	Insulating Bushing	—	2
69	Contact Spring #3	—	1
70	Insulating Bushing	—	2
71	Spring Contact #1	—	2
72	Insulating Spacer	—	2
73	Spring Contact #2	—	2
74	M2 Flat Washer	—	4
75	M2 Lockwasher	—	4
76	M2×12 ⊕ Machine Screw	—	4
77	Support Stud	—	4
78	Motor PC Board Ass'y	S8100323	1
79	M3×6 ⊕ Machine Screw	S8000844	4
80	Lower Chassis	S8000464	1
81	3×8 ⊕ Tapping Screw	S8000845	3
82	3×6 ⊕ Tapping Screw	S8000846	2
83	Power Transformer	L3190014	1
84	M4×10 ⊕ Machine Screw (Transformer)	S8000847	2
85	M4 Nut (Transformer)	S8000848	2
86	Not used	—	—
87	Main Controller PC Board	S8100324	1
88	Not used	—	—
89	3×6 ⊕ Tapping Screw	S8000866	2
90	Fuse Holder (includes Nos. 91 - 93)	P2000039	1
}	}	}	}
94	Rotator Cable Socket	S8000465	1
95	3×6 ⊕ Tapping Screw	S8000849	2
96	RS-232C Cable Clamp	S8000466	1
97	M3×8 ⊕ Tapping Screw	S8001022	1
98	RS-232C Cable Cutout Cover	S8001023	1
99	3×6 ⊕ Tapping Screw	S8000850	2
100	Rubber Grommet	S8000467	1
101	Not used	—	—
102	Heatsink	S8000469	1

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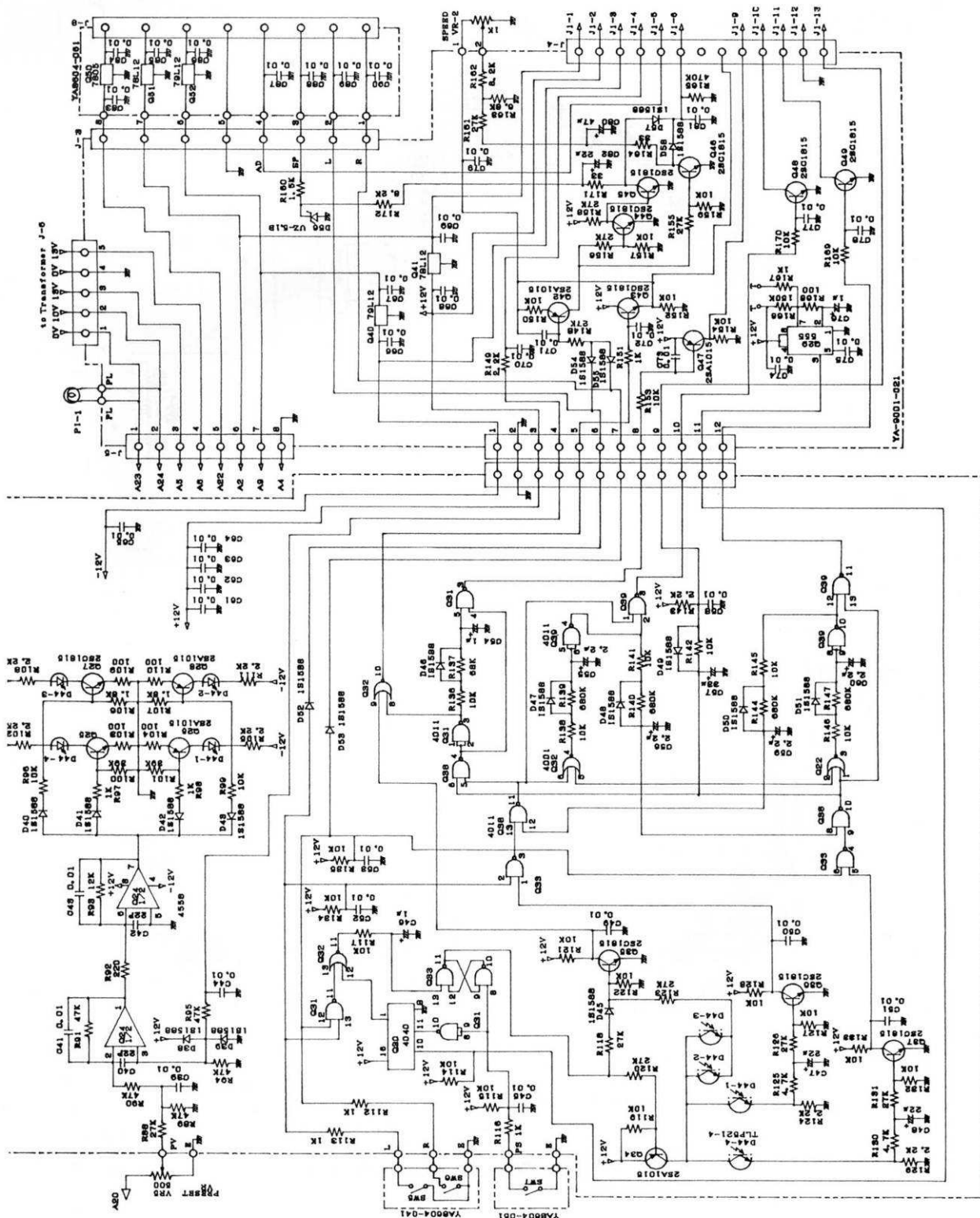
Controller Unit Parts List

No.	Description	Yaesu P/N	Qty
103	3×6 ⊕ Tapping Screw	—	2
104	Regulator Transistor Ass'y (includes Nos. 103 - 110)	G3090014	1
}	}	}	}
111	Bridge Rectifier	G2090437	1
112	3×12 ⊕ Tapping Screw	S8000868	1
113	Expansion Board Chassis	S8000869	1
114	3×6 ⊕ Tapping Screw	S8000851	2
115	M3×6 ⊕ Machine Screw	S8000870	2
116	Not used	—	—
117	Driver PC Board	Q9000488	1
118	3×6 ⊕ Tapping Screw	S8001024	2
119	3×6 ⊕ Tapping Screw	S8000871	1
120	3×6 ⊕ Tapping Screw	S8000872	1
121	Cover	S8000471	1
122	Rubber Foot	S8000472	4
123	3×8 ⊕ Tapping Screw	S8000852	4
124	Terminal Lug	S8000853	2
125	Axial Lamp	Q1000070	1
126	Reflective Tape	S8001025	1
127	Not used	—	—
128	Bushing	S8001026	1
129	Heading Sheet	S8000473	1
130	Expansion Board (Option)	—	1
131	M3×6 ⊕ Machine Screw	S8000873	1
132	Not used	—	—
133	Control PC Board Mounting Bracket	S8001027	4
134	3×10 ⊕ Tapping Screw	S8001028	4
135	Control PC Board (Front)	S8100325	1
136	M3 Flat Washer	S8001029	4
137	M3 Split Washer	S8001030	4
138	Separator Stud	S8001031	4
139	Control PC Board (Back)	S8100326	1
140	M3×6 ⊕ Machine Screw	S8001032	4
141	Transformer Cushion	S8001033	1

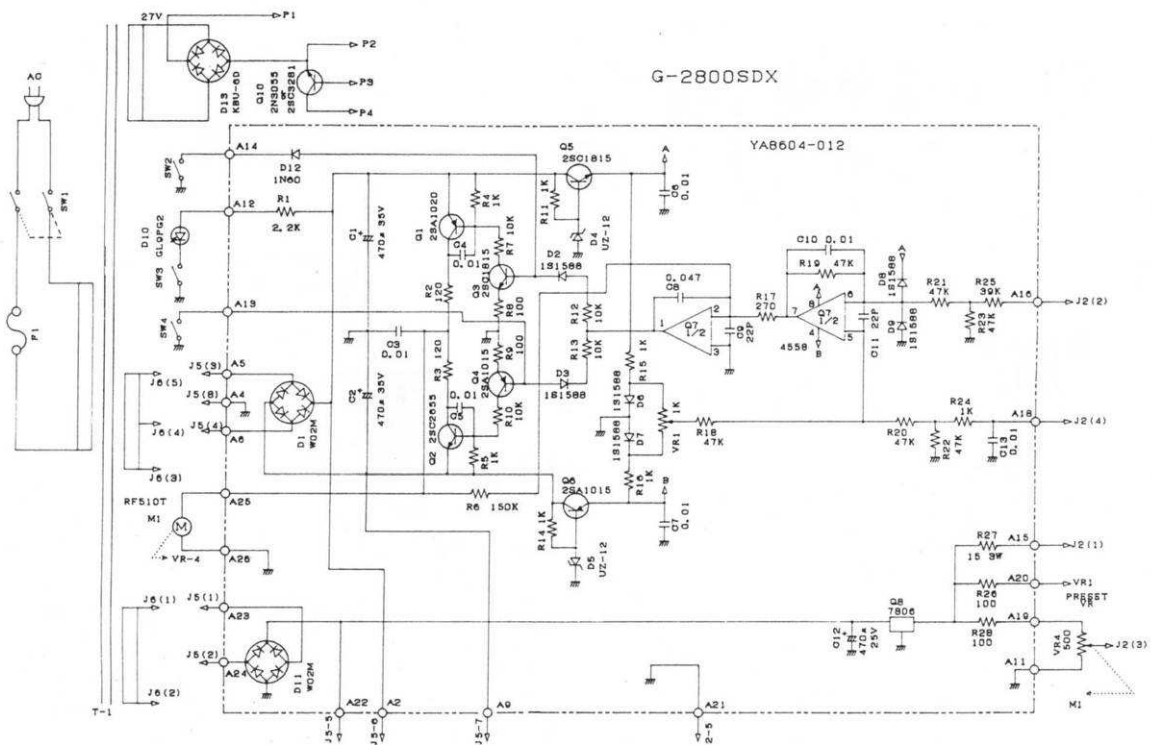
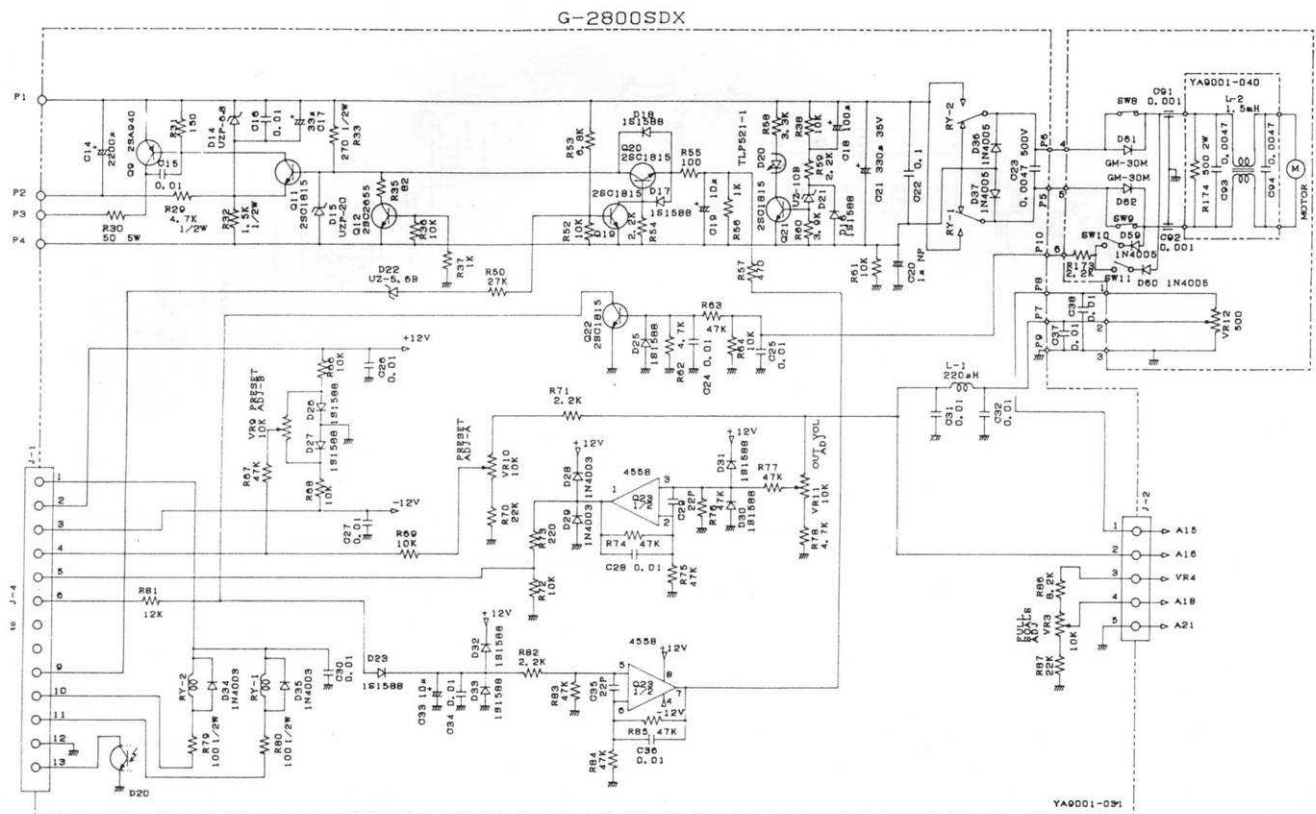
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