Introduction
The Space Academy has been formed by the nations of Earth. It’s mission is to train a new generation of explorers. As the newest member of the Academy, you will use this Constructopedia™ as a training manual. It will help you meet the challenges of space.
In this Constructopedia, you will learn how to build machines for Martian Missions. The included software will then help you use and control these machines.

Exploration Mars™ is an expansion set of the LEGO® MINDSTORMS™ Robotics Invention System™. The RCX is from the Robotics Invention System.
CONTENTS

Introduction  page 2
Project Ideas  page 4
Building Instructions
Mars Lander  page 6
Rover 1  page 16
Rover 2  page 22
Turntable  page 28
Robotic Arm  page 32
Additional ideas  page 40
Special Features  page 41
Tips & Tricks  page 44
Camera Attachment  page 46
Parts ID  page 47
PROJECT IDEAS

These are the models used to solve the Martian Missions on the CD-ROM. You can also design your own inventions for the Missions.

Rover 1
Basic Mars vehicle which can explore your Mars Yard. (page 16)

Rover 2
Rover with RCX standing upright. Much faster than Rover 1. (page 22)
Robotic Arm
Lifts objects from your Mars Yard. To make it turn, attach to the Turntable. (page 32)

Mars Lander
The home base for all of your Missions. Build it first so you can use it with the other models. (page 6)

Turntable
Adds motion to the Robotic Arm or PC video camera (not included). (page 28)
MARS LANDER

The following pages show you how to build the Mars Lander.
ROVER 1

The following pages show you how to build Rover 1. Make sure that your RCX has working batteries before starting.
For additional ideas, go to page 40.
The following pages show you how to build Rover 2. Make sure that your RCX has working batteries before starting.
TURNTABLE

The following pages show you how to build the Turntable.
ROBOTIC ARM

The following pages show you how to build the Robotic Arm. The Robotic Arm is placed on top of the Turntable.
Attach the Robotic Arm to the Turntable like this. For help building the Turntable, go to page 28. For additional ideas, go to page 40.
This is an example of how to control Rover 1 from the Mars Lander.

This is an example of how to attach the Robotic Arm and Turntable to the Mars Lander.
SPECIAL FEATURES

The following pages show you ideas for dressing up your inventions.

Dozer Blade
This is an example of how to build a Dozer Blade.
Special Features

Off-Track Wheels

Magnetic Arm

example
Rack and Pinion Steering
For help building, go to page 45.

Touch Sensor Steering
TIPS & TRICKS

These two pages show tips and tricks to make your inventions bigger and stronger.

- Adding an axle
- Making a lander leg
- Linking gears
- Using pulley wheels
Using the gear block with the motor

Strong but slow gearing

Steering construction
TOP SECRET

CODE: NU-ML9738  DEF: MINDSTORMS
REF: Mass Launcher on Mars
FAC: MB, SC, BNH, PM, MD, SL, IOU

MB, SC, BNH
We are at the final stage of testing for the Mass Launcher (ML) prototype on Mars. With the ML prototype, we have successfully sent materials into a LO (Low Orbit) and will aim for PICO (Phobos Insertion Orbit) when we build the real ML.

The program uses to drive the ML is in REX Code. Touch Sensors are used to control the LA (Loading Arm) and LA2 (Launching Arm). The LA1 loads mass onto the LA2 and the LA2 shoots the object into orbit.

The ML is designed to work in a low gravity environment.
CAMERA REFERENCE

This page is for those of you who have a PC video camera connected to your computer.

These two models are examples of how to connect a camera to your robotic inventions. They can be used with the Ranger and Surveyor Missions on the CD-ROM.

The Exploration Mars software works with most PC video cameras. If you already have a PC video camera, please refer to those instructions for help on connecting it to your computer. If you have any problems with your camera, please contact the manufacturer.