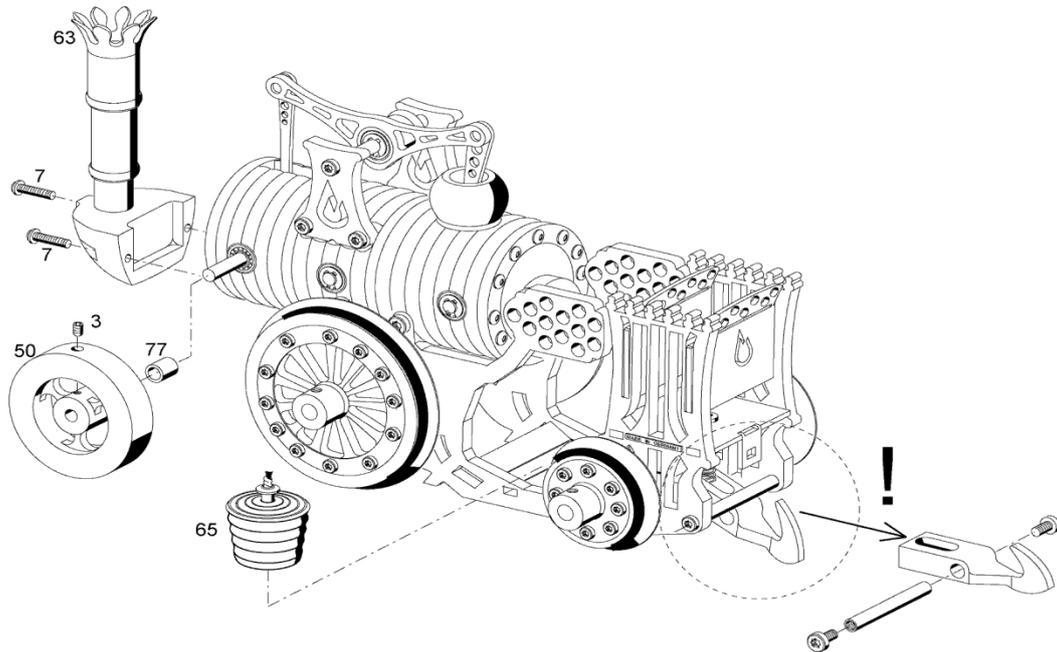


**Kurzanleitung Endmontage Fertigmodell**  
**Brief instruction for end assembling of the ready model**



**I.) nur Fertigmodell: Verpackungsbedingte Endmontage durch Kunde**

- 1- Schlotkrone (Teil 63) von vorne mit zwei Schrauben (Teil 7) befestigen.
- 2- Schwungrad (Teil 50) mit Büchse (Teil 77) seitlich auf herausstehende Achse schieben und mit minimalem seitlichen Spielraum unter zur Hilfenahme des Inbusschlüssels SW1,5 fest ziehen.
- 3- An der Rückseite der Lok befindet sich der Anhängenhaken. Klappen Sie diesen nach hinten. Lösen Sie mit dem Schlüssel Torx 10 beide Schrauben, die in der Achse eingeschraubt sind. Schieben Sie die Achse nun zwischen Seitenteil links und rechts nach oben, bis Sie die Schrauben durch die Bohrungen befestigen können.
- 4- Schmier- und Klebemittel sind nur beim Bausatz enthalten.

**I.) only assembled model: Final assembly by customer due to packaging**

- 1- Pipe crown (Part 63) fasten with two screws (Part 7) from the front.
- 2- Flywheel (Part 50) with belt drive (Part 77) slide sideways on protruding axis and with a minimum lateral clearance tighten using the Allen key SW1,5.
- 3- At the rear of the locomotive is located the trailer hook. Flip up this backwards. Loosen with Torx 10 key both screws, which are screwed in the axis. Slide the axle now between the side section left and right to top, until you can fix the screws through the holes.
- 4- Lubricants and adhesives are included only in kit.

## Tools and equipment

The following tools - not included in the set - should be kept on hand for the assembly of this set: Allen key SW 1,5, Needle-tip tweezers, Allen key SW 2,5, Torx keys 6, 8, 10. You will also require additional color paint and glue.

Included in the set for kits, you will find: 1 ceramic paste syringe, 1 holder plate for aligning pin, 1 drive punch for releasing the aligning pin,

1x fluid oil 12, 1 x Super Glue instant adhesive!

### Assembly (front = chimney on the right)

**1** - Manually carefully insert a bearing (13) into both sides of the rocker arm (37). Take the rocker arm axis (34) and push a locking washer (30) on the short side with a clearance groove. Drive the rocker arm axis (34) into the rocker arm (37) through the side of the aluminum case, so that the

long end of the rocker arm axis (34) protrudes from the rear. Attach the rocker arm axis (34) to the rocker arm (37) with another locking washer (30). Here you should observe the fact that the rocker arm (37) may not be attached tightly onto the rocker arm axis (34)

between both locking washers (30). Some play should remain (see **Figure 1**)

**2** - **Glue** respectively one bearing (13+14) degreased on the outside in the degreased side part holes (66 + 67) - flush with the outside (sunken side) - using super glue (73)

(only put a little glue in a circle around the drill hole of the side part). 30 minute curing!! (see **Figure 2**)

**3** - **Press in** the displacement piston cover (25) into the displacement piston (24), then screw into the displacement axis (23) with lacquer / glue on the thread. **Carefully** remove any overflowing glue using a cloth, **then let it dry.** (see **Figure 3**)

**4** - Insert the sleeve (49) into chamber 1 (38), so that the sleeve (49) may not fall out. (see **Figure 4**)

**5** - Insert the assembled displacement piston (24) into the chamber 1 (38). If the chamber 1 (38) is held vertically, the displacement piston (24) should fall in by itself - it should not jam. (see **Figure 5**)

**6** - Place the heating cylinder (47) in the middle of chamber 1 (38) and attach with the screws (9) 4x. (see **Figure 6**)

**7** - Connect the shorter connecting rod (28) with the crankshaft (27) using the aligning pin (11), the holding plate (76) and needle-tip tweezers, then connect to the displacement axle (23) of chamber 1 (38).

**PLEASE BE CAREFUL:** The slip surface of the displacement axle (23) should not be damaged! (see **Figure 7**)

**8** - Insert the piston guide (48) into the large hole of chamber 1 (38) so that the small outer drill hole of the piston guide (48) points in the direction of the heating cylinder (47). Plug the chamber ring 1 (41) onto chamber 1 (38) and screw on to the upper drill hole of the chamber ring 1 (41) with a screw (6) 1x in order to properly center and fixate the piston guide (48) into chamber 1 (38).

Then proceed to screwing in the other screws (4) 8x into chamber 1 (38). (see **Figure 8**)

**9** - Finally, plug the chamber ring 2 (42) onto chamber 1 (38) after having driven the crankshaft (27) through. Then, connect chamber 1 (38) and chamber 2 (39) using the screws (9) 2x. Take care to not damage the crankshaft (27) and that the sleeve (49) is located in chamber 1 (38). (see **Figure 9**)

**10** - Drive the second chamber ring 2 (42) over the crankshaft (27). Take chamber 3 (40) with the large slot pointing down over the crankshaft (27) and plug the chamber ring 2 (42) onto it.

**Here it is important** that you take care to point the sunken sides of both connecting rods (28/29) of the crankshaft (27) forward! Now, connect chamber 2 (39) and chamber 3 (40) using the screws (9) 2x. (see **Figure 10**)

**11** - Lightly screw on the rocker arm plates (71/72) on the right and left onto chamber 2 (39) with the screws (4) 4x and make sure the flame is correctly positioned.

Screw the assembled rocker arm (37) between both rocker arm plates (71/72) using the screws (4) 2x. It should be ensured that both rocker arms (37) point upward. Then, tighten all 6 screws (4). (see **Figure 11**)

**12** - Connect the short connecting rods (26) and the working piston (22) using the aligning pin (11).

**WARNING:** The wall thickness of the working piston (22) is very thin, therefore do not use tweezers - one drill hole is usually smoother than the other! (see **Figure 12**)

**13** - Drive the previously assembled working piston (22) into the piston guide (48). It is **important** that the sunken side of the connecting rod (26) points forward.

Attach the working piston (22) and attached connecting rod (26) to the rocker arm (37). Push in a black bearing bush (10) into the connecting rod (26) from behind and screw in from the front using a screw (8). Only tighten very lightly using a 3 cNm torque, since excess torque will crush the black bearing bush (10), leading to braking and blockage! (see **Figure 13**)

**14** - Insert bearings (12) 6x in chamber 1 (38), chamber 2 (39) and chamber 3 (40). Make sure that the bearings do not fall out.

Assemble both locking washers (30) with both belt pulley axes (31). The first assembled belt pulley axle (31) goes into the bearing (12) on chamber 1 (38) from behind.

The belt pulley wheel (44) is assembled onto the belt pulley axle (31) that points outward to the front using a screw (3). There should be a spacing of 0,2mm between the front bearing (12) and the belt pulley wheel 1 (44) (this corresponds to 2 sheets of paper).

The second assembled belt pulley axle (31) is inserted in the bearing (12) on chamber 2 (39) from the rear.

The belt pulley wheel 2 (45) is attached to the belt pulley axle (31) that protrudes

towards the front using a screw (3). There should be a spacing of 0,2mm between the front bearing (12) and the belt pulley wheel 2 (45). (see **Figure 14**)

**15** - Then, the axis (32) goes through the bearing (12) at the front of chamber 3 (40), through the first cam of the crankshaft (27) and is screwed there so that the axle (32) does not overlap further than the cam of the crankshaft (27).

Then, the axle (33) goes through the ball bearing (12) at the rear of chamber 3 (40) and the second cam of the crankshaft (27) and is screwed so that the axle (33) does not overlap further over the cam.

Attach the connecting rod (29) with the rocker arm (37). Push in a black bearing bush (10) into the connecting rod (26) from behind and screw in from the front using a screw (8). Only tighten very lightly using a 3 cNm torque, since excess torque will crush the black bearing bush (10), leading to braking and blockage!

The chamber ring 3 (43) is plugged onto chamber 3 (40) and screwed on with screws (4) 8x. (see **Figure 15**)

**16** - Take the left side frame (66) and screw respectively one spacer axle (36) onto the outer right and left drill holes towards the front with screws (4) 2x.

Lay the left side frame (66) on a table so that the spacer axles (36) are oriented upward. Next, a spacer axle (36) is screwed on the lower floor plate (69) using a screw (4) so that the bent side points in the same direction as the spacer axle (36). Plug the left assembled floor plate (69) in both small slots of the left side frames (66). Then proceed to plugging the other floor plate (68) on the bottom centered in the other small slots.

Make sure that the bent part is oriented to the right.

Push the spring (1) onto the assembled spacer axle (36) of the floor plate (69). The trailer coupling (64) is placed above using the drill hole so that the right spacer axle (36) goes through the left side frame (66). The spacer axle (36) that points downward from the floor plate (69) should then immediately be driven through the groove of the trailer coupling (64). It is subsequently screwed from below with a screw (4).

The right side frame (67) goes onto the left side frame (66) and is attached with screws (4) 2x. (see **Figure 16**)

**17** - The assembled chamber is screwed to the assembled side frames using screws (4) 4x. (see **Figure 17**)

**18** - The small brass wheel (52) and small plastic wheel (55/56) is attached with screws (2) 8x. **The screws may only be lightly tightened since excess torque will tear the thread from the plastic wheel.**

**Create this assembly 2x since they are 2 pairs. Depending on requirements, the plastic wheels for Lehmann (56) or Märklin (55) are screwed on.**

Respectively 2 O-belts (19) are pulled onto each small assembled plastic wheel (55/56). (see **Figure 18**)

**19** - The large brass wheel (51) and large plastic wheel (53/54) is attached with the screws (2) 12x. **The screws may only be lightly tightened since excess torque will tear the thread from the plastic wheel.**

**Create this assembly 2x since they are 2 pairs. Depending on requirements, the plastic wheels for Lehmann (54) or Märklin (53) are screwed on.**

Two O-belts (18) are placed on one large assembled plastic wheel (53/54).

On the other one, only one O-belt (18) is placed on the front in the first groove. (see Figure 19)

**20** - Now, the drive axle (35) is driven through the large plastic wheel (53/54) along with **both O-belts (18)** and screwed with screw (3) so that it sits flush. Then, another spacer sleeve (20/77) goes onto the drive axle (35). The assembled drive axle (35) goes through the left side frame (66), onto the ball bearing (14) under the assembled chamber and is equipped with a further spacer sleeve (20/77) on the other side. Then, the large plastic wheel (53/54) is **plugged** onto the drive axle (35) with another O-belt (18) and screwed on with the screw (3). It is important that you leave a 0,2mm space before the second wheel (53/54) is secured. The same assembly is then performed on the ball bearing (13) with the small plastic wheels (55/56). (see Figure 20)

**21** - Push the spacer sleeve (21) on the rear of the axle (33) followed by the flywheel (50) and secure them with a screw (3). It is important that you attach the flywheel (50) flush with the axle (33).

Plug the belt pulley 3 (46) on the axle (32) and screw it in with the screw (3), taking care that the space between the ball bearing (12) and the belt pulley 3 (46) is of 0,2mm.

Both holding plates (70) are pushed into the left side of the left side frame (66) in the two adapted slots to the right and left. Press the holding plates (70) down manually so that they cannot fall out sideways. (see Figure 21)

**22** - Pull the O-belt (17) on the rear groove of the large plastic wheel (53/54) and on the rear small groove of the belt pulley 1 (44).

Pull the O-belt (16) over the belt pulley 3 (46) and the belt pulley 2 (45) around the rear groove.

Now the O-belt (15) goes into the rear groove of belt pulley 1 (44) and in the front groove of belt pulley 2 (45). (see Figure 22)

**23** - The pipe holder (57) is attached to the front of chamber 3 (40) using the screws (7) 2x.

Pipe coil 1 (61) is plugged over pipe bush 1 (58). Subsequently, place a drop of instant adhesive (73) in the inner heel of pipe bush 2 (59) which is then placed on pipe bush 1 (58). **Carefully** wipe off any overflowing glue with a cloth **and let it dry**.

The pipe coil 2 (62) goes onto pipe bush 2 (59), which are then glued to the inner heels (73) of pipe bush 3 (60) using a drop of glue. Here, also only use one drop. **Carefully** wipe off any overflowing glue with a cloth **and let it dry**.

Next, a drop of instant adhesive (73) is placed in the inner heel of pipe coil 3 (60), onto which the pipe crown (63) is then placed.

**Carefully** wipe off any overflowing glue with a cloth **and let it dry**. Place the glued pipe in the pipe holder (57) and screw in with a screw (4).

Pull off the lid of the ethyl alcohol burner (65) with sufficient force, insert a wick, then replace the lid. Enlarge the wick by approx. 3mm. Close the ethyl alcohol burner (65)

on the floor plate (68). (see Figure 23)

**24** - **Perform the first test run WITHOUT lubricant**, then: rub off a **minimal** amount of white ceramic paste between your thumb and index finger until almost no paste is visible. Now place a thin film on the working piston (22) using your index finger. Insert the working piston (22) into the piston guide (48) and move back and forth. First, release the working piston (22) from the crankshaft (27). The working piston (22) may not scratch or jam! Oil should not enter the working piston (22) under any circumstance! Place a **small** droplet of oil (Ø1mm) from the provided syringe onto the displacement axle (23) and onto the crankshaft axle (27) (**after 1st test run**).

**25** - **PLEASE NOTE**: A small impact of the flywheel (50) is normal and inevitable in this assembly (it is no grounds for a warranty claim!).

**26** - Never unscrew the grub screws of the crankshaft (27)! The crankshaft can only be aligned using special equipment from the manufacturer!

**Handle denaturated alcohol carefully. Never leave alcohol bottles open.**

**Inappropriate use of the loco can lead to fires! NEVER in CHILDREN'S HANDS!!!**

**The legal regulations for open fires apply when operating the device!**

### Operating instructions

**1** – Set up the loco in a draught-free place with flat floor/table surface.

**2** – Remove the lid of the aluminum burner can and fill up to the marking with **94% denaturated alcohol(fresh fluid!!!)**.

**WARNING:** The denaturated alcohol bottle should always be closed again and tidied away::**Danger of explosion:::**

**3** – Light the wick. Wick must be out of burner 5mm and be **good bushy**.

**4** – **Wait approx. 30 seconds for good heat.**

- Never leave the loco without supervision.

### Maintenance/ Cleaning

Oil gotten the working piston (56)? (After longer standstill possible):

Please towel the working piston with a lint-free cloth and as well its working piston bush (13).

Never re-apply oil, oil has an adhesive effect and stops the loco from moving! The loco should be stored in a dust-free environment. The smallest pollution can stop the motor from functioning. The adjustments are in the H7-area. All mobile mechanical parts should be free-moving or the motor will not run! Be careful when disassembling – some parts have thicknesses of less than 0,25 mm.

In case of problems visit the following link

[http://www.boehm-stirling.com/tl\\_files/stirling-technik.de/images/Antwort%20Wartungshinweise%20Deutsch.pdf](http://www.boehm-stirling.com/tl_files/stirling-technik.de/images/Antwort%20Wartungshinweise%20Deutsch.pdf) or read yellow paper Note in the box.

In case of technical questions please contact us at

E-mail: [info@stirling-technik.de](mailto:info@stirling-technik.de)

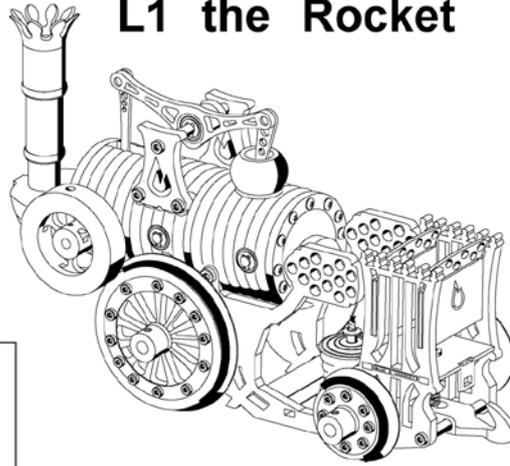
Internet: [www.boehm-stirling.com](http://www.boehm-stirling.com)

### The propulsion principle of the Stirling motor

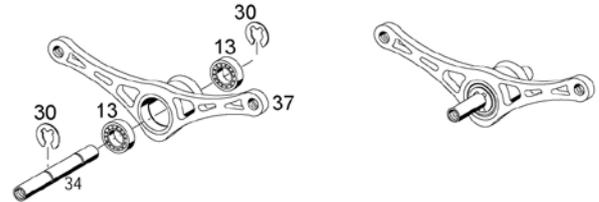
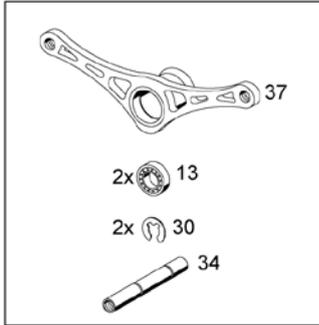
The burner heats the air contained in a closed circuit. Due to thermal expansion, the working cylinder and the flywheel are kept in motion. As the working cylinder moves in direction of the wheels, the displacing cylinder is pushed from the boiler into the heating cylinder. Since the displacement body has no seal, the hot air is moved past its outer wall into the front part of the boiler. Since the temperature there is approx. 300°C lower (volume reduction), the cooled air creates a vacuum that sucks the working cylinder back out and maintains the flywheel's motion. The rotating movement pulls the displacing cylinder back into the cooling rib part, allowing for a quick streaming of the cooled air from this chamber into the heating cylinder. The air heats again, expands and provides work once again.

**WARNING: The loco should only be operated under constant supervision by persons over 18 years of age. Easily flammable objects should not be kept in the vicinity of the demonstration area. Do not touch the heating cylinder or the flame area as this could cause burning.**

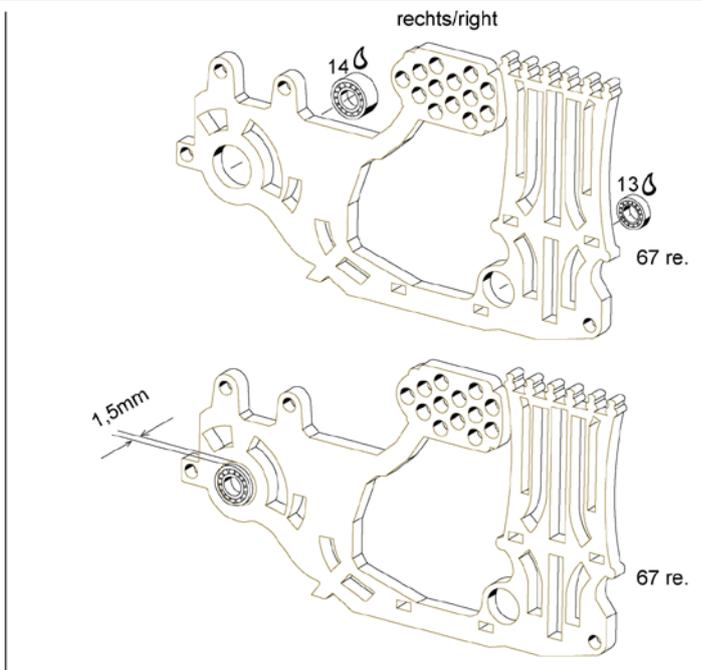
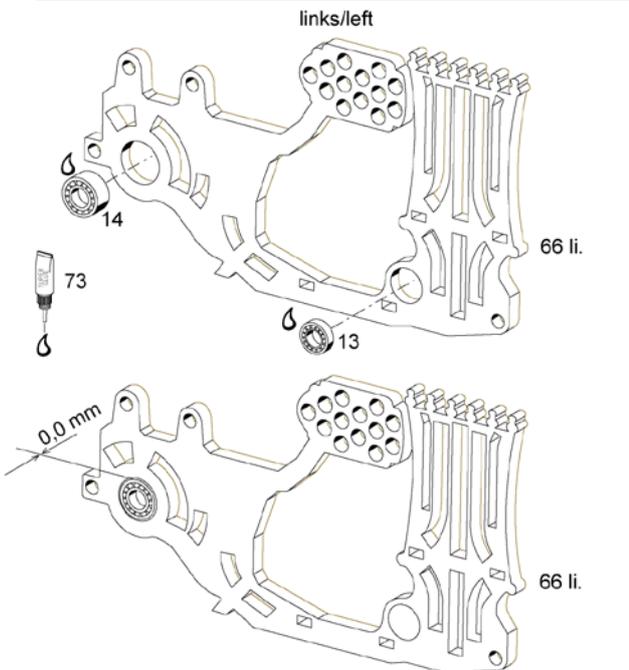
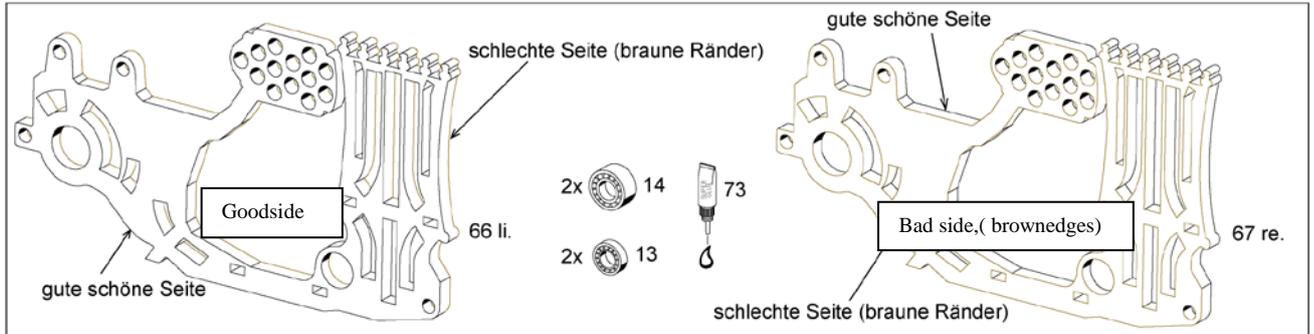
# L1 the Rocket



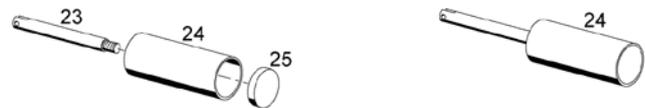
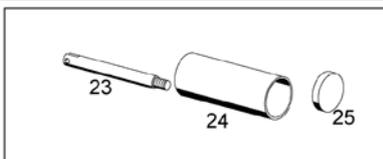
1



2

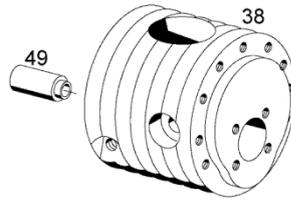
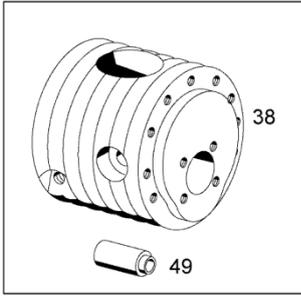


3

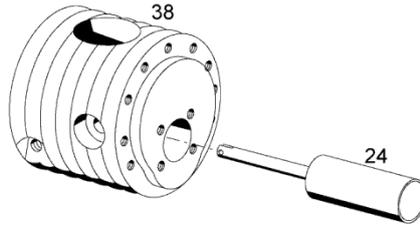


# L1 the Rocket

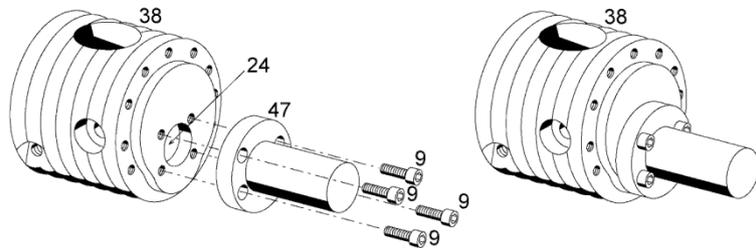
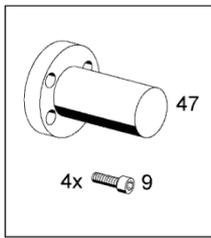
4



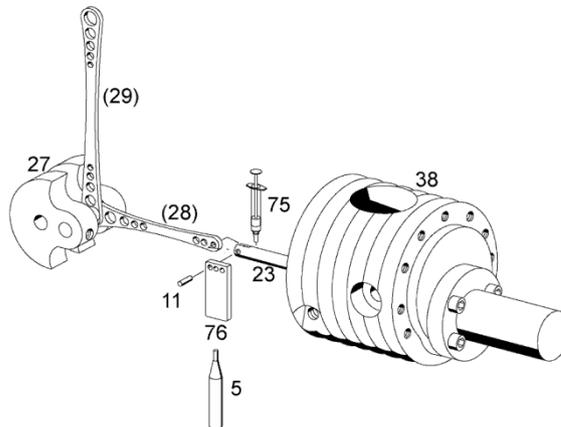
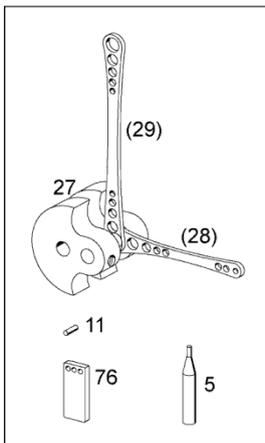
5



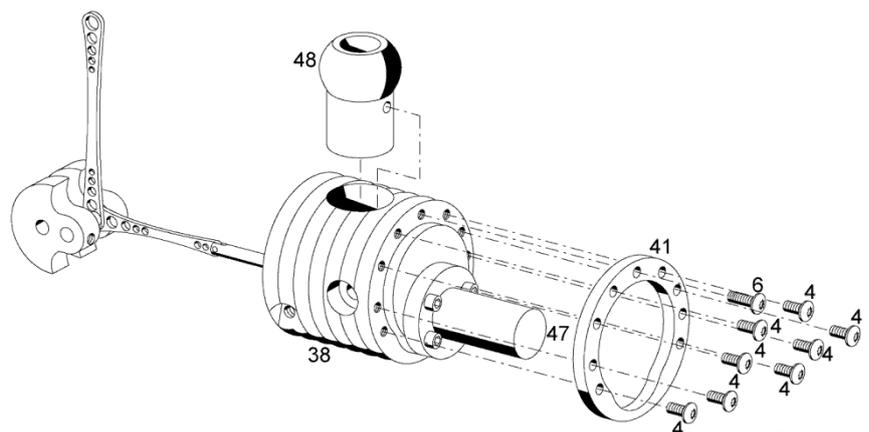
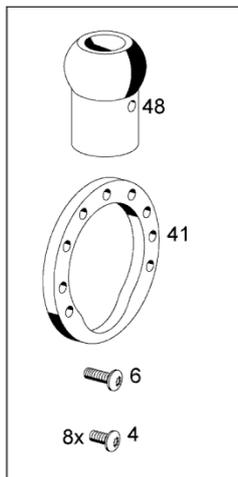
6



7

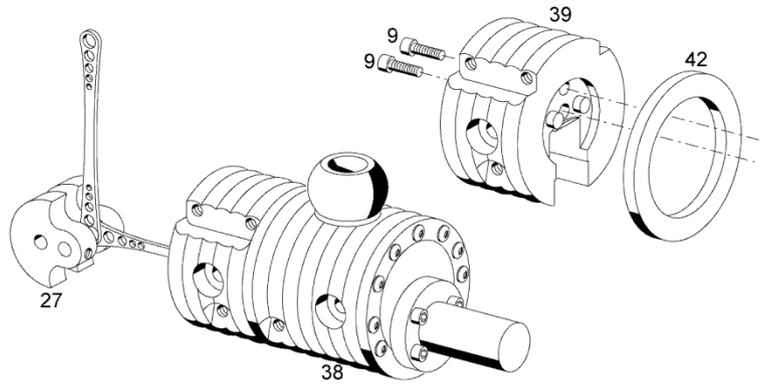
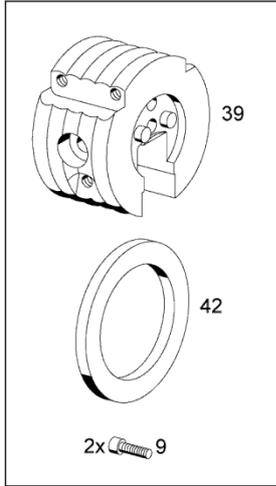


8

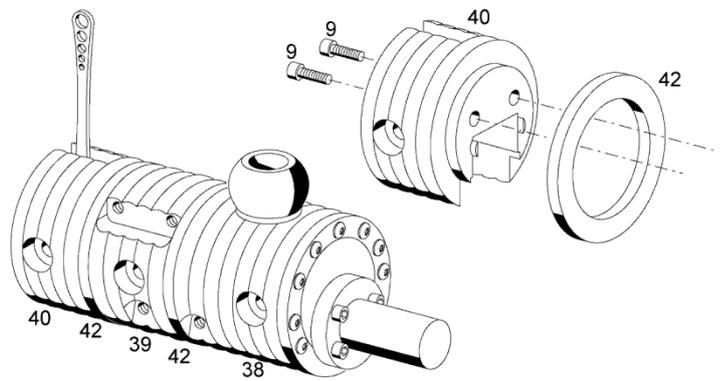
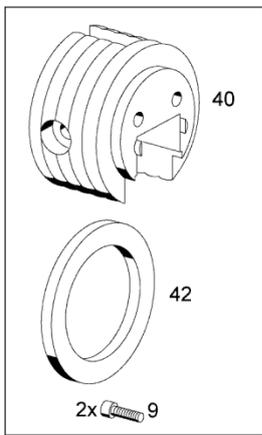


# L1 the Rocket

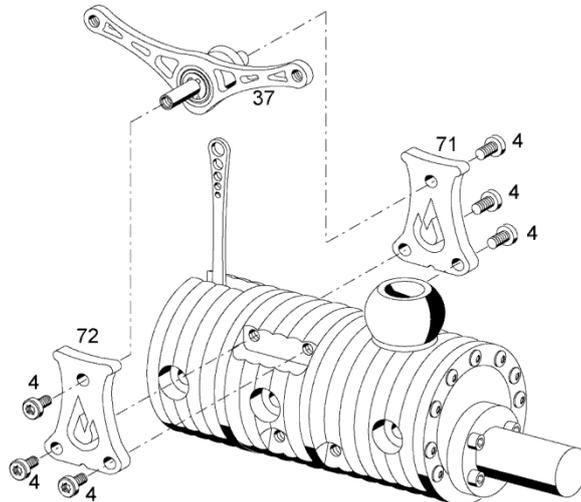
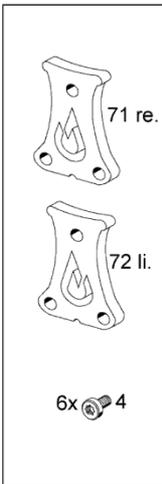
9



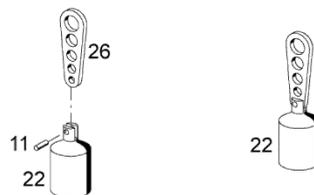
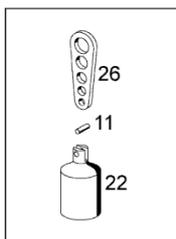
10



11

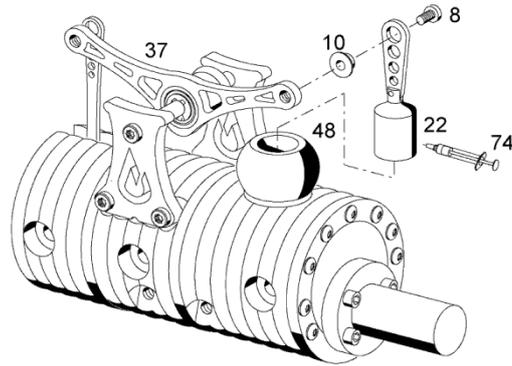
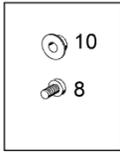


12

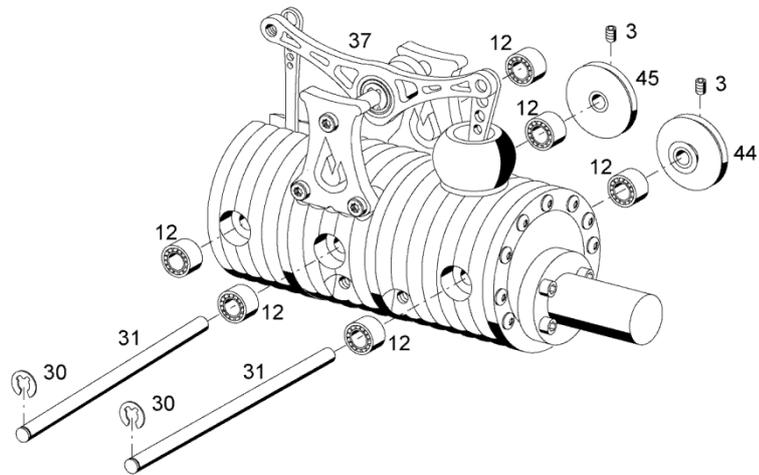
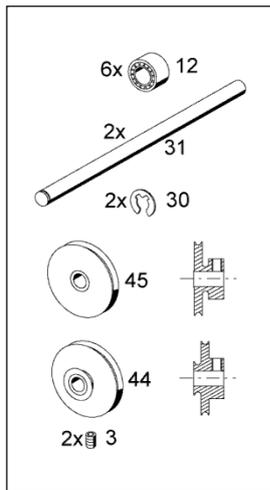


# L1 the Rocket

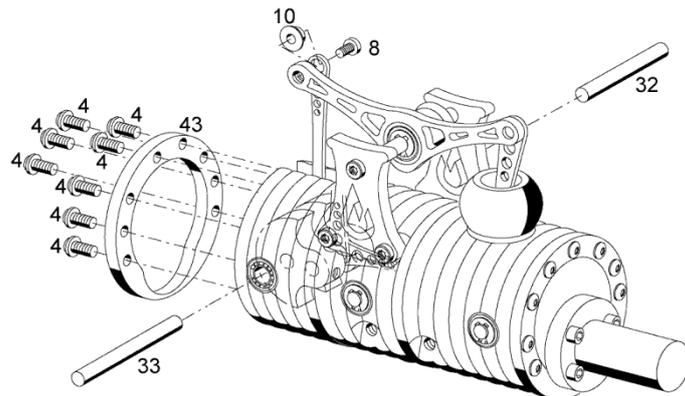
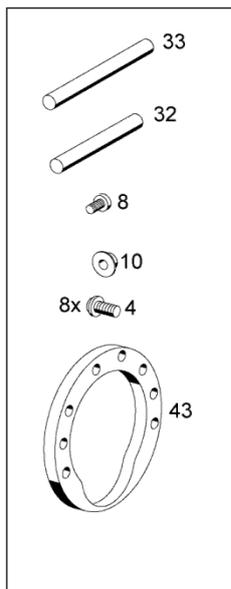
13



14



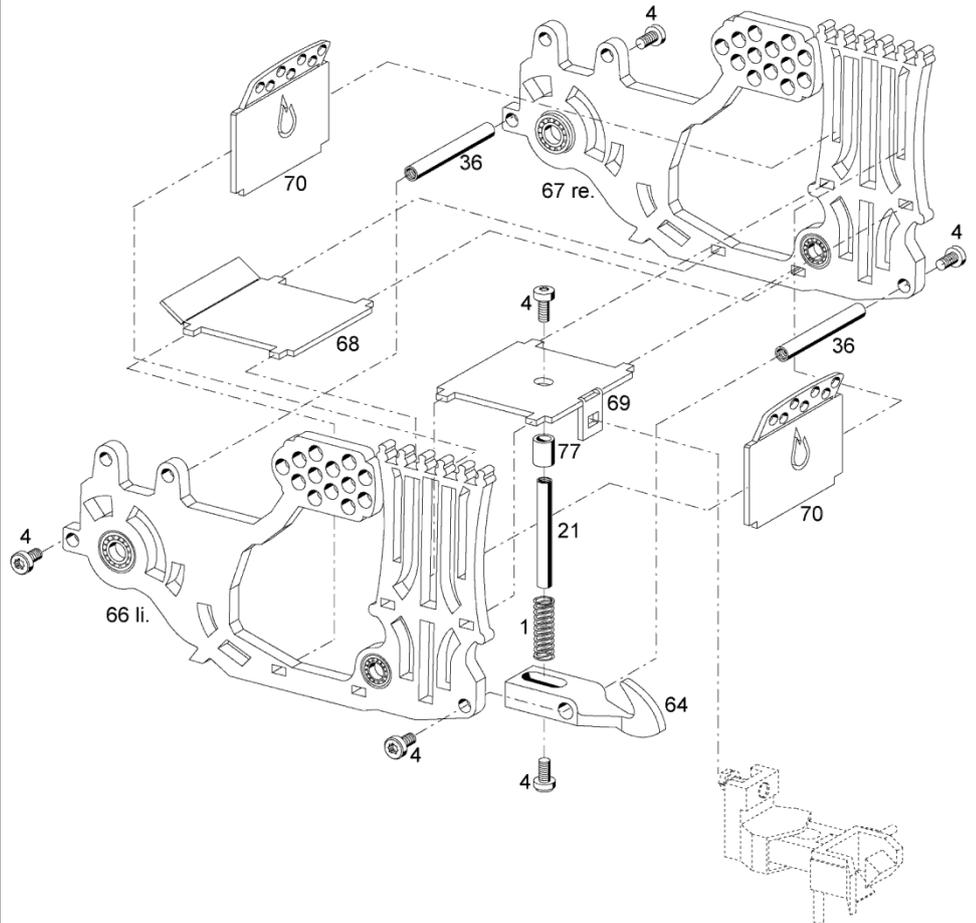
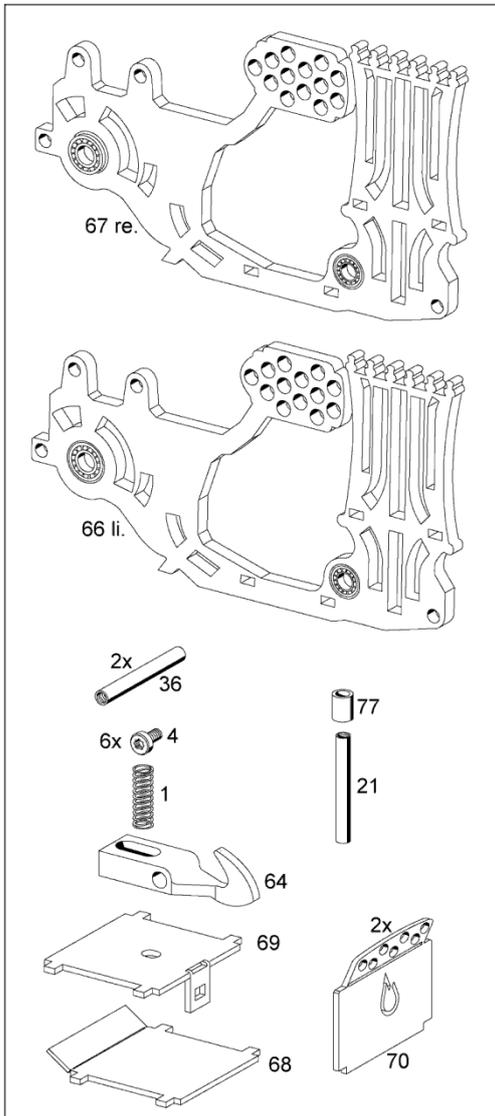
15



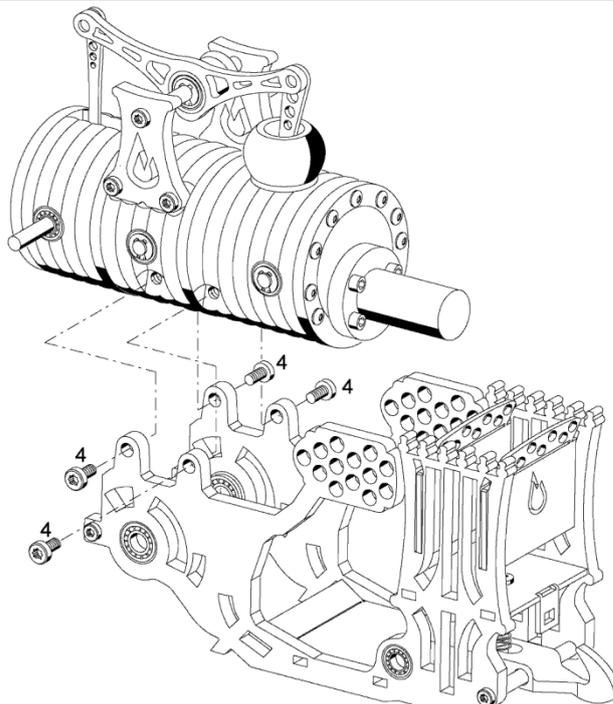
# L1 the Rocket

Internet: [www.boehm-stirling.com](http://www.boehm-stirling.com)  
 email: [info@stirling-technik.de](mailto:info@stirling-technik.de)  
 shop: [www.boehm-stirling-shop.com](http://www.boehm-stirling-shop.com)

16



17

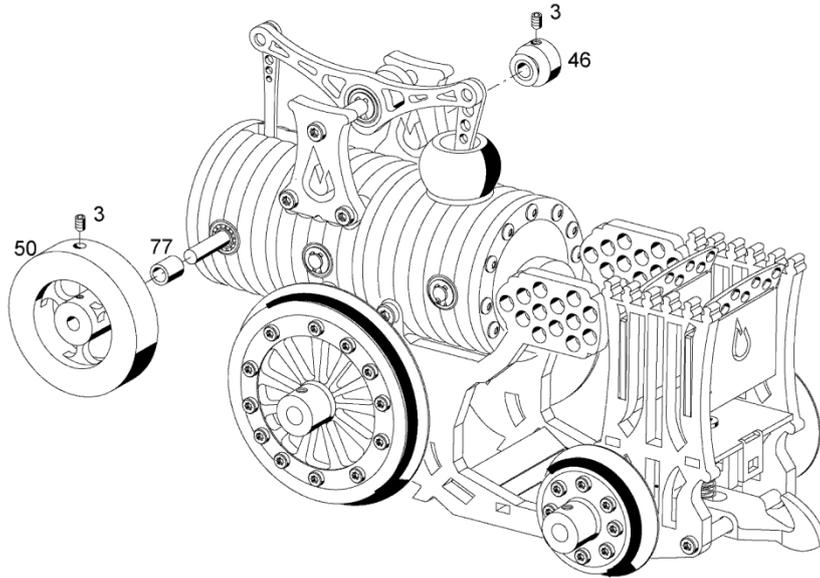
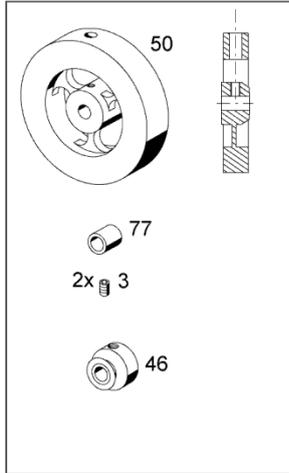




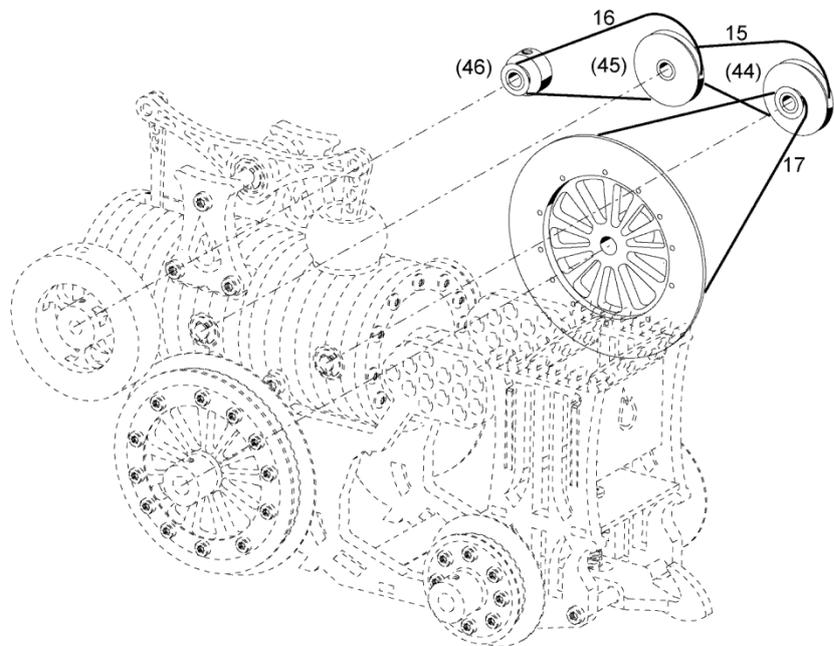
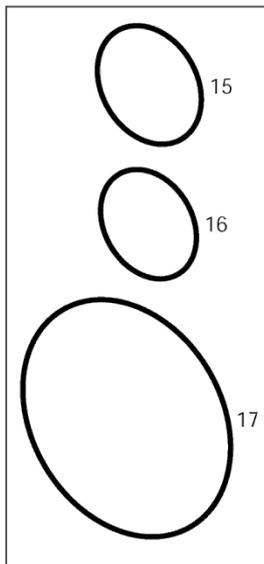
# L1 the Rocket

Internet: [www.boehm-stirling.com](http://www.boehm-stirling.com)  
 email: [info@stirling-technik.de](mailto:info@stirling-technik.de)  
 shop: [www.boehm-stirling-shop.com](http://www.boehm-stirling-shop.com)

21

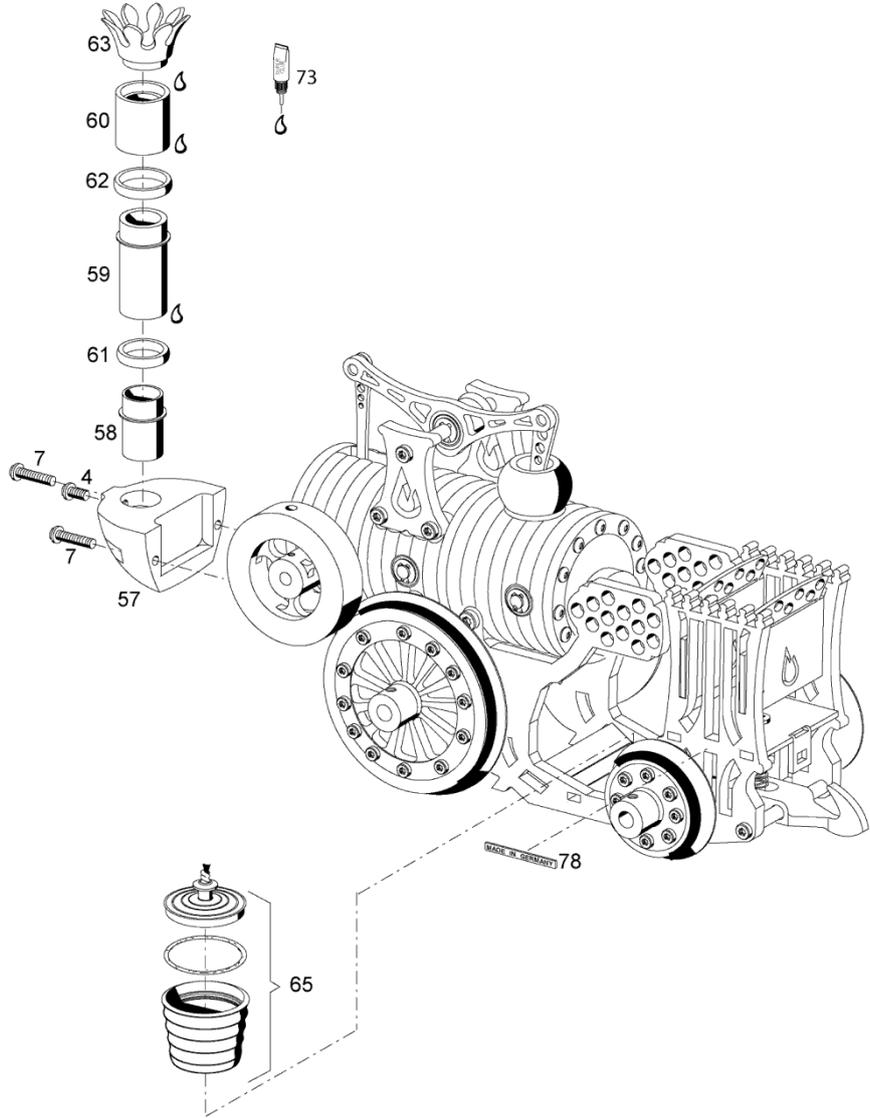
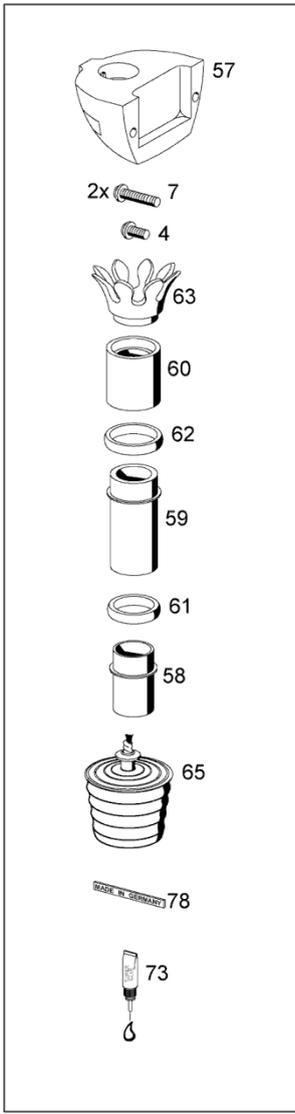


22



# L1 the Rocket

23



Stückliste/Ersatzteilliste  
 L1 the Rocket

Bill of material  
 L1 the Rocket

Bild/Nr. Ill. No.	Benennung Part No.	Abm. Bemerkung Diment. Remarks	Stück Pieces	Denomination
1	Druckfeder	Ø5,4x16mm	1	Pressure spring
2	Linsenkopfschraube	M2x4mm TX6	40	Head screw
3	Madenschraube	M3x3mm SW1,5	8	Crub screw
4	Linsenkopfschraube	M3x6mm TX10	34	Head screw
5	Durchschlag für lösen des Passstift		1	Drive punch
6	Linsenkopfschraube	M3x8mm TX10	1	Head screw
7	Linsenkopfschraube	M3x12mm TX10	2	Head screw
8	Linsenkopfschraube	M2,5x4mm TX8	2	Head screw
9	Inbusschraube	M3x8mm SW2,5	8	Sockethead screw
10	Schwarze Plastikbüchse		2	Black plastic bush
11	Passstift	Ø1,5x4mm	2	Pin
12	Kugellager	Ø9x4mm	6	Ball bearing
13	Kugellager	Ø9x2,5mm	4	Ball bearing
14	Kugellager	Ø11x4mm	2	Ball bearing
15	O-Riemen Antrieb	Ø32x1,5mm	2	Belt drive
16	O-Riemen Antrieb	Ø29x1,5mm	2	Belt drive
17	O-Riemen Antrieb	Ø60x1,5mm	2	Belt drive
18	O-Riemen großes Rad	Ø51x1,5mm	6	Belt drive
19	O-Riemen kleines Rad	Ø27x1,5mm	8	Belt drive
20	Distanzhülse	Ø6x7mm	4	Spacer
21	Abstandsachse	Ø4x30mm	1	Spacer
22	Arbeitskolben	Ø11,5x18,3mm	1	Working piston
23	Verdrängerachse	Ø4x33mm	1	Displace axle
24	Verdrängerkolben	Ø12x27,6mm	1	Displace piston
25	Verdrängerkolben Deckel	Ø11,6x1,5mm	1	Displace piston cover
26	Pleuel kurz	22mm	1	Connecting rod short
27	Kurbelwelle montiert		1	Crank shaft ass.
28	Pleuel mit Kurbelwelle	39,5mm	1	Connecting rod with Crank shaft
29	Pleuel mit Kurbelwelle	62mm	1	Connecting rod with Crank shaft
30	Sicherungsscheibe	3,2mm	4	Lock washer
31	Achse für Riemenrad 1+2	Ø4x54,7mm	2	Axle for belt pully
32	Achse für Riemenrad 3	Ø4x27,3mm	1	Axle for belt pully
33	Achse für Schwungrad	Ø4x33,1mm	1	Axle for Flywheel
34	Kipphebelachse mit 2 Einstichen	Ø4x25mm	1	Rocker shaft
35	Antriebsachse	Ø4x64,3mm	2	Drive axle
36	Achse für Abstand	Ø4x25mm	2	Axle
37	Kipphebel		1	Rocker arm
38	Kessel 1 für Heizzylinder		1	Boiler 1 for heating cylinder
39	Kessel 2 für Kipphebel		1	Boiler 2 for rocker arm
40	Kessel 3 für Kurbelwelle		1	Boiler 3 for crank
41	Kesselring 1 für Kessel 1		1	Boiler ring 1
42	Kesselring 2 für Kessel 1+3		2	Boiler ring 2
43	Kesselring 3 für Kessel 3		1	Boiler ring 3
44	Riemenrad 1 für Kessel 1	Ø20,2x8,2mm	1	Belt pully 1
45	Riemenrad 2 für Kessel 2	Ø20,2x8,2mm	1	Belt pully 2
46	Riemenrad 3 für Kessel 3	Ø11,3x6,2mm	1	Belt pully 3
47	Heizzylinder	Ø25x28mm	1	Heating cylinder
48	Kolbenführung	Ø23,6x28,5mm	1	Piston guide
49	Hülse für Verdrängerachse	Ø8x16,3mm	1	Bush
50	Schwungrad	Ø40x8mm	1	Flywheel
51	Großes Rad	Ø48x8,5mm	2	Big wheel
52	Kleines Rad	Ø23x8,5mm	2	Small wheel
53	Großes Rad Plastik Märklin	Ø57,8x5mm	2	Big wheel plastic Märklin
54	Großes Rad Plastik Lehmann	Ø61x5mm	2	Big wheel plastic Lehmann
55	Kleines Rad Plastik Märklin	Ø34x5mm	2	Small wheel plastic Märklin
56	Kleines Rad Plastik Lehmann	Ø36x5mm	2	Small wheel plastic Lehmann
57	Schlothalter		1	Pipe holder
58	Schlothülse 1	Ø16x20,4mm	1	Pipe bush 1
59	Schlothülse 2	Ø18x31mm	1	Pipe bush 2
60	Schlothülse 3	Ø18x18mm	1	Pipe bush 3
61	Schlotring 1	Ø17,5x3mm	1	Pipe coil 1
62	Schlotring 2	Ø19,5x3mm	1	Pipe coil 2
63	Schlotkrone		1	Pipe crown
64	Anhängerkupplung Lehmann		1	Towing hitch
65	Spiritus-Brenner	Ø30x35mm	1	Burner case with wick
66	Seitenteil links		1	Side frame left
67	Seitenteil rechts		1	Side frame right
68	Bodenplatte Spiritus-Brenner		1	Base plate
69	Bodenplatte Lokführer		1	Base plate
70	Halteblech Lokführer		2	Holding plate
71	Kipphebelplatte rechts		1	Rocker arm plate right
72	Kipphebelplatte links		1	Rocker arm plate left
73	Sekundenkleber SUPER GLUE		1	Ball bearing adhesive
74	Keramikpaste weiss		1	White ceramic grease
75	Öl für Verdrängerachse		1	Oil
76	Montagehilfe für Passstift		1	Holder plate
77	Distanzhülse	Ø6x5mm	2	Spacer
78	Schild		1	Plate