Stichting Consortium Beroepsonderwijs

platform metaal & metalektro

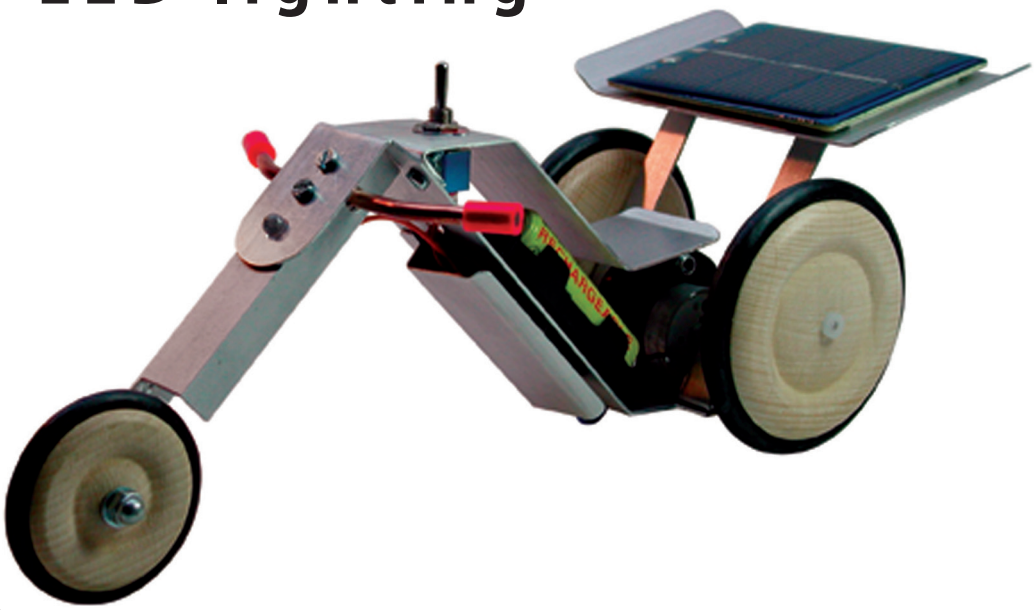
Met uw leerlingen aan de slag ?
Bestel de docentenhandleiding en het instructiemateriaal
Teken en ontwerp De Energy Trike met het 3 D tekenpakket Solid Edge
Bekijk de 3 D animatie op Youtube
Stap in de wereld van Augmented Reality
Stuur voor meer info een mail naar:
HYPERLINK "mailto:platformm-me@consortiumbo.nl"
platformm-me@consortiumbo.nl

Materialen zijn te bestellen bij: OPITEC is uniek

http://nl.opitec.com/opitec-web/st/downloads

110.693

Energy Trike with ACCU battery drive and LED lighting



Necessary materials

Fretsaw with metalworking blade
Drills dia. 3, 5, 6, 7, 10
Machine vice with soft jaws
Soldering iron, solder
Side cutters
Wire strippers
Combination pliers
Mole grips
Screwdriver
Spanner 5,5
Rivet gun
Centre punch
Sharp pencil
Ruler
Set square
Insulation tape

Please Note

The OPITEC range of projects is not intended as play toys for young children.They are teaching aids for young people learning the skills of Craft, Design and Technology.These projects should only be undertaken and tested with the guidance of a fully qualified adult.
The finished projects are not suitable to give to children under 3 years old. Some parts can be swallowed. Danger of suffocation!

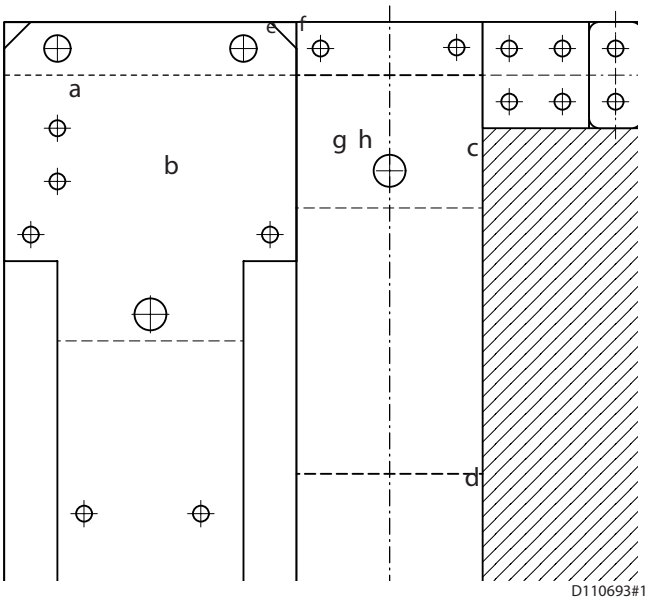
INSTRUCTIONS

PARTS LIST				
	Quantity	**Size**	**Descripton**	**Part**
Aluminium sheet	1	200x200x1	Metal part	1
Aluminium section	1	100x16,5x10x1,5	Fork	2
Welding rod	1	200x2	Rear axle	3
Welding rod	1	200x4	Steering	4
Wooden wheel /tyre	1	ø 43mm dia	Front wheel	5
Wooden wheel /tyre	2	ø 63mm dia	Rear wheel	6
Solar cell	1	80x60	Power source	7
Gear box	1		Gears	8
Solar motor	1	RF300	motor	9
Minature switch	1		Switch	10
LED red	2	ø 5	Rear light	11
LED Super bright	1	ø 5	Front light	12
Battery holder	1		Accu holder	13
Rechargeable Battery	1		Rechargeable battery	14
Voltage regulator	1		Component	15
Schottky diode	1		Diode	16
Cable –black	1	500	Circuit	17
Cable-red	1	500	Circuit	18
Machine screw	2	10x3	Fixing	19
Machine screw	8	8x3	Fixing	20
Machine screw	1	20x4	Front axle	21
Nuts	2	M4	Fixing	22
Lock nut	9	M3	Fixing	23
Cap nut	1	M4	Fixing	24
Cable tie	2	100x2,5	Fixing	25
Sticky pads	2		Fixing solar cell	26
Rivets	7	6x3	Fixing	27
Reducers	4	4/2	Rear wheel	28
Shrink tube	1		Cover for joint	29

Sawing out the metal parts

Step 1
Trace the plan (Page 15) on to the aluminium sheet (1). (see dia.1) Centre punch and drill the holes.

Note:
Trace the parts one after the other then cut them out.

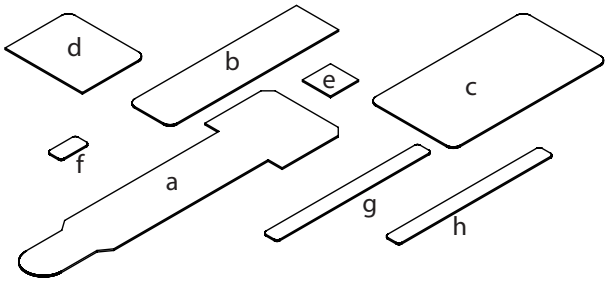


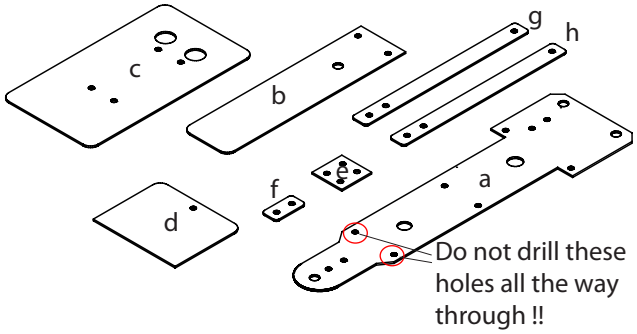
D110693#1

INSTRUCTIONS

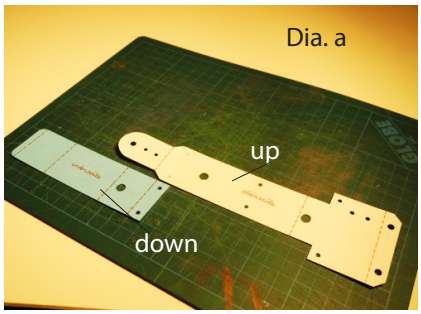
Step 2
Saw out all the aluminium metal parts according to the plan.
Remove the burr from the rough edges with a file.
Centre punch all the holes to be drilled.

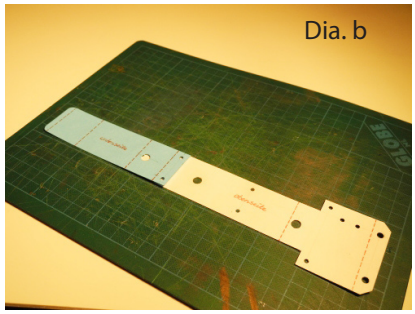
Step 3
Use a pair of mole grips to hold the individual parts when drilling (Drills 3,5,6,7,10 mm). Finally countersink the holes lightly to remove any burr.
Tape the two support strips together when drilling.
Please Note! There are two holes that are not drilled all the way through !!! SEE DIAGRAM (Step 4)

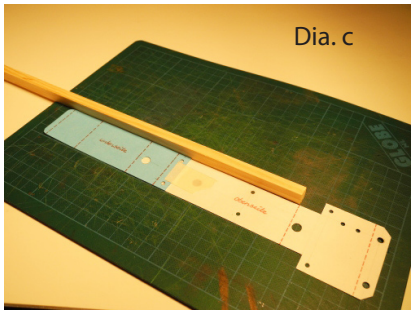




Step 4:
Take the seating part and turn it over and then sellotape it to the base. Use a ruler to make sure that it lines up. Make sure all the burr is removed from the holes.



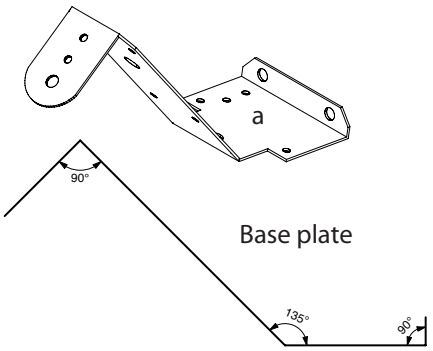


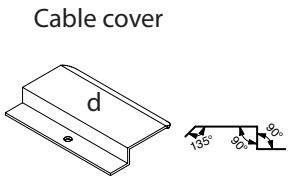


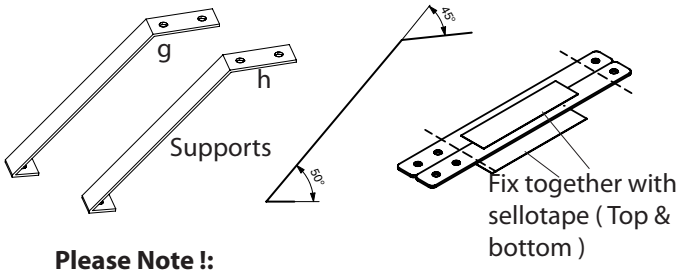
Fixing the metal sheet parts for boring part a

General
Use a machine vice with soft jaws to hold the parts for bending.

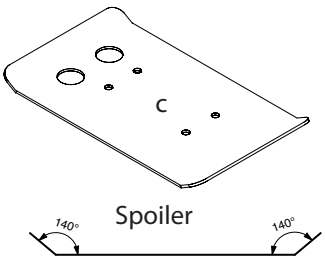
Step 5:
Use a pencil and ruler to draw the lines for bending on all the aluminium parts (Base,cover,supports, cable cover, motor fixing) See page 7. Bend the two supports (sellotaped together) at the same time !
Use a set square to check the angles.

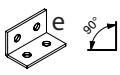


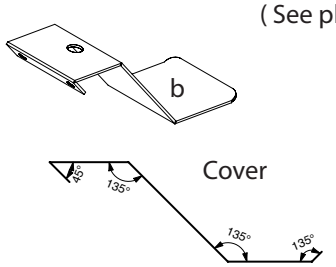


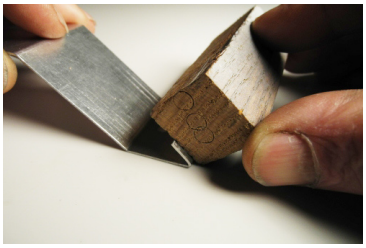


Please Note !:
When bending angles of over 90 degrees, carefully use a piece of wood to make the bend
(See photo underneath).





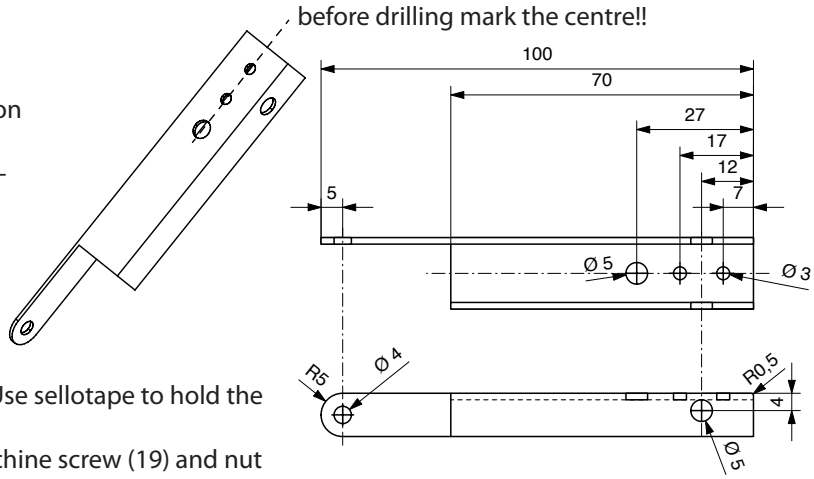




INSTRUCTIONS

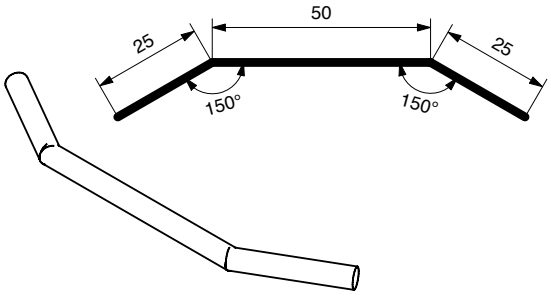
Constructing the front axle and steering

Step 6:
Mark 30mm with a pencil on the aluminium on the U section (2).
Carefully saw the section as shown in the drawing so that the left side
is left.
File any sawn edges smooth.



Mark out with a pencil the holes in the top. Use sellotape to hold the fork on the frame.
Drill the first 3mm hole and then insert a machine screw (19) and nut (23).
Then drill the remaining holes. Remove the sellotape and remove any burr from the holes.

Step 7:
Cut the welding rod (4) handlebars to 100mm
Bend to shape as shown. See the pattern on page 7.

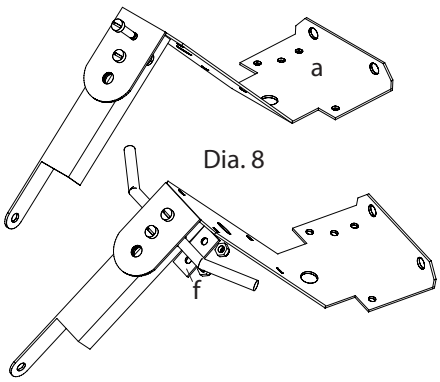


Assembling the solar trike

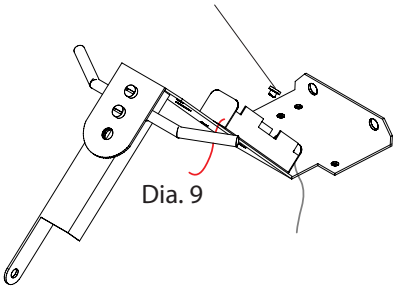
Note 1:
Before cabling the solar trike cut the cables to length according to the plan. Remove about 10mm insulation from the ends and twist wire strand together. All the ends with solder and then trim the ends to 8mm long.

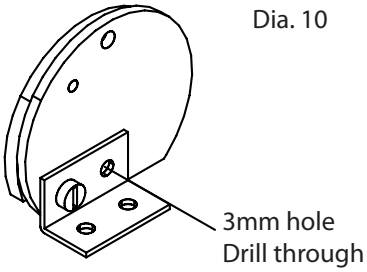
Note 2:
Before connecting the voltage block, tin the connections. Then solder the black and red cables as shown.

Note 3:
On the plan (See page 7) the points are shown with (●) where the shrink cover must be added before making the cable connection.



Flat side of rivet on top
To fix the battery holder



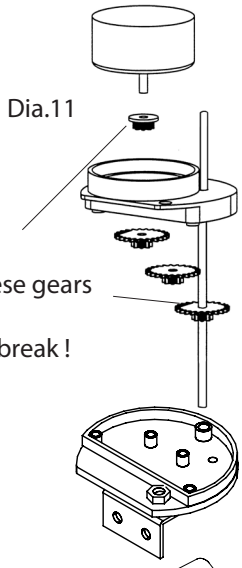


8. Mount the fork on the base frame using two machine screws (19) from the top.
Insert the steering from the side and clamp it in position.
Add the aluminium part (f) underneath and fix with two stop nuts (23)

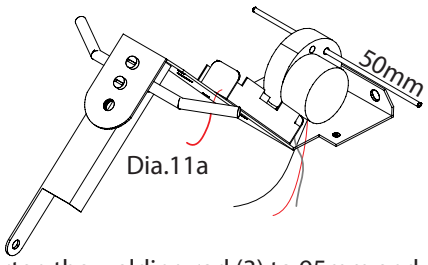
9. Set the battery holder (13) dia.9 in the basic frame, so that the red cable faces the fork and the black faces the rear of the trike . Line up the holes and rivet the holder in place.

10. Fix the motor holder (e) to the back of the gearbox using a machine screw (20) and nut (23) Drill the second hole 3mm dia. and insert a screw (20) and nut (23).

INSTRUCTIONS

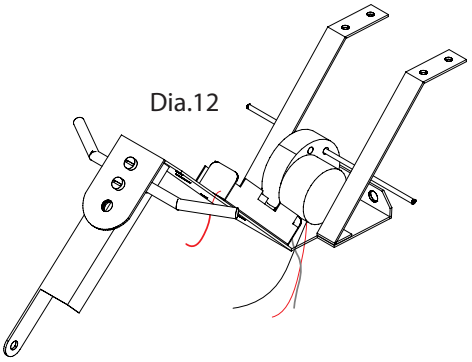


Note!
Place these gears carefully
as it can break !

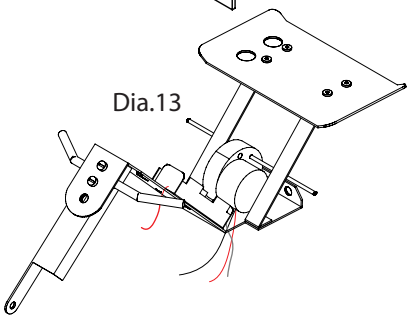


11. Shorten the welding rod (3) to 95mm and remove burr from the ends.
Assemble the gear box (8) using the above welding rod (rear axle).
Use two machine screws (20) and two nuts (22) to hold it together. See dia 11a.

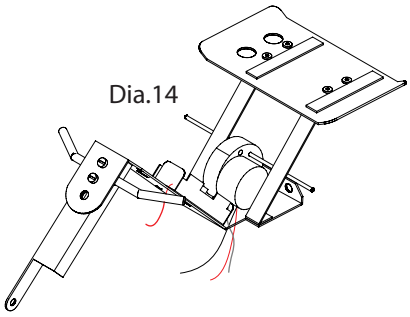
Note: the rear axle protrudes about 50mm.



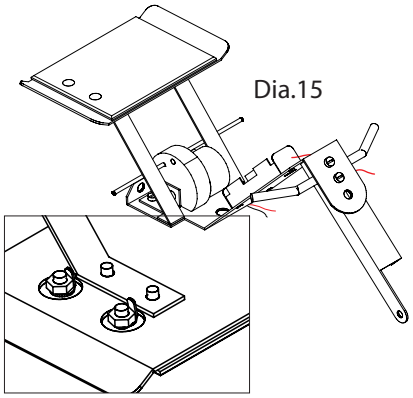
12. Rivet the two supports in place on the back of the trike.



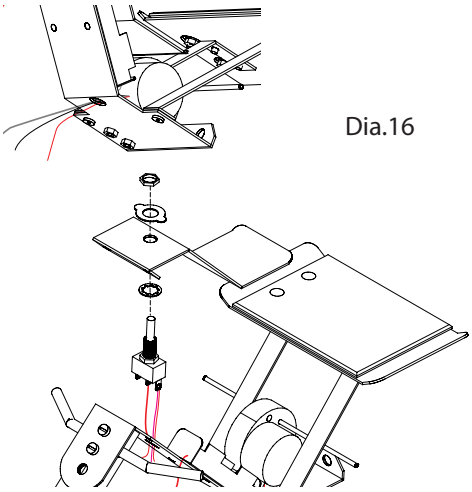
13. Rivet the spoiler in place as shown in Dia.13.
Note! The direction of the spoiler.



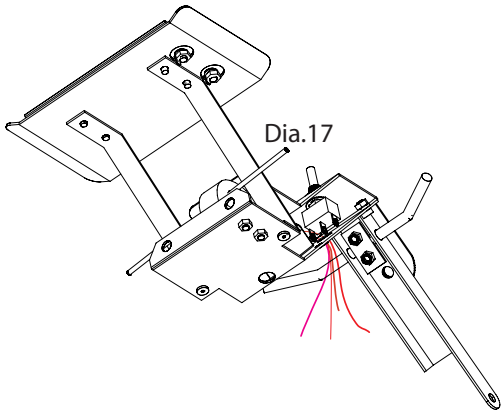
14. Place two sticky pads (26) on the spoiler.



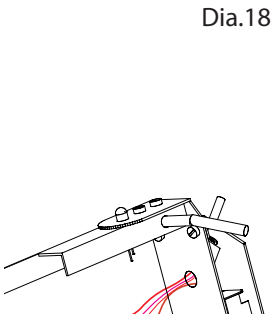
15. Screw the tabs on the solar cell. Set the solar cell (7) in place. Make sure the fixings line up with the holes and the cell is held in place by pressing it on the pads.



16. Steek de aansluitdraad van de motor evenals de zwarte draad van de batterijhouder door de achterkant van de trike. Soldeer de rode aansluitdraad van de motor en een ca. 60 m lang stuk van de rode draad (18) aan de buitenste aansluiting van de tuimelschakelaar. Soldeer een ca. 60 mm lang stuk van de draad (18) aan de middelste aansluiting. Bevestig de tuimelschakelaar zoals afgebeeld aan de afdekking.



17. Trek de draad van de tuimelschakelaar evenals de rode aansluitdraad van de batterijhouder door het gat 7 mm in de grondplaat. Bevestig de afdekking (6) met 2 cilinderkopschroeven (20) en 2 stopmoeren aan de grondplaat. (zie afbeelding 17)

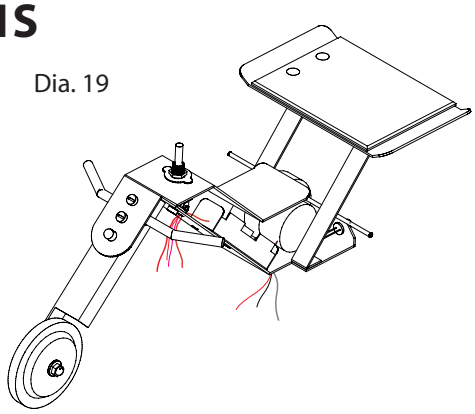


18. Then insert the white LED (12) in the 5mm hole in the front fork.

INSTRUCTIONS

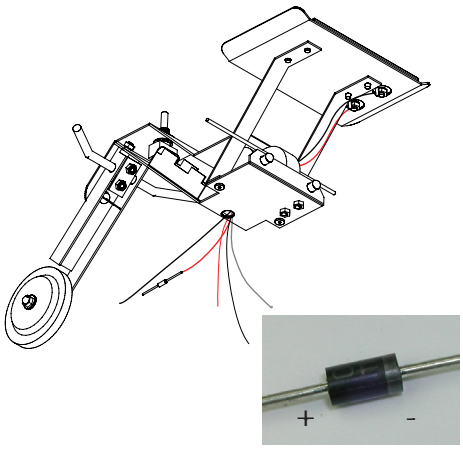
19. The rear lights (Led red, 11) are inserted through the 5mm hole in the rear of the frame.
Please note !
If its difficult to solder the LED in place. The gearbox can be moved. Insulate the solder joints with insulation tape.

Dia. 19

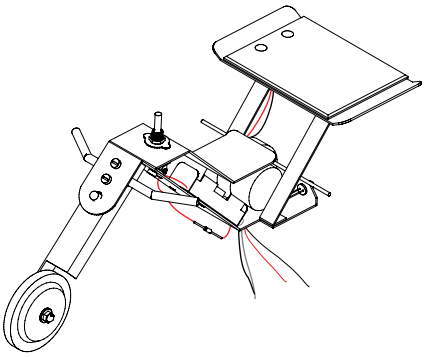


20. Insert a machine screw (21) through the axle in the front fork. Add a nut (22) and tighten. Add a wooden wheel (5) and finish with a capped nut (24). The fork should be able to turn. See dia.19

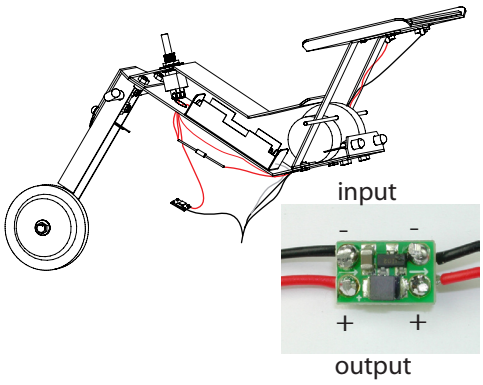
Cabling – For the lengths see the plan on page 7 :



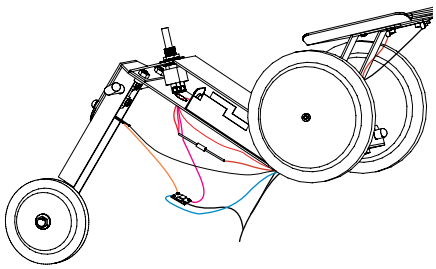
21. Solder one end of 150mm long black cable (17) to the back (minus) connection on the solar cell . Then solder a 150mm long red cable to the plus connection on the solar cell. Insert both cables through the 7mm hole in the rear of the trike. Solder the free end of the red cable to the Schottky diode(16). Don't forget to use the insulating shrink tube on the joints !



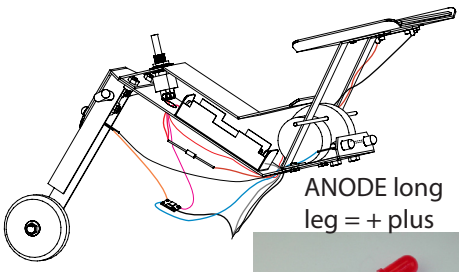
22. Place a piece of shrink tube over the red cable where it joins the Schottky-diode. Solder the black cable from the solar cell with the black cable from the battery holder.



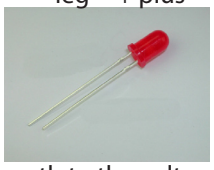
23. Connect a 60mm piece of black cable (17) with the black cable motor, battery and solar cell. Solder the free end of the black cable to the minus pole on the voltage regulator.
A red 60mm cable is soldered to the plus + connction on the voltage regulator (15). Solder the middle cable of the switch (10) with the Schottky diode (Shrink tube).



24. Solder a 60mm red cable (18) to the Anode of the LED (12) in the fork . The other end is connected to the voltage regulator (15) + output). Solder a 120mm piece of red cable from the Cathode on the LED (12) and guide it through the hole in the rear of the trike . Solder it to the Anode on the left hand side of the rear light (LED red,11) (Use shrink tube insulation).



CATHODE short leg = - minus



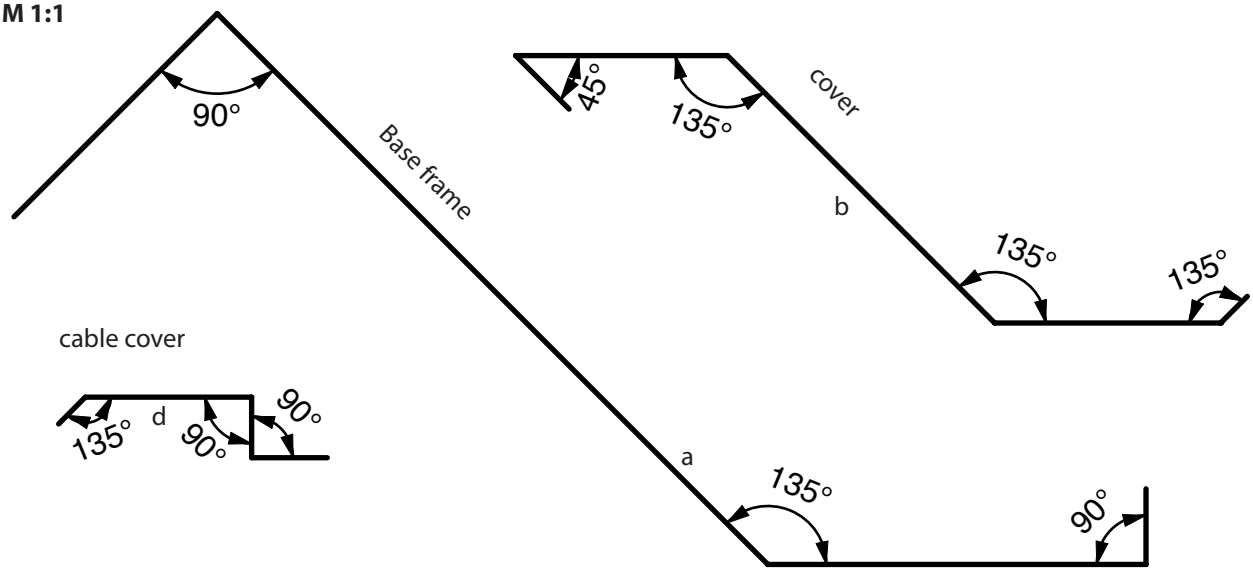
25. Solder a 100mm length to the voltage regulator to the free connection on the voltage regulator. The other end is soldered to the Cathode on the left hand rear light.
Insulate the joist with insulation tape ! Check the circuit .

26. Tie all the loose cable together with a clip(25) Add the cable cover using a machine screw(20) and a stop nut (23).

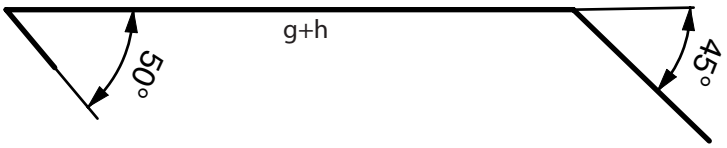
27. Insert a reducer (28) in each of the rear wheels. Push the two wooden wheels (6) on the rear axle . Finally mount the top cable cover using two machine screws (20) and 2 stop nuts (23).

INSTRUCTIONS

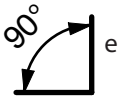
Bending pattern
M 1:1



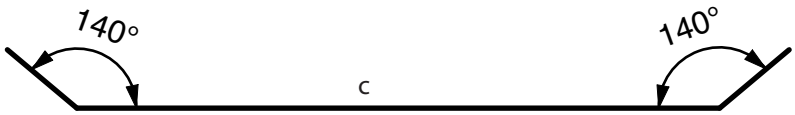
supports 1 and 2



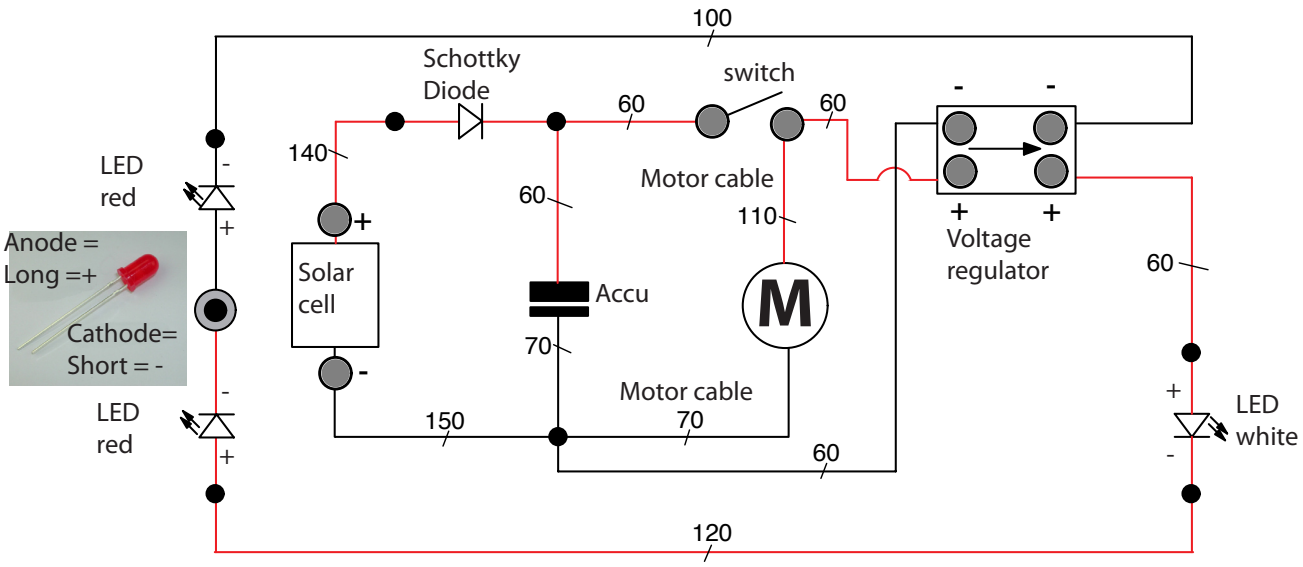
Motor fixing



Spoiler



Circuit diagram



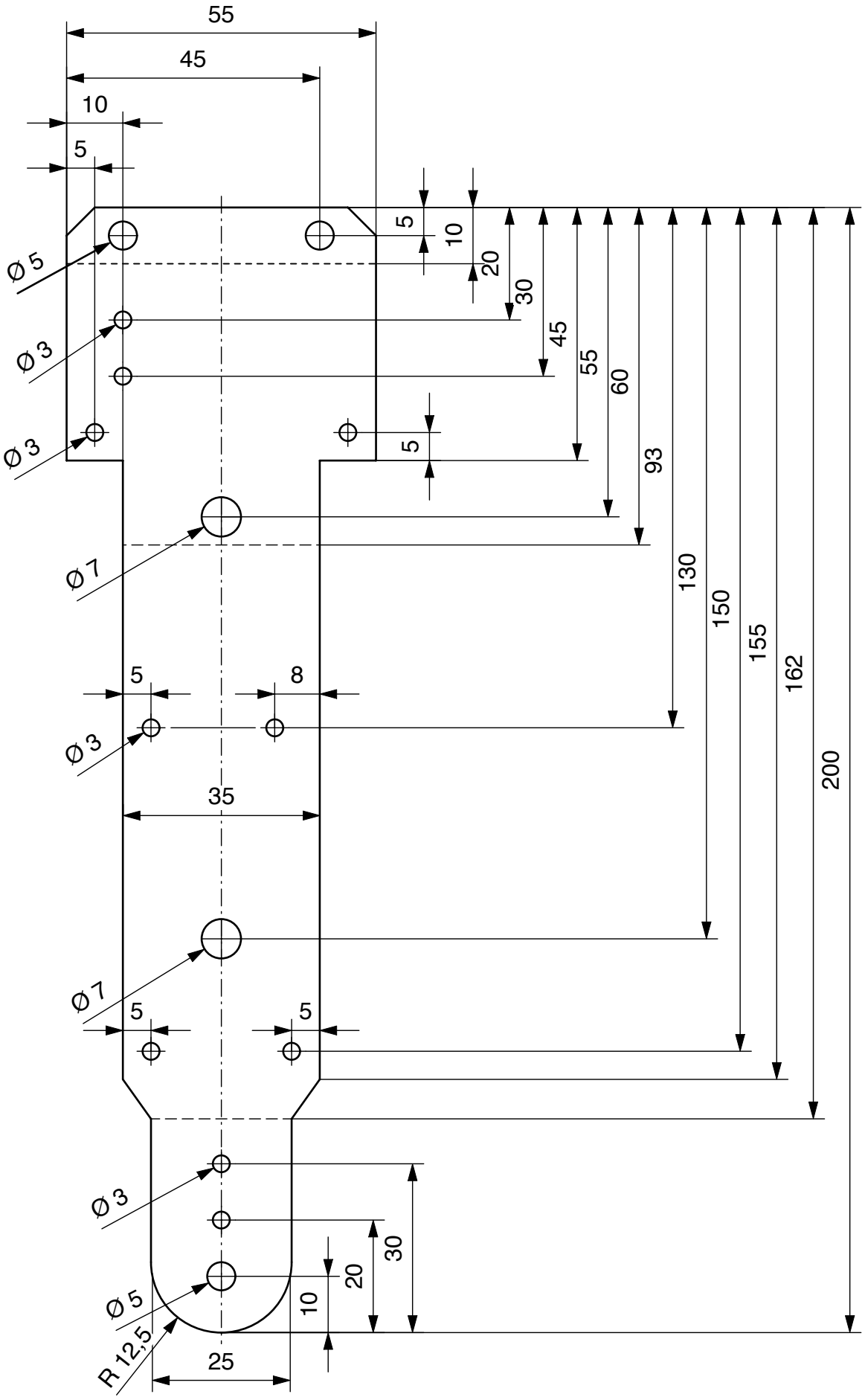
● Solder connection with shrink tube tape.

Soldering point

Solder covered with insulation

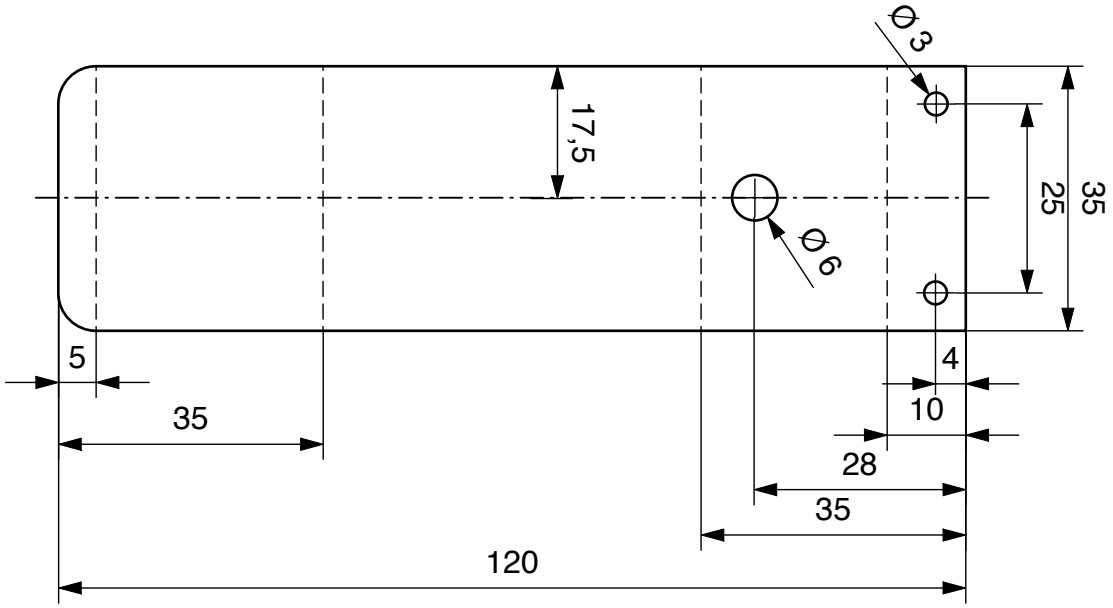
INSTRUCTIONS

Pattern for the base frame(a)
Scale 1:1

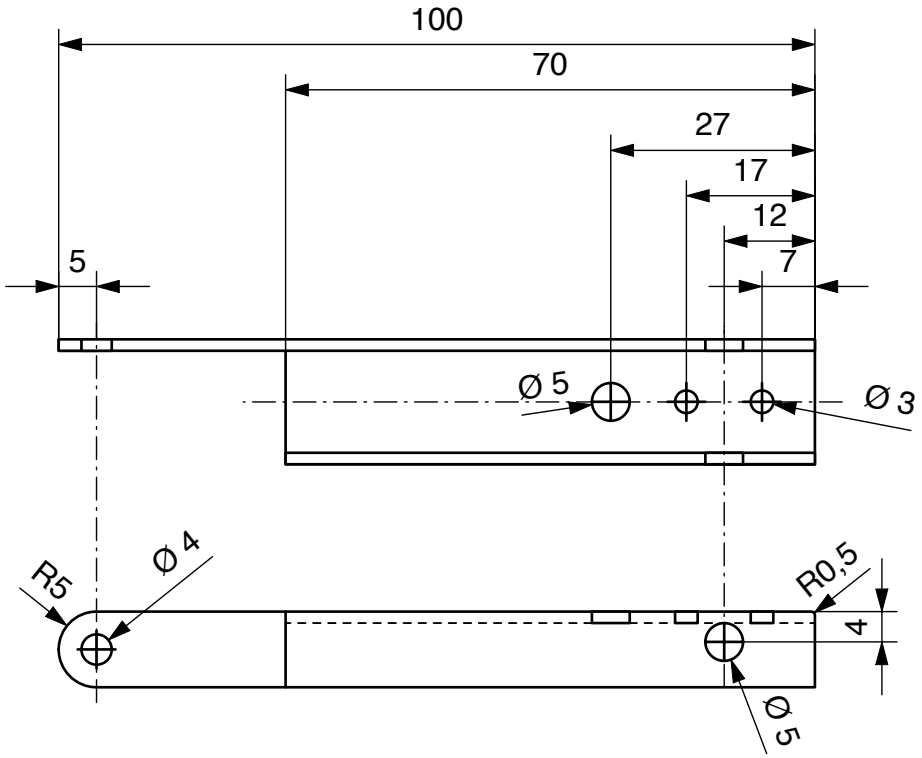


INSTRUCTIONS

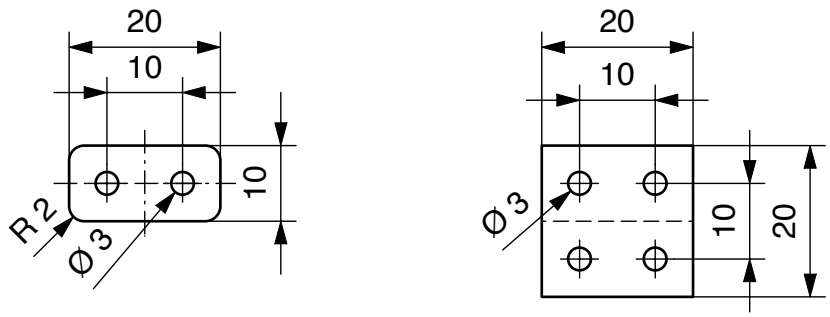
Pattern for cover (b)
Scale 1: 1



Pattern for the forks
Scale 1: 1

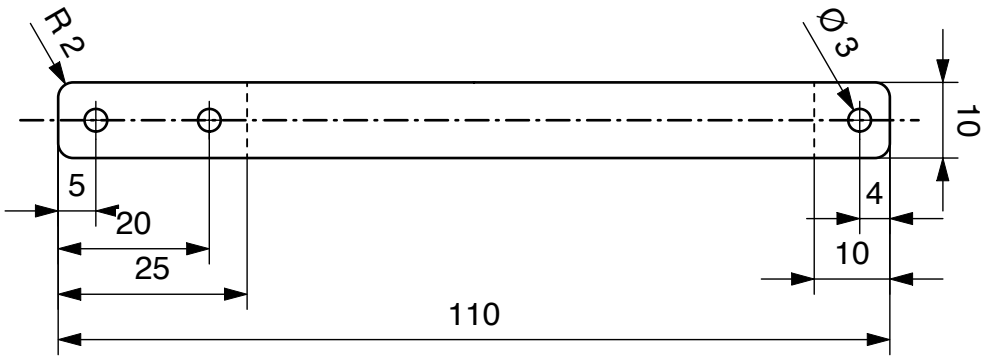


Pattern for the clip and motor fixing (f+e)
Scale 1: 1

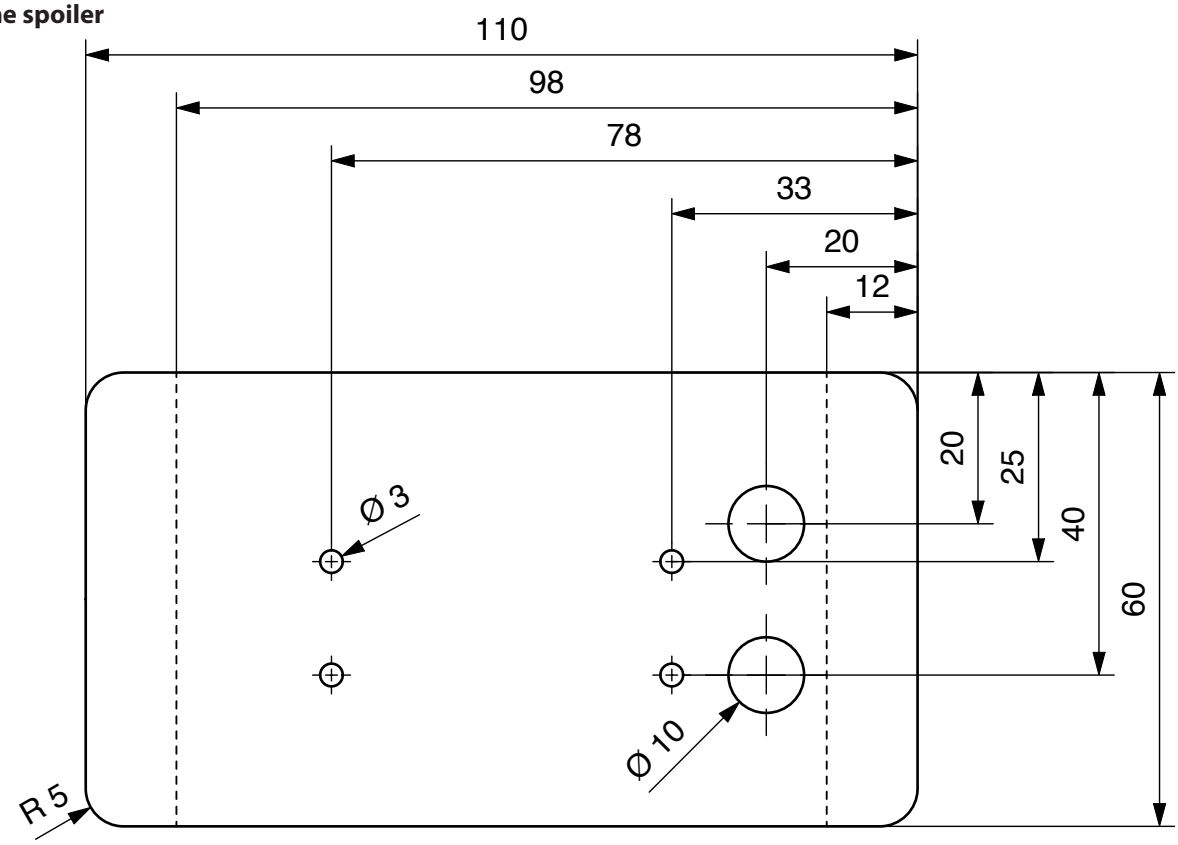


INSTRUCTIONS

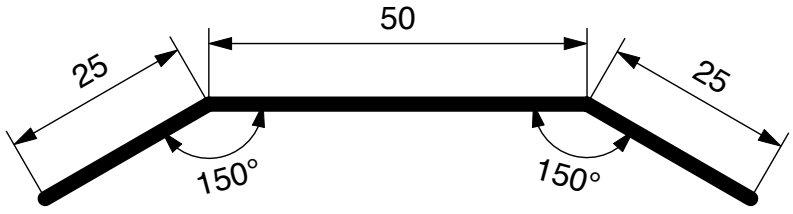
Pattern for the supports (g+h)
Scale 1:1



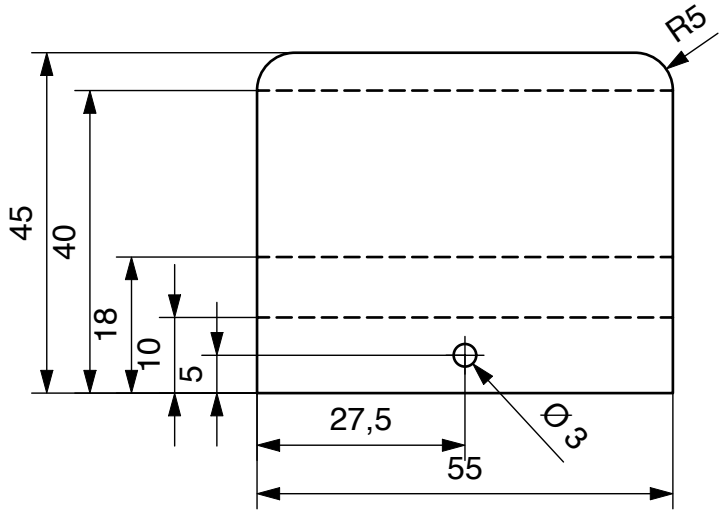
Pattern for the spoiler
Scale 1:1



Pattern for the steering
Scale 1:1



Pattern for the cover (d)
Scale 1:1



INSTRUCTIONS

Cutting pattern
Scale 1:2