Table of Contents

- Introduction
- History
- How it Works: JetLev Flyer
- How it Works: Martin
- Jetpacks in the Future
Fictional Jetpacks

- Buzz Lightyear
- RoboCop
- Turboman
- GTA4
- Ironman
Recreational Water Jetpack

- [Link to YouTube video](http://www.youtube.com/watch?v=0snTqLQLpBA)
Martin Jetpack

- [http://www.youtube.com/watch?v=FnWLvrNKVjc](http://www.youtube.com/watch?v=FnWLvrNKVjc)
Personal Jetpacks

DESIGNS OF THE PAST
Breakthrough Designs

- 1944 - Nazi Himmelstürmer
- 1952 - Jump Belt
- 1959 – Aeropack/Rocketbelt/SRLD
- Varying Hydrogen Peroxide Designs
Nazi Himmelstürmer (Heaven Stormer)

- Developed by Germans from 1944-1945
-Designed to jump 50-70 meters, not fly
-Used Schmidt pulse jet engine used on the V-1 Rocket
-Problems
  - Needed to light both engines at exact same time
  - Must turn off immediately after jump
Jumpbelt

- Developed from late 1940s through mid 1950s by Thomas Moore, Harry Burdett, and Alexander Bohr
- First demonstration achieved only a few feet of lift for an instants (large jump)
- Used compressed gas forced through a nozzle
- Eventually allowed user to jump 20 feet into the air or run 100 yards in 9.3 seconds
Aeropack/Rocketbelt/SRLD

- Military Name: Small Rocket Lift Device (SRLD)
- 1959 - Studied by Aerojet General Corporation
- 1960 - Bell Aerosystems took over design

<table>
<thead>
<tr>
<th>Performance Specifications</th>
<th></th>
</tr>
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<tbody>
<tr>
<td>Weight</td>
<td>125 lbs</td>
</tr>
<tr>
<td>Propellant</td>
<td>90% pure H_2O_2</td>
</tr>
<tr>
<td>Flight Time</td>
<td>21.5 seconds</td>
</tr>
<tr>
<td>Thrust</td>
<td>0-300 lbs</td>
</tr>
<tr>
<td>Range</td>
<td>860 ft</td>
</tr>
<tr>
<td>Max Speed</td>
<td>80 mph</td>
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</table>
Varying Hydrogen Peroxide Designs

- From the late 1960’s to late 1990’s several H2O2 jetpacks have been designed with no major changes in design except in materials (light alloys)

- Culmination of these designs was the RB2000 Rocket Belt:
  - 30 second flight time
  - 60 mph max speed
  - 820 foot range
Personal Jetpacks

How Does it Work: JetLev Flyer
What is It?

- **Recreational Jet-pack** that uses a water jet to produce thrust
- Currently over 200 have been sold
- Provides for flight above water only

http://www.onlineweblibrary.com/blog/?p=2882

http://www.youtube.com/watch?v=7-KczCp0OQ4
How & Why it Works

- High Thrust to Weight Ratio: Engine and Fuel located on ground
- Pump is located on a jet-ski size craft, pumps water up a hose that feed two water jets.
- Water weighs more than gas, enabling flight by large amount of mass transfer.

http://www.zamazing.org/yazi/su-tahrikli-jetpack-jetlev-flyer

Steering

- Created to be rented out to people
- 30 minute lesson is all that is needed
- Throttle controlled by twisting grip
- Lift and propulsion forward controlled by lifting arms up and down.

Specifications

- Dry Weight: 30 lbs
- Max Thrust: 420 lbf
- Thrust-Weight: 2.5-1
- Engine HP: 200 HP
- Hose Length: 33 ft
- Top Speed: 25 mph
- Fuel Capacity: 26 gal.
- Flight Duration: 2-3 hrs
- Cost: $90,000

http://postlr.net/jetlev-flyer/
The Future

- 300 units plan to be sold by Sept. - Dec. 2011
- We will see these Water-Jet Packs in the future wherever recreational water activities take place:
  - Beach Vacation Destinations
  - Lakefronts
- The first of its kind, and the first airborne jet propelled vehicle to be commercially sold on a large scale
- More responsive than Martin Jet Pack
- Downside: limited to flying over water and elevations of 30 ft
Personal Jetpacks

How Does it Work: Martin
Martin Jetpack

- Most current advancement in personal jetpack technology
- Cost - $100,000
- Based in New Zealand
- As seen in Popular Science - Video

# Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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<tbody>
<tr>
<td>Height</td>
<td>5 ft</td>
</tr>
<tr>
<td>Width</td>
<td>5.5 ft</td>
</tr>
<tr>
<td>Length</td>
<td>5 ft</td>
</tr>
<tr>
<td>Structure</td>
<td>Carbon fibre composite</td>
</tr>
<tr>
<td>Empty weight</td>
<td>250 lbs (excluding safety equipment)</td>
</tr>
<tr>
<td>Gross weight</td>
<td>535 lbs</td>
</tr>
<tr>
<td>Useful (Pilot) Load</td>
<td>280 lbs+</td>
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<tr>
<td>Maximum thrust</td>
<td>600 lbs+</td>
</tr>
<tr>
<td>Fuel Capacity</td>
<td>5 US gallons (as required by FAA Part 103, Ultralight Regulations)</td>
</tr>
<tr>
<td>Fuel burn</td>
<td>10.0 gph</td>
</tr>
<tr>
<td>Engine</td>
<td>Martin Aircraft 2.0 L V4 2 stroke, rated at 200 hp (150 kw). Max 6000 rpm.</td>
</tr>
<tr>
<td>Electrical system</td>
<td>12 V DC Battery, starter, 360 w alternator.</td>
</tr>
<tr>
<td>Rotor</td>
<td>Carbon / Kevlar composite diameter 1.7 ft</td>
</tr>
<tr>
<td>Max</td>
<td>7058 rpm</td>
</tr>
<tr>
<td>Range</td>
<td>31.5 miles (at max speed of 63 mph as required by FAA part 103).</td>
</tr>
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</table>
# Flight Test Data

<table>
<thead>
<tr>
<th>Key Flight measures</th>
<th>Previous achievement</th>
<th>High Flight and parachute deployment test</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Climb rate</strong></td>
<td>100 ft/min 0.5 m/s</td>
<td>800 ft/min 4 m/s</td>
</tr>
<tr>
<td><strong>Altitude</strong></td>
<td>50 ft 15 m</td>
<td>5000 ft 1500 m</td>
</tr>
<tr>
<td><strong>Flight duration</strong></td>
<td>7:15 min</td>
<td>9:46 min</td>
</tr>
<tr>
<td><strong>Impact under Parachute</strong></td>
<td>Not tested</td>
<td>25.2 km/hr 15.7 mph</td>
</tr>
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</table>
How it Works

- Pilot Operated
- Purpose-Built Gasoline engine
- Twin ducted fans produce thrust for vertical takeoff and landing

- Standard Equipment
  - Flight and Engine displays
  - Harness
  - Ballistic Parachute
  - Retractable undercarriage
  - Energy absorbing undercarriage.
Uses/Advantages

• Uses
  ○ Defense – Rapid Insertion, Air Mobile Surveillance
  ○ Civil Defense – Emergency Response, Border Patrol
  ○ Recreation – Tourism (Sky Segway?)

• Advantages
  ○ Only around twenty hours of classroom and flight training (easy to fly)
  ○ Catastrophic failure will not lead to pilot fatality (safe)
  ○ The hourly operating cost will be around 90% lower compared to helicopters (cheap)
  ○ Small profile means it can access places a helicopter could never reach (small)
  ○ The Jetpack can be flown manned, or unmanned as a carrying platform (multi-purpose)
Personal Jetpacks

Jetpacks of the Future
Future of Martin Jetpack

- Earliest customers
  - Military and Emergency application
- Currently only recreational
  - Not a commuter
- FAA Highways in the Sky
  - Being developed
- U.S. market does not require license
JetMan

- Yves Rossy – First and only
- Current model he jumps from planes
- 4 Jet-Cat P200 22 kg of thrust each
- Prototype
  - Smaller, More powerful
  - Take-off

http://www.jetman.com/?page_id=945
NASA Puffin

- Langley Research Center
- Personal aviation vehicle
  - One passenger
- Vertical take-off and landing
- Electric powered
- 150 mph cruise
- Extremely quiet
- Long ways away
Commuting

- Urban use not allowed
- FAA Highway in the Sky
  - Currently in the works
- Pocket Airports
  - Designed by CAFE
  - Suburban Air Vehicles
  - Single-runway
  - Max 2 acres
  - greenbelts

References

- **History**
  - [http://www.canosoarus.com/07RocketBelt/Rocket02.htm](http://www.canosoarus.com/07RocketBelt/Rocket02.htm)
  - [http://www.youtube.com/watch?v=0snTqLQLpBA](http://www.youtube.com/watch?v=0snTqLQLpBA)
Questions