Instructions

Congratulations for buying your EASY-ROTOR-CONTROL remote (shortly **ERC-R**). This document will guide you through the needed steps for assembly, configuration and installation of the **ERC-R**. You will reach the best result by following these instructions step by step.

## Table of contents

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Safety-Instructions

- Don't continue using the product if fit is damaged.
- Keep electronic assemblies and components away from children!
- Products that carry electric voltages must be handled by taking care about the valid instructions and regulations.
- If the product must be repaired, only use original spare parts! Using different parts may cause property damage and personal injury! The repair has only to be done by an expert!
- The installation has to be done by a skilled expert.
- Connection-cables have to be chosen according to the needed diameter.
- Before working on the product all supply-voltages have to be securely cut of.
- The product is designed to work in clean and dry areas inside buildings.
- Prevent the product of humidity, water and heat.
- Don't use the product in areas where explosive gases, vapour or dust are or may occur.
- Don't let the product fall or apply mechanical stress as the product may be damaged.

1. Bill of Material (BOM)

ERC3-R V1.2 Bill Of Material

QTY	Type	Value	Pitch(mm)	Reference	Comments
1	PCB assembled	ERC-R V1.2			SMD assembled
1	USB-Jack	Type B		USB	assembled
2	Box-Header	2x5 pole		LCD,LED&SWITCH	assembled
1	Potentiometer	10KA	PT6-L	Contrast	assembled
1	Pinheader	2x3 pole		ISP	assembled
1	Jumper	red	2.54mm	Reset	
1	Heat-shrink tube	6.4mm x 2cm			for cable
1	Cable-Tie	150mm			for cable
4	Screws	2.9mm x 6.5mm			
1	Housing	72mm x 50mm x 27mm			incl. 4 screws
1	USB-Cable	A to B 1.8m			
1	Isolated wire	10 cm			

2. Assembly of the Controller PCB

The PCB is fully assembled when delivered, so you don't have to take care about the items greyed out in the bill of material. All other parts will be needed to prepare and connect the rotator-specific cable, to mount the PCB into the housing and to connect the ERC-R with the computer.

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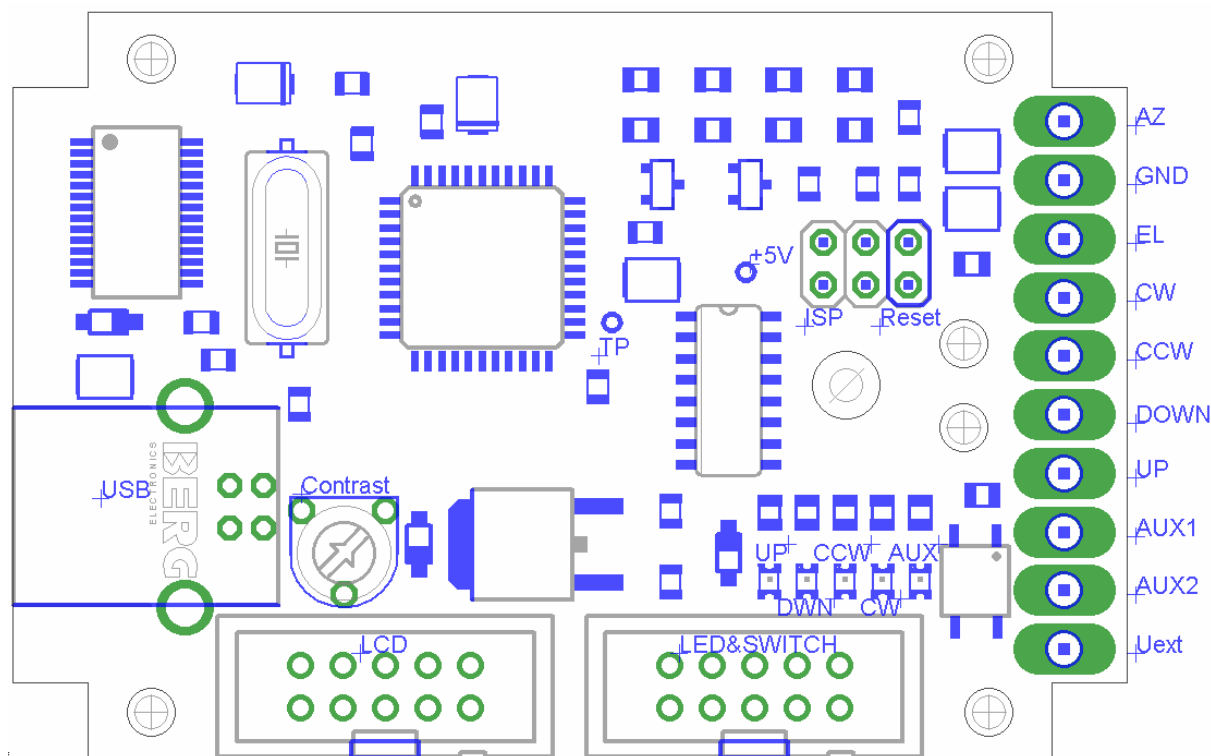
3. Establishing of the USB-connection

Plug the USB-B-connector to the ERC-R and the USB-A-connector to a free USB-connector on your PC.

Depending on your operating-system, you will be asked to install an USB-driver. This driver is available on the CD delivered with your kit.

After successful installation of the driver, a new COM-Port (COMn) is available. You can identify the COM-port-number by inspecting the hardware-settings of your PC.
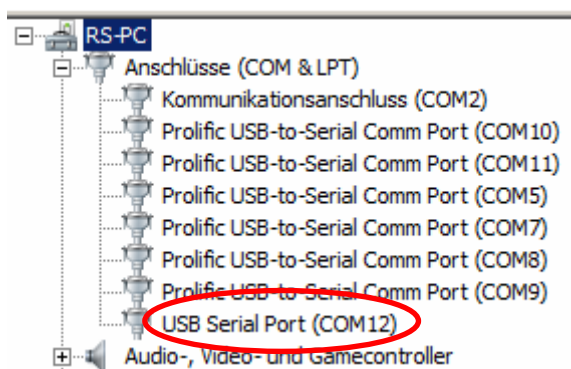
4. Installation of the Service-Tool

The Service Tool is on the CD supplied with the kit.

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Start the Setup-File **SETUP ERC-R_Vnn.EXE** (nn=version) directly on the CD and follow the instructions.

The installation wizard will automatically install the Service Tool in the program directory (or any other if you choose a different one) and put an icon on your desktop.

5. Configuration of the Service Tool

Start the Service Tool by double-clicking the Icon on the desktop.

5.1 Configuration of the COM-Port

On shipment, the Service Tool is configured to COM1, which is most properly not the comport, where you connected the ERC-R, hence after Start-Up the program may bring up an error-message because of the wrong COM-Port.

Choose the right COM-Port. Comport [5 ▼]

The Service Tool will check the availability of the ERC-R at the chosen COM-Port. If successful, the Service Tool will read the configuration-parameters of the ERC-R and populates the ERC-configuration-window and the ERC-calibration-window.

You can now perform a little hardware-test before the installation. Click the [Test]-button and all LEDs on the PCB will be switched on sequentially. This test-function can be stopped by pressing the button again.

5.2 Read the ERC-R-configuration-parameters

The parameters of the ERC-R can be read by clicking the [Read ERC] button.

5.3 Language

The Service-Tool and the help-files are available in different languages. Choose the language with the Language [EN ▼] -box.

5.4 Other functions of the Service Tool

The other functions of the Service Tool are well described in the help-function of the Service Tool. Click the [Help] button.

Now, disconnect the ERC-R from USB for the further steps.
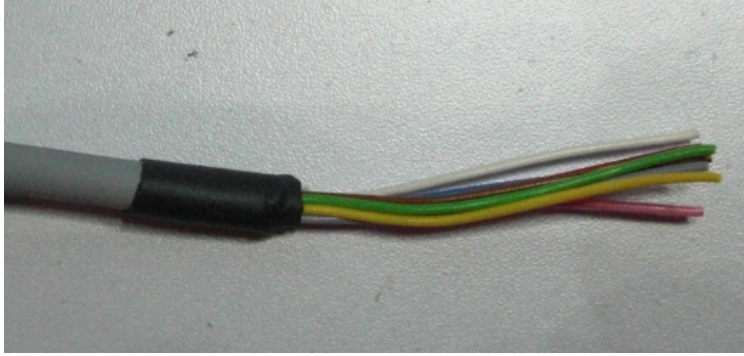
6. Preparation and connection of the rotator-specific-cable

Prepare the rotator-specific cable according to the following pictures:

Dismantle the outer insulation by 40mm and remove the shielding
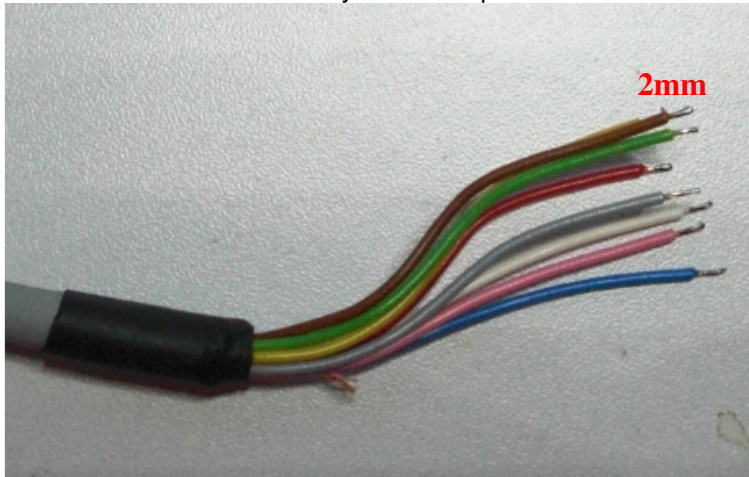

40mm
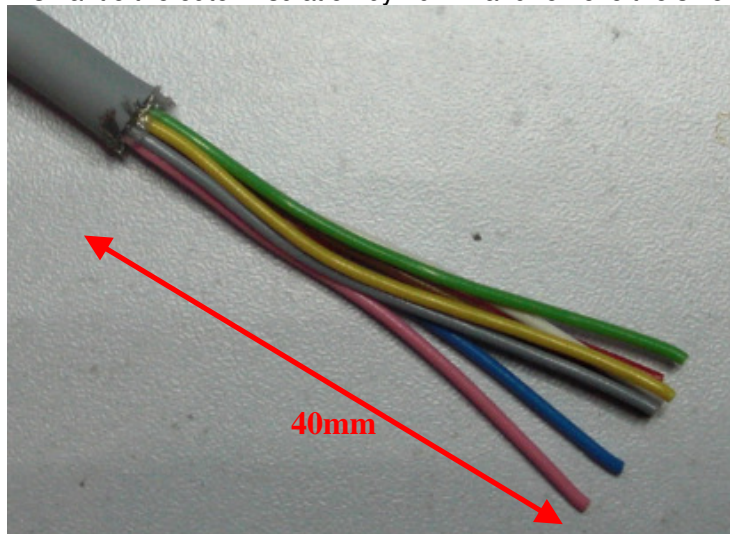
Put the heat-shrink tube over the cable to avoid later shortages

Dismantle the inner cables by 2mm and pre-solder them

Follow now the rotor-specific instructions in the next chapter to solder the cable to the PCB and to solder the rotor-specific connector to the cable (if you don't have it already assembled).
If you got a cable with the connector already on it, you have to measure, which of the contacts corresponds to which colour of the cable.
The view to the rotor-specific connectors in the instructions is always looking from outside to the control-box connector.
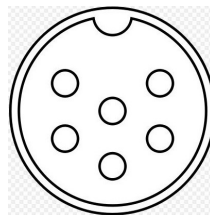
Example :   =>

The connection is made by a colour/number scheme. Depending of the type of rotator, between 5 and 8 connections are needed:

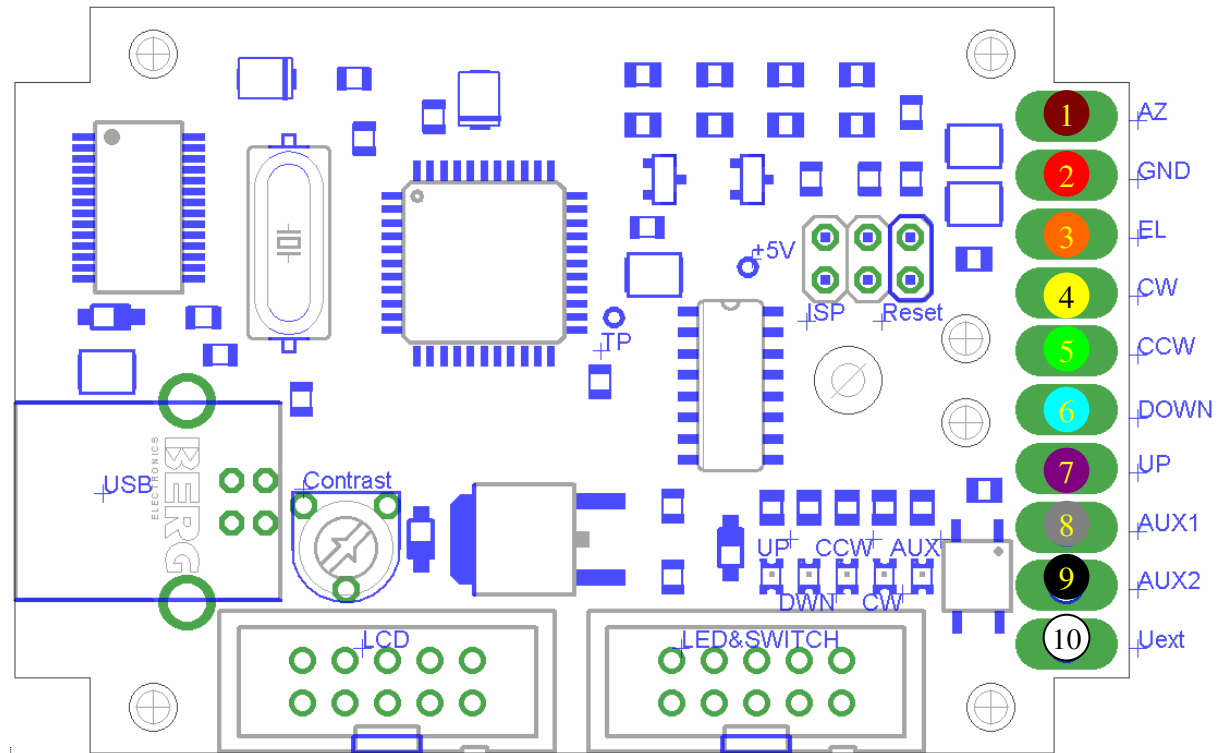| #	Label
1	AZ
2	GND
3	EL
4	CW
5	CCW
6	DOWN
7	UP
8	AUX1
9	AUX2
10	Uext

Example for soldering the wires to the ERC-R. Details for your rotator follow in section 6.1. ff

Guide the wires from the top-side to the bottom-side through the hole in the PCB
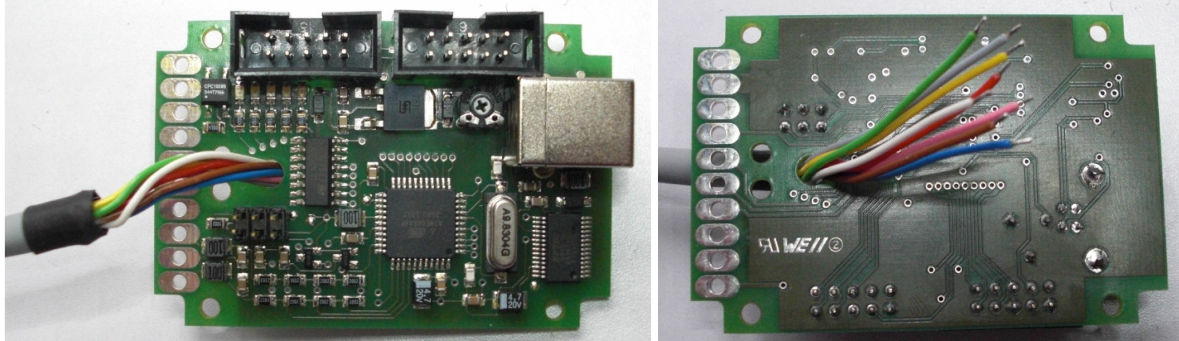
If the rotator-specific-instruction tells you to make a bridge between pins on the ERC-R PCB do this on the bottom side by using the isolated wire as shown.
Pre-solder the connections and finally insert the cables as specified in the rotator-specific section.
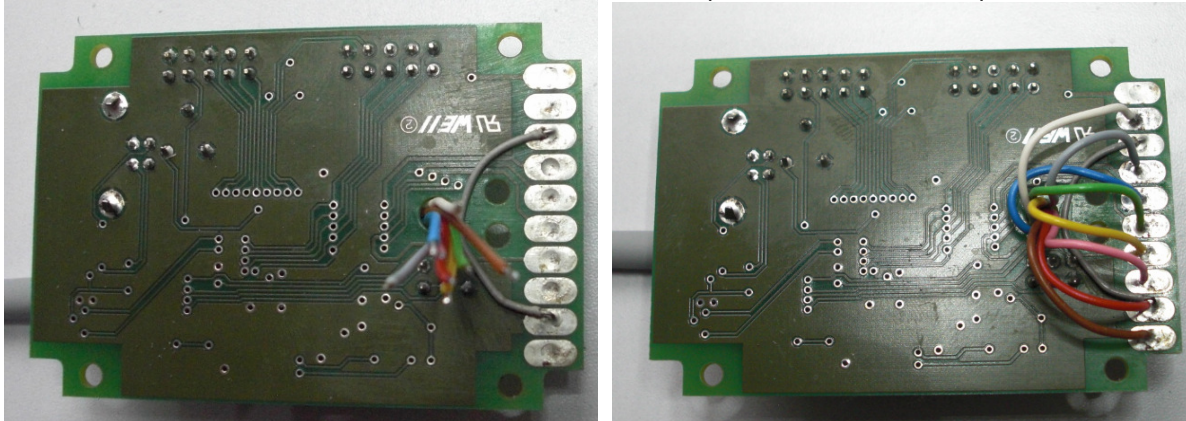
After soldering fix the cable with a tie-wrap to the PCB

Put the jumper on only 1 pin of the ISP-connector as shown. You may need this jumper for a later firmware-update.
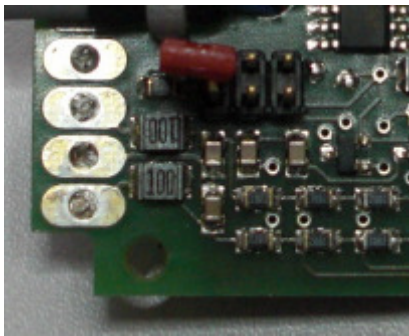
6.1 YAESU/KENPRO G/KR-5400/5500/5600

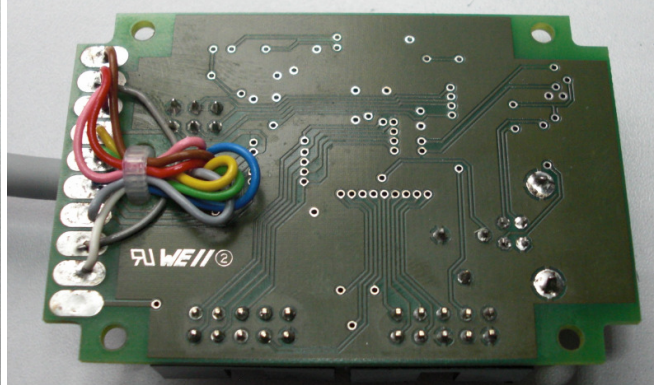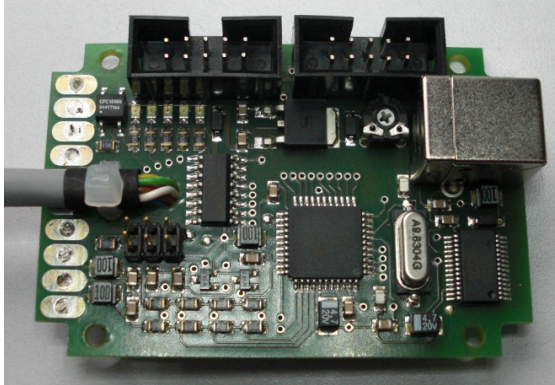Type of rotator: Azimuth/Elevation combi-rotator
Type of connector: 8-pole DIN, 8 connections
AUX-Control: none
Supply from remote-connector: yes
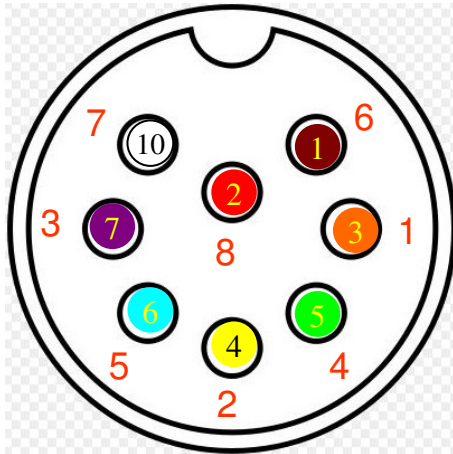
6.2 YAESU/KENPRO G/KR-800/1000/2700/2800 SDX

Type of rotator: Azimuth-rotator
Type of connector: 8-pole flat connector in the rotor-controller cabinet, 6 connections
AUX-Control: speed
Supply from remote-connector: yes
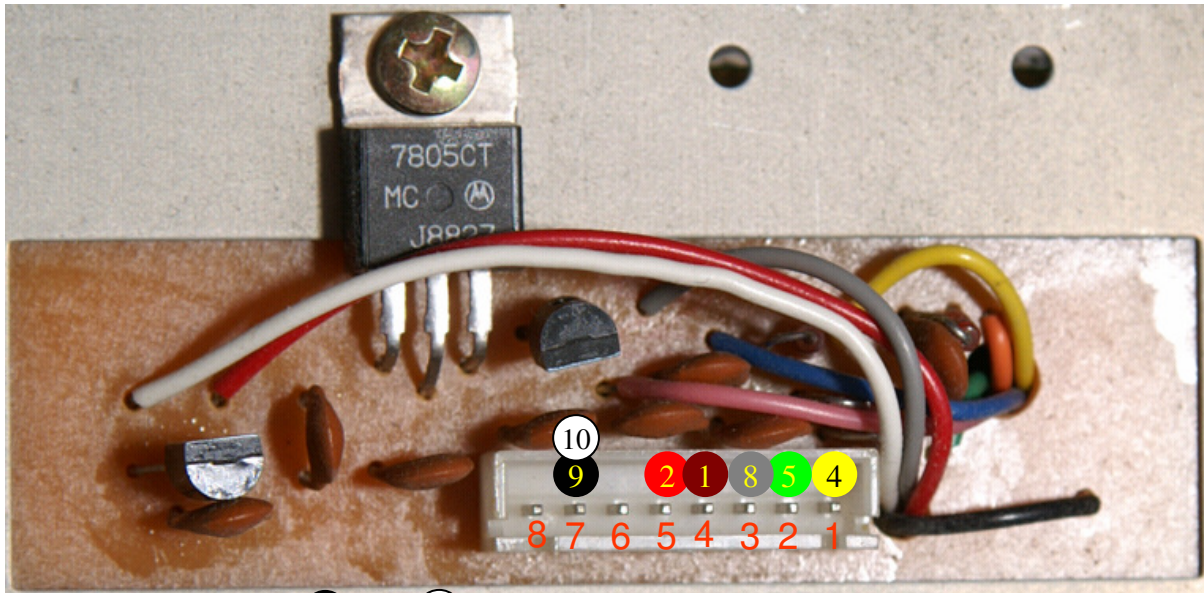
Make a bridge between (9) and (10) on the ERC-R PCB

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6.3 YAESU G-800/1000/2800 DXA/DXC

Type of rotator: Azimuth-rotator
Type of connector: 6-pole Mini-DIN connector, 6 connections
AUX-Control: speed
Supply from remote-connector: no
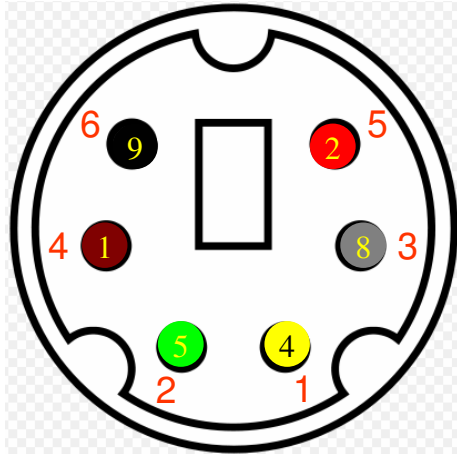
6.4 CREATE RC5A/B-3-P

Type of rotator: Azimuth-rotator
Type of connector: 6-pole DIN connector, 6 connections
AUX-Control: reverse-speed
Supply from remote-connector: yes

Make a bridge between 2 and 9 on the ERC-R PCB and connect them to the shielding of the cable.

6.5 CREATE ERC5A-P

Type of rotator: Elevation-rotator
Type of connector: 6-pole DIN connector, 6 connections
AUX-Control: none
Supply from remote-connector: yes
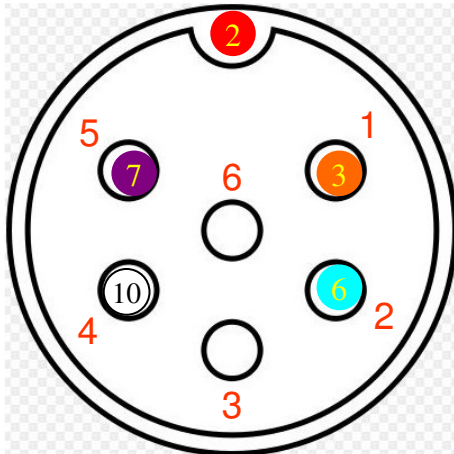
Connect ② to the shielding of the cable.

Leave ⑩ away if you already supplied the ERC-R with an Azimuth-rotator.

6.6 EMOTATOR 747 SRX – 750FXX – 1200 FXX/FMX – 1300 MSAX – 1800 FXX

Type of rotator: Azimuth
Type of connector: 5-pole DIN connector, 5 connections
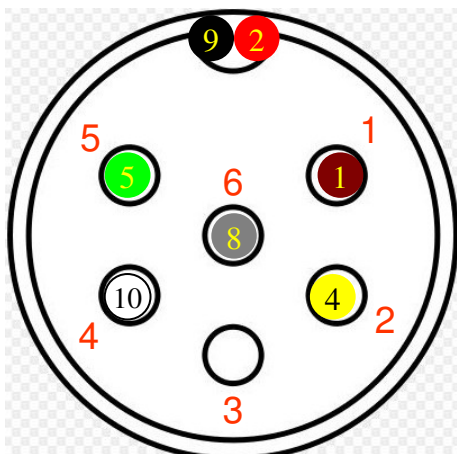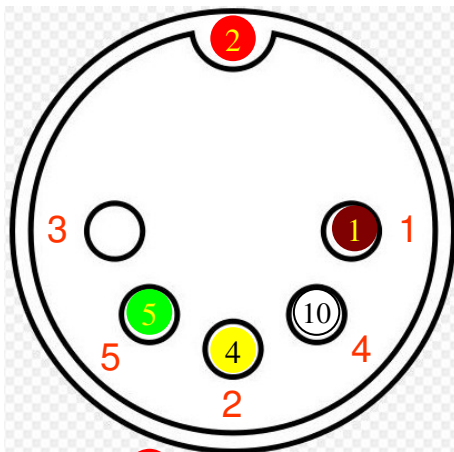AUX-Control: none
Supply from remote-connector: yes

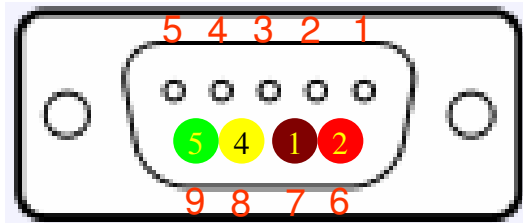Connect ② to the shielding of the cable.

6.6 PRO.SIS.TEL: Model B

Type of rotator: Azimuth
Type of connector: 9-pole D-Sub male, 4 connections
AUX-Control: none
Supply from remote-connector: no

7. Installation of the ERC-R into the housing

Drill 2 holes into the housing for the cable and the USB-connector. Proceed as follows:
- put the PCB into the bottom housing and mark the position of the holes on the housing's surface
- remove the PCB
- Put the housing together with the 4 screws
- Drill the hole for the cable. Diameter depending on your cable used (4..6mm)
- Drill the hole for the USB-connector with 10mm

Mount the PCB with the 4 screws 2.9x6.5 into the housing and close the housing with screws.
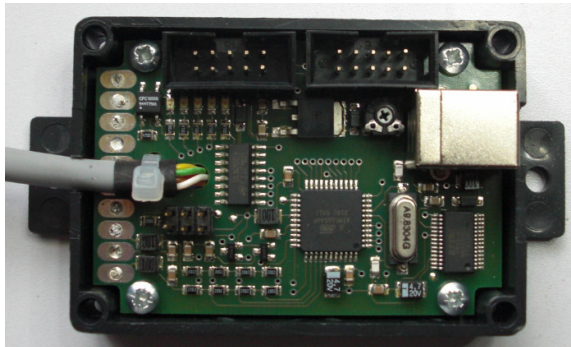
8 Theory of operation

A Microcontroller receives commands via the USB-interface in the Yaesu GS-232B (or GS-232A) protocol from the programs that support controlling rotators. These commands include the target-position for the rotators (Azimuth 0..360° and Elevation 0..180°), a rotor-stop-command or the request to report the current position of the rotator.

The ERC-R takes the task to move the rotator to the desired position or to stop the rotator while it is moving. Also changes of the direction are possible while the rotator is moving. The current position of the rotators is calculated by the ERC-R from the measured rotor-feedback-voltages AZ and EL. To achieve accurate function, the ERC-R has to be calibrated to the specific value of the rotor-feedback-voltages (ref. to the next chapter).

Depending on the direction to move, the contacts CW and CCW or UP and DWN are tighten to ground. With a programmable delay the contact AUX1 and AUX2 will be activated to control the speed of the rotator (if the rotator supports speed-control by the remote-connector).

The ERC-R is powered by the USB-bus. The current consumption is according to the USB-specifications. Using an USB-hub may require to power this hub. Wherever there is a suitable DC-supply available on the rotor-controllers remote-jack, it is taken from there to supply the ERC-R. The ERC-R is than switching automatically to the external supply in order not to drawn current from the USB-bus.

9. Calibration

After the ERC-R is connected to the rotor-controller, it has to be calibrated. This calibration is needed, because different kinds of rotators deliver different kinds of feedback-voltages. Also variations between rotators of the same model would lead to inaccuracy. To calibrate the ERC-R, it has to measure the rotor-feedback-voltages at both ends and possible overlaps (turning radius > 360°). The calibration is a software-guided procedure, which will be started by pressing the [Calibrate AZ] or [Calibrate EL] button of the service tool. Just follow the instructions given by the calibration assistant.

10. First check of calibration with Rotor-Control 3D

The rotor-control-program Rotor-Control 3D is on the CD supplied with the kit.

Start the Setup-File **SETUP RC-3D_Vnn.EXE** directly on the CD and follow the instructions.
The installation wizard will automatically install the Service Tool in the program directory (or any other if you choose a different one) and puts an icon on your desktop.

Start Rotor-Control 3D by double-clicking the Icon on the desktop.
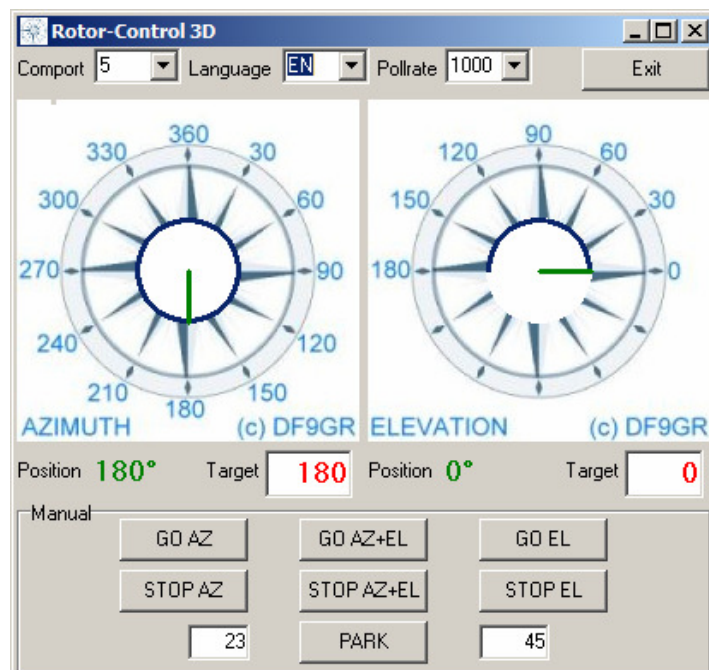
The green pointers and numbers show the current position of the rotators.
Targets can be put at the red numbers.
You can control the rotators for Azimuth and Elevation separately or together. Click the GO- or STOP-buttons.
You can also move a rotator to a target-position by clicking on any point of the graphics.
By clicking the button PARK, the rotators move to their configured parking positions.

11. First check of calibration with PstRotator-Lite

On the CD you will find a Lite-version of the professional rotor-control-program PstRotator by YO3DMU. Install the program by starting the setup-file „PstRotatorAZEL_Lite" in the directory PstRotator Lite der CD.

Close the Service-Tool before you start PstRotator as they cannot share the same COM-port.
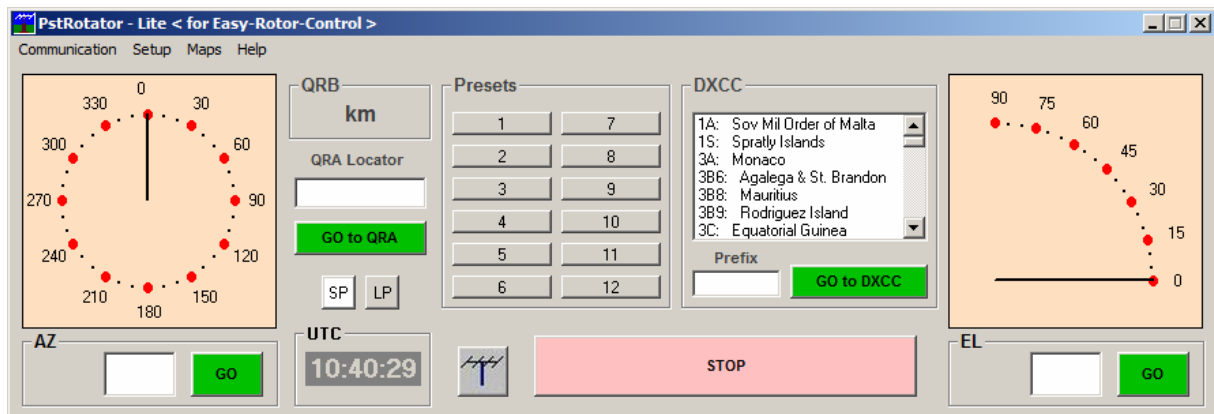
12. Connect the ERC-R to other programs

Please take care about the following issues, if you want to control your ERC-R with other programs :

- Choose the right COM-port
- Adjust the comport in the program to : 9600 N81
  - 9600 Baud
  - No Parity
  - 8 databits
  - 1 stopbit
- Use the protocol Yaesu GS232B or GS232A

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13. Optional LCD-display

LCD Assembly					
1	LCD-Display	16x2			
1	Flat ribbon cable	20cm10 pol.	1.27		
1	Connector	2x5 pol.	2.54		for flat ribbon cable
2	Resistor	27R 5%			
4	Distance-Bolt	M3x8x6mm			
4	Spring-Wascher	3.2mm			
4	Nuts	M3			
4	Screw	M3x6mm			

Cut the flat-ribbon-cable if you need a different length.
Position the connector as shown in the following picture and take care about the coding-plug.
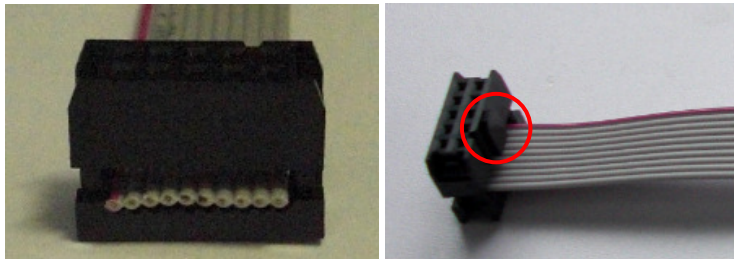
Press the connector by using a pliers or a vice unless it snaps in.
Bend the flat-ribbon-cable once on the top of the connector and put the strain relief on top.

Solder the 2 pieces of 27R resistors for the LCD-Backlight to the LCD-display according to the following pictures.

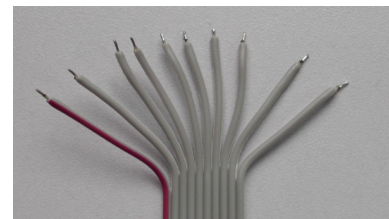1x 27R on the bottom-side of the LCD between Pin 2 und Pin 15
1x 27R on the top-side of the LCD between Pin 1 und Pin 16

Take care not to make any shortages with the legs of the resistors

Splice the 10 wires of the flat-ribbon-cable by 5cm.

Dismantle the 10 wires and pre-solder them.

Solder the 10 wires to the display as shown (take care about the red marking of the flat-ribbon-cable).
After soldering attach the 4 bolts with nuts for mounting. Use spring-washers below the bolts.
Now connect the flat-ribbon-cable to the 2x5 boxheader LCD on the ERC-R-PCB

The LCD is showing the current position for Azimuth (AZ) and Elevation (EL), the target positions and
the directions when moving.

14. Optional LED&Switch-PCB

LED+Switch V1.0 BOM				
1	PCB	ERC-LS V1.0		
4	Switch	13mm black		
1	Box-Header	2x5 pole		
5	Resistor	300R 5%	2.5mm	
1	LED	red 3mm LC		
2	LED	green 3mm LC		
2	LED	yellow 3mm LC		
4	Distance-Bolt	M3x8x6mm		
4	Spring-Wascher	3.2mm		
4	Nuts	M3		
4	Screw	M3x6mm		
1	Flat ribbon cable	20cm 10 pol.	1.27	
2	Connector	2x5 pol.	2.54	for flat ribbon cable

Identify the top-side of the PCB by the printed number 1 on the top-side
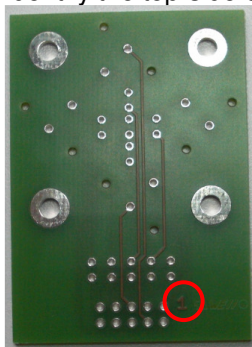
Mount the 4 bolts to the bottom-side of the PCB by using the spring-washers and nuts on the top-side
and solder the resistors and the box-header to the top-side. Take care about the polarity of the box-
header.
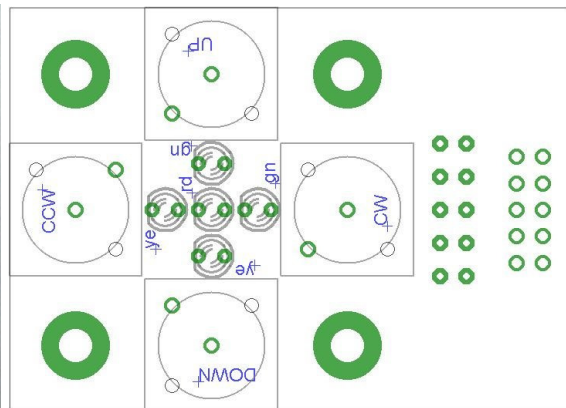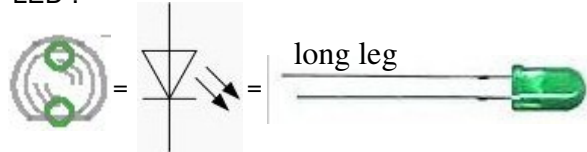Put the screws into the bolts. This will give a proper distance of about 11mm for the LEDs.
Assemble the LED from the bottom-side. All long legs of the LEDs have to show to the connector.
Assemble the switches also from the bottom-side.
Carefully align the LEDs and switches before soldering.

LED :

long leg
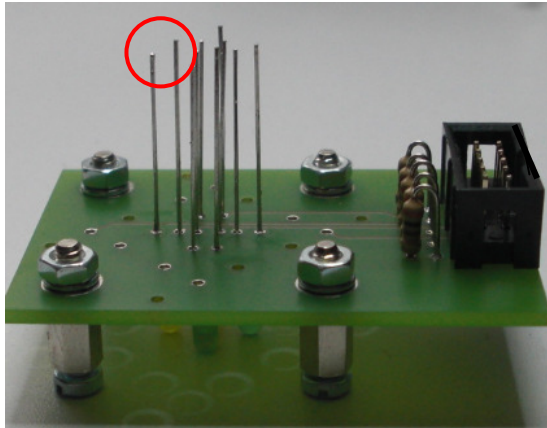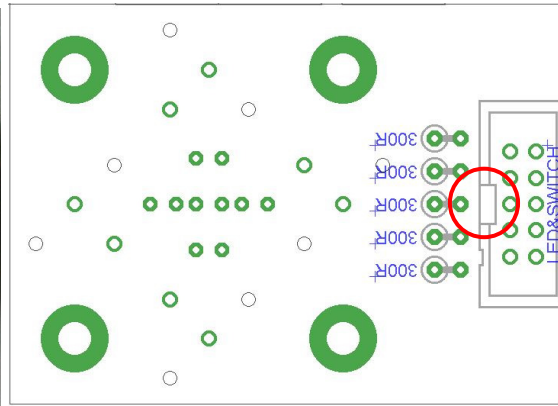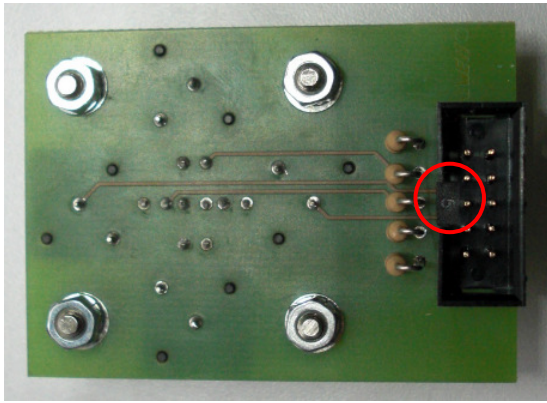
Cut the length of the flat-ribbon-cable if needed and align the connectors as shown. Take care about the coding-plugs of the connectors.
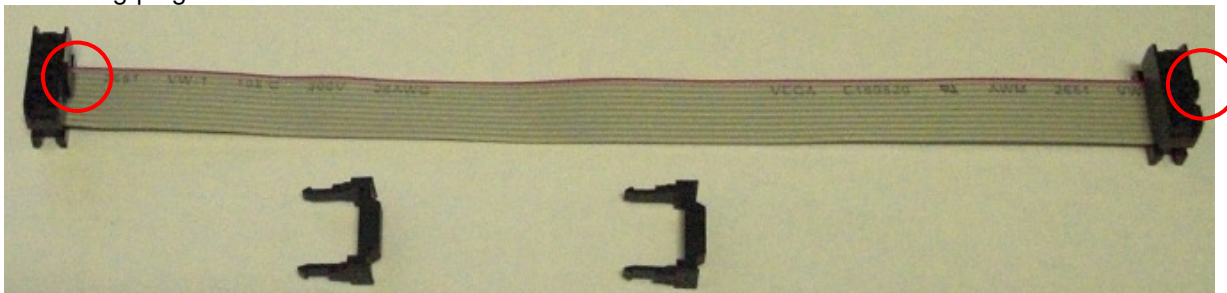
Press the connector by using a pliers or a vice unless it snaps in.
Bend the flat-ribbon-cable once on the top of the connector and put the strain relief on top.
Now connect the flat-ribbon-cable to the the 2x5 boxheaders on the LED&Switch-PCB and the ERC-R-PCB.

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15. Pinning of accessory-connectors

LCD connector

Pin	Signal	Comment
1	GND	
2	VCC	+5VDC
3	V0	LCD-drive, 0..+5VDC adjustable with contrast-potentiometer
4	RS	
5	R/W	connected to GND
6	E	Enable
7	DB4	
8	DB5	
9	DB6	
10	DB7	

LED&switch-connector

Pin	Signal	Comment
1	GND	
2	UP	switch input, active low
3	DOWN	switch input, active low
4	CCW	switch input, active low
5	CW	switch input, active low
6	LED UP	LED-output, active high, max-current 10mA
7	LED DOWN	LED-output, active high, max-current 10mA
8	LED CCW	LED-output, active high, max-current 10mA
9	LED CW	LED-output, active high, max-current 10mA
10	LED AUX	LED-output, active high, max-current 10mA

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