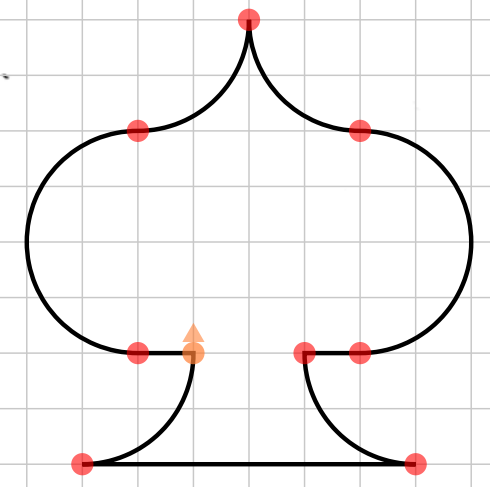
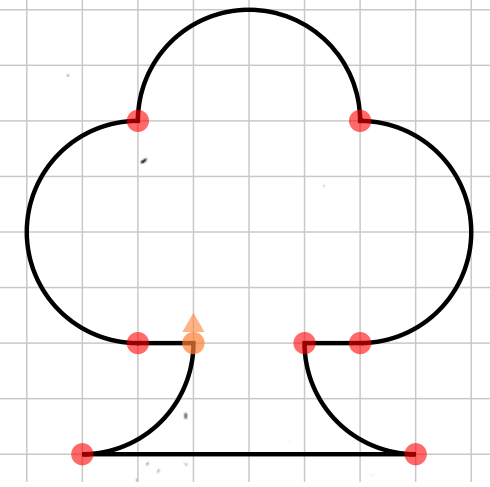
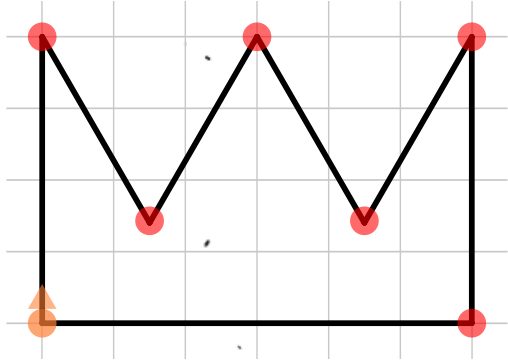
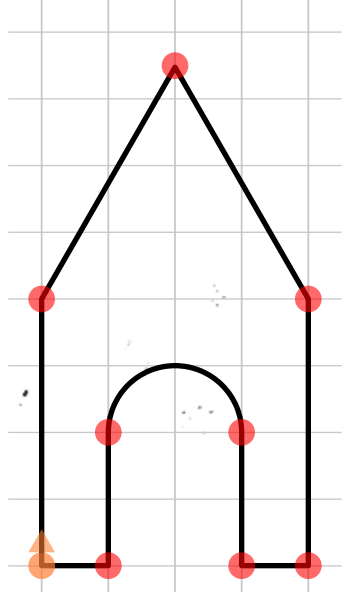
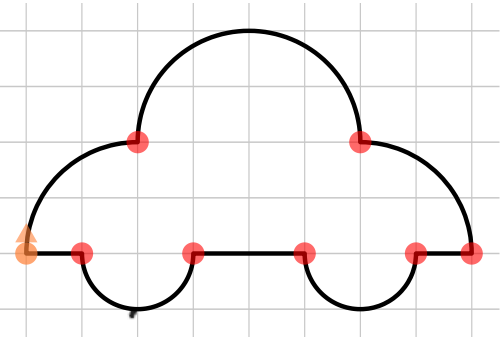
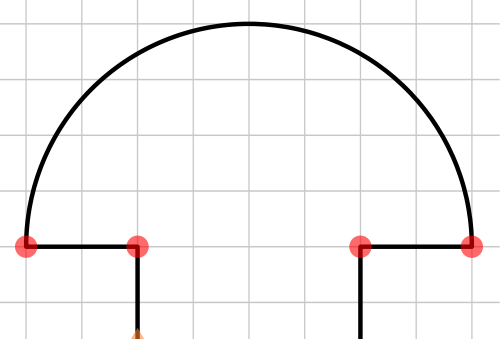


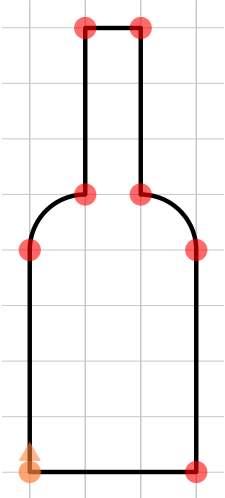
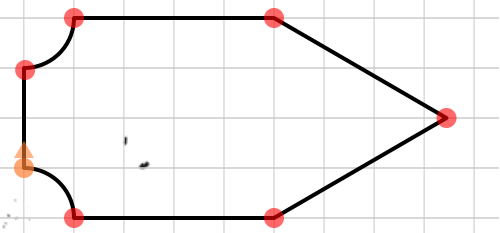
On the Subject of Turtle Robot

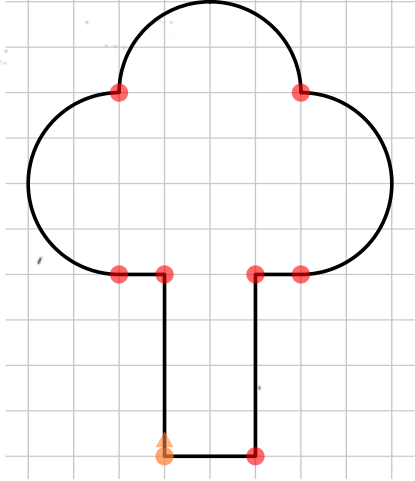
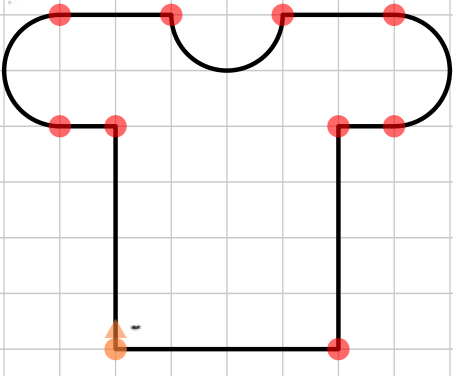
Shapes are drawn optionally with a scale and contain three bugs (see page 7). In addition, the commands can be mirrored (LT/RT → RT/LT) or reversed (1,2,3 → 3,2,1).

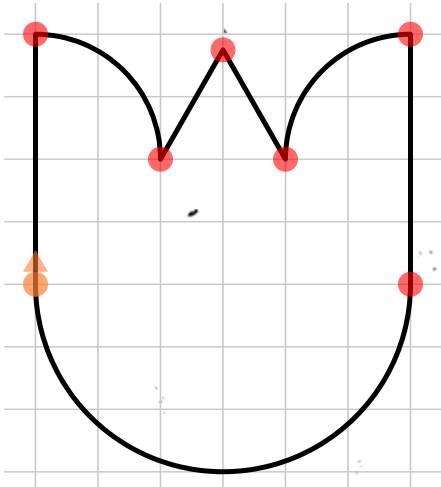
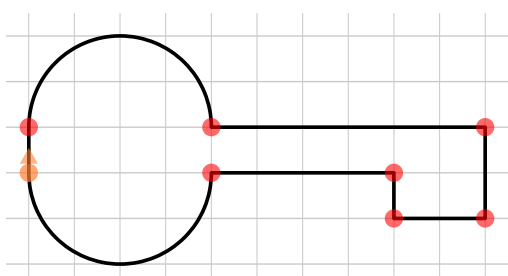
Shape	Normal	Mirrored	Reversed	Both
	LT 90 FD 1 RT 180 2 LT 90 2 RT 180 LT 90 2 RT 180 2 FD 1 LT 90 LT 90 2 RT 180 FD 6 RT 180 LT 90 2	RT 90 FD 1 LT 180 2 RT 90 2 LT 180 RT 90 2 LT 180 2 FD 1 RT 90 RT 90 2 LT 180 FD 6 LT 180 RT 90 2	LT 90 2 RT 180 FD 6 RT 180 LT 90 2 LT 90 FD 1 RT 180 2 LT 90 2 RT 180 LT 90 2 RT 180 2 FD 1 LT 90	RT 90 2 LT 180 FD 6 LT 180 RT 90 2 RT 90 FD 1 LT 180 2 RT 90 LT 180 RT 90 2 LT 180 2 FD 1 RT 90
Spades Instruction Count: 14	RT 180 LT 90 2	LT 180 RT 90 2	FD 1 LT 90	FD 1 RT 90
	LT 90 FD 1 RT 180 2 LT 90 RT 180 2 LT 90 RT 180 2 FD 1 LT 90 LT 90 2 RT 180 FD 6 RT 180 LT 90 2	RT 90 FD 1 LT 180 2 RT 90 LT 180 2 RT 90 LT 180 2 FD 1 RT 90 RT 90 2 LT 180 FD 6 LT 180 RT 90 2	LT 90 2 RT 180 FD 6 RT 180 LT 90 2 LT 90 FD 1 RT 180 2 LT 90 RT 180 2 LT 90 RT 180 2 FD 1 LT 90	RT 90 2 LT 180 FD 6 LT 180 RT 90 2 RT 90 FD 1 LT 180 2 RT 90 LT 180 2 RT 90 LT 180 2 FD 1 RT 90
Clubs Instruction Count: 14	RT 180 LT 90 2	LT 180 RT 90 2	FD 1 LT 90	FD 1 RT 90

Shape	Normal	Mirrored	Reversed	Both
	FD 4 RT 150 FD 3 LT 120 FD 3 RT 120 FD 3 LT 120 FD 3 RT 150 FD 4 RT 90 FD 6 RT 90	FD 4 LT 150 FD 3 RT 120 FD 3 LT 120 FD 3 RT 120 FD 3 LT 150 FD 4 LT 90 FD 6 LT 90	RT 90 FD 6 RT 90 FD 4 RT 150 FD 3 LT 120 FD 3 RT 120 FD 3 LT 120 FD 3 RT 150 FD 4	LT 90 FD 6 LT 90 FD 4 LT 150 RT 120 FD 3 RT 120 FD 3 LT 120 FD 3 RT 120 FD 3 LT 150 FD 4
Crown Instruction Count: 14				
	FD 4 RT 30 FD 4 RT 120 FD 4 RT 30 FD 4 RT 90 FD 1 RT 90 FD 2 LT 180 1 FD 2 RT 90 FD 1 RT 90	FD 4 LT 30 FD 4 LT 120 FD 4 LT 30 FD 4 LT 90 FD 1 LT 90 FD 2 RT 180 1 FD 2 LT 90 FD 1 LT 90	RT 90 FD 1 RT 90 FD 2 LT 180 1 FD 2 RT 90 FD 4 RT 30 FD 4 RT 120 FD 4 RT 30 FD 4	LT 90 FD 1 LT 90 FD 2 RT 180 1 FD 2 LT 90 FD 4 LT 30 FD 4 LT 120 FD 4 LT 30 FD 4
Dog House Instruction Count: 16				

Shape	Normal	Mirrored	Reversed	Both
	RT 90 2 LT 90 RT 180 2 LT 90 RT 90 2 RT 90 FD 1 LT 90 RT 180 1 LT 90 FD 2 LT 90 RT 180 1 LT 90 FD 1 RT 90 RT 180 2 LT 90 RT 90 2	LT 90 2 RT 90 LT 180 2 RT 90 LT 90 2 LT 90 FD 1 RT 90 LT 180 1 RT 90 FD 2 RT 90 LT 180 1 RT 90 FD 1 LT 90 RT 90 LT 180 1 RT 90	RT 90 FD 1 LT 90 RT 180 1 LT 90 FD 2 LT 90 RT 180 1 LT 90 RT 90 LT 90 2 RT 90 2 LT 90 RT 180 2 LT 90 RT 90 2	LT 90 FD 1 RT 90 LT 180 1 FD 1 LT 90 RT 90 LT 180 1 FD 1 LT 90 RT 90 LT 90 2 RT 90 LT 180 2 RT 90 LT 90 2
Car Instruction Count: 16	RT 180 1 LT 90 FD 1 RT 90	LT 180 1 RT 90 FD 1 LT 90	LT 90 RT 180 2 LT 90 RT 90 2	RT 90 LT 180 2 RT 90 LT 90 2
	FD 2 LT 90 FD 2 RT 90 RT 180 4 RT 90 FD 2 LT 90 FD 2 RT 90 FD 4 RT 90	FD 2 RT 90 FD 2 LT 90 LT 180 4 LT 90 FD 2 RT 90 FD 2 LT 90 FD 4 LT 90	RT 90 FD 4 RT 90 FD 2 LT 90 FD 2 LT 90 RT 180 4 RT 90 FD 2 LT 90 FD 2	LT 90 FD 4 LT 90 FD 2 RT 90 FD 2 LT 90 LT 180 4 LT 90 FD 2 RT 90 FD 2
Mushroom Instruction Count: 12	FD 4 RT 90	FD 4 LT 90	LT 90 FD 2	RT 90 FD 2

Shape	Normal	Mirrored	Reversed	Both
	FD 4 RT 90 1 LT 90 FD 3 RT 90 FD 1 RT 90 FD 3 LT 90 RT 90 1 FD 4 RT 90 FD 3 LT 90 RT 90	FD 4 LT 90 1 RT 90 FD 3 LT 90 FD 1 LT 90 FD 3 RT 90 LT 90 1 FD 4 LT 90 FD 3 RT 90 LT 90	RT 90 FD 3 RT 90 FD 4 RT 90 1 LT 90 FD 3 RT 90 FD 1 RT 90 FD 3 LT 90 LT 90 RT 90 1 FD 4	LT 90 FD 3 LT 90 FD 4 LT 90 1 RT 90 FD 3 LT 90 FD 1 LT 90 FD 3 RT 90 RT 90 LT 90 1 FD 4
Bottle Instruction Count: 14	FD 3 RT 90	FD 3 LT 90	RT 90 1 FD 4	LT 90 1 FD 4
	FD 2 RT 90 LT 90 1 RT 90 FD 4 RT 30 FD 4 RT 120 FD 4 RT 30 FD 4	FD 2 LT 90 RT 90 1 LT 90 FD 4 LT 30 FD 4 LT 120 FD 4 LT 30 FD 4	RT 90 LT 90 1 RT 90 FD 4 RT 30 FD 4 RT 120 FD 4 RT 30 FD 4 RT 90	LT 90 RT 90 1 LT 90 FD 4 LT 30 FD 4 LT 120 FD 4 LT 30 FD 4 LT 90
Shape Shift Instruction Count: 14	RT 90 LT 90 1 RT 90	LT 90 RT 90 1 LT 90	LT 90 1 RT 90 FD 2	RT 90 1 LT 90 FD 2

Shape	Normal	Mirrored	Reversed	Both
	FD 4 LT 90 FD 1 RT 180 2 LT 90 RT 180 2 LT 90 RT 180 2 FD 1 LT 90 FD 4 RT 90 FD 2 RT 90	FD 4 RT 90 FD 1 LT 180 2 RT 90 LT 180 2 RT 90 LT 180 2 FD 1 RT 90 FD 4 LT 90 FD 2 LT 90	RT 90 FD 2 RT 90 FD 4 LT 90 FD 1 RT 180 2 LT 90 RT 180 2 LT 90 RT 180 2 FD 1 LT 90 FD 4	LT 90 FD 2 LT 90 FD 4 RT 90 FD 1 RT 90 LT 180 2 RT 90 LT 180 2 RT 90 LT 180 2 FD 1 RT 90 FD 4
Tree Instruction Count: 14				
	FD 4 LT 90 FD 1 RT 180 1 FD 2 RT 90 LT 180 1 RT 90 FD 2 RT 180 1 FD 1 LT 90 FD 4 RT 90 FD 4 RT 90	FD 4 RT 90 FD 1 LT 180 1 FD 2 LT 90 RT 180 1 LT 90 FD 2 LT 180 1 FD 1 RT 90 FD 4 LT 90 FD 4 LT 90	RT 90 FD 4 RT 90 FD 4 LT 90 FD 1 RT 180 1 FD 2 RT 90 LT 180 1 RT 90 FD 2 RT 180 1 LT 90 FD 1 FD 4	LT 90 FD 4 LT 90 FD 4 RT 90 FD 1 LT 180 1 FD 2 LT 90 RT 180 1 LT 90 FD 2 LT 180 1 RT 90 FD 1 FD 4
T-Shirt Instruction Count: 16				

Shape	Normal	Mirrored	Reversed	Both
	FD 4 RT 90 RT 90 2 LT 150 FD 2 RT 120 FD 2 LT 150 RT 90 2 RT 90 FD 4 RT 180 3	FD 4 LT 90 LT 90 2 RT 150 FD 2 LT 120 FD 2 RT 150 LT 90 2 LT 90 FD 4 LT 180 3	RT 180 3 FD 4 RT 90 RT 90 2 LT 150 FD 2 RT 120 FD 2 LT 150 RT 90 2 RT 90 FD 4	LT 180 3 FD 4 LT 90 LT 90 2 RT 150 RT 120 FD 2 FD 2 RT 150 LT 90 2 LT 90 FD 4
Tulip Instruction Count: 12				
	FD 1 RT 180 2 LT 90 FD 6 RT 90 FD 2 RT 90 FD 2 RT 90 FD 1 LT 90 FD 4 LT 90 RT 180 2	FD 1 LT 180 2 RT 90 FD 6 LT 90 FD 2 LT 90 FD 2 LT 90 FD 1 RT 90 FD 4 RT 90 LT 180 2	RT 180 2 LT 90 FD 4 LT 90 FD 1 RT 90 FD 2 RT 90 FD 2 RT 90 FD 6 LT 90 RT 180 2 FD 1	LT 180 2 RT 90 FD 4 RT 90 FD 1 LT 90 FD 2 LT 90 FD 2 LT 90 FD 6 RT 90 LT 180 2 FD 1
Key Instruction Count: 14				

Bug Reference

All bugs are added to the program, not removed. When added, they are either added after another command or they split another command in half. **Note that all bugs are added before the program is mirrored or reversed.**

Splitting Bugs

Splitting bugs take a single instruction and split it into three, but only a few specific types of commands can be split:

Command Type	Resulting Command Sequence
Forward FD [R>1]	FD a, [Rotation Bug], FD b where $a+b=R$
Rotation (90°) LT/RT 90	LT/RT 180, [Arc Bug], RT/LT 90 or LT/RT 90, [Arc Bug], RT/LT 180
Rotation (180°) LT/RT 180	LT/RT 90, [Forward or Arc Bug], LT/RT 90
Arc (180°) LT/RT 180 R	LT/RT 90 R, [Forward or Rotation Bug], LT/RT 90 R

Addition Bugs

An addition bug occurs between two commands, however the possible bug type is influenced by the types of the two commands:

Former Command Type	Latter Command Type	Resulting Command Type
Forward FD R	Arc	Rotation
	Otherwise	Arc
Rotation LT/RT A	Arc	Forward
	Otherwise	Arc
Arc LT/RT A R	Arc	Forward or Rotation
	Rotation	Forward
	Otherwise	Rotation

Note: For use by those familiar with the original manual. Contact ZekNikZ#0878 on Discord with any corrections.