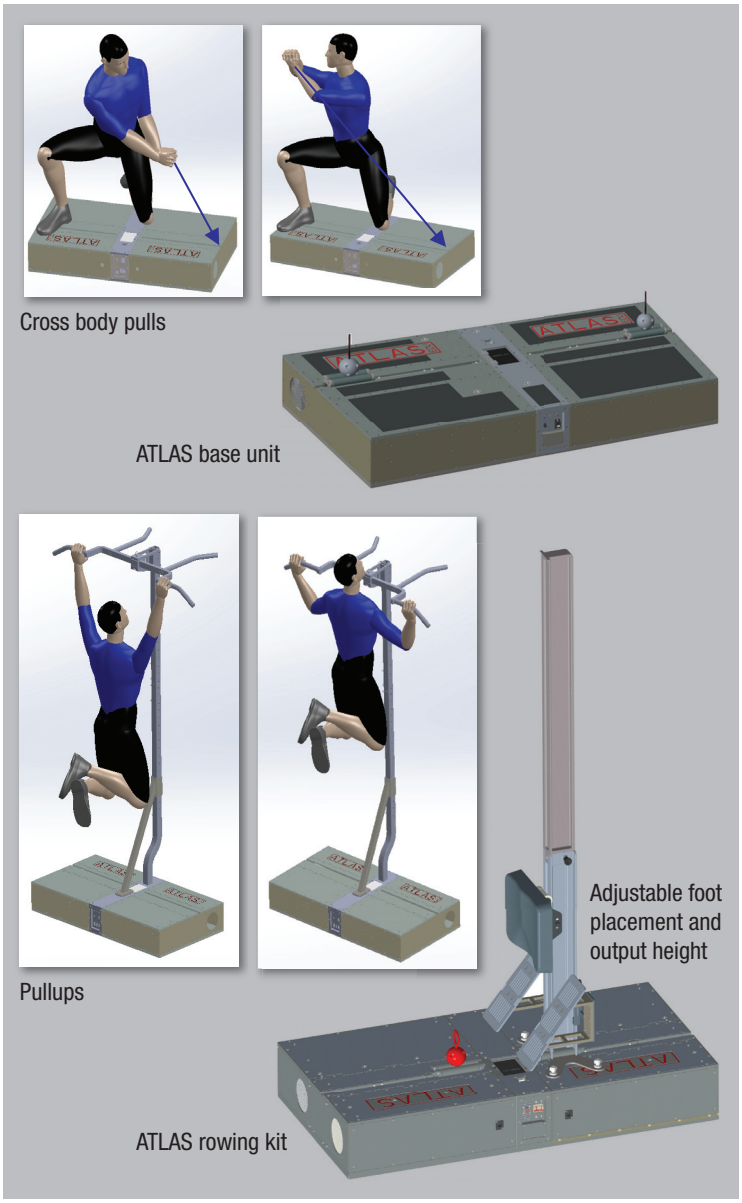
National Aeronautics and
Space Administration

Advanced Twin Lifting and Aerobic System (ATLAS)

Features

— Completely customizable and programmable advanced exercise device for research, flight analog studies and exploration.
— Loads between 10 and 600 lb of resistance
— Compact while still maintaining a large enough surface area to complete exercises safely
  • 50- by 26- by 7.5-in. platform
  • ~250 lb
— Both resistance and metabolic exercise
  • Adjustable rowing kit
  • Squats, dead lifts, curls, etc.
  • Pullups and dips
  • Cross body (and more)
— Manually translatable outputs for quick reconfiguration to different exercises
— Virtual racking: software control feature that applies working load only when user is within their calibrated range of motion
  • Allows for safe single-user operation
— Eccentric overloading: capable of providing different loads for concentric and eccentric phases of movement
— Power connection: 120 VDC and 7 amp
  • Power supply interfaces with standard 120-V and 15-A wall outlet
— Connectivity to one portal graphical user interface (GUI)
— Surface mount touch screen display for quick setup if laptop is unavailable
— Emergency stop (E-stop)
  • E-stop to cut power to motor drives should operator need to immediately stop exercise session
— Motor brake is automatically engaged



ATLAS Engineering Development Unit (EDU)




ATLAS Predecessors Developed by Glenn Research Center and Zin Technologies

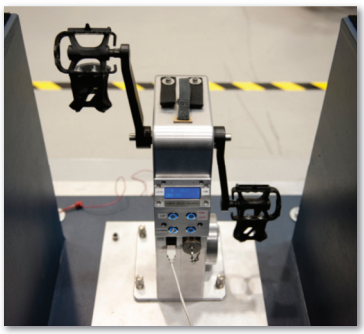
Resistive Overload Combined With Kinetic Yo-Yo (ROCKY)

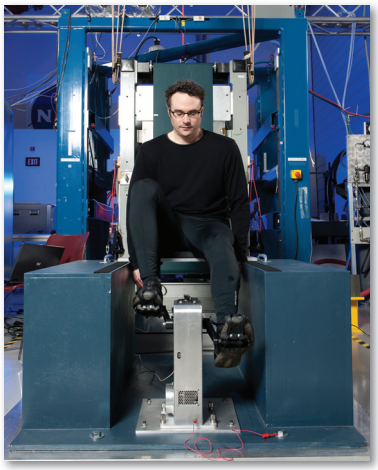
— Meets all medical and vehicle requirements for shorter-duration exploration missions; ready to support research and flight analogs
— Single-cable and 400-lbf-resistive-loading device
— Ultra-compact volume and weight
  • 21.5- by 13.5- by 7.5-in. platform
  • ~25 lb of mass
— Both resistance and metabolic exercise
  • Adjustable rowing kit
  • Squats, dead lifts, curls, etc.
— Virtual racking: software control feature that applies working load only when user is within their calibrated range of motion
— Accurately simulates the load profile of a mass in a 1-g environment (free weights) for strength training and the load profile of a rowing machine (up to 220 lbf) for aerobic training
— Eccentric overloading: capable of providing different loads for concentric and eccentric phases of movement
— Power connection: 120 VDC via external power supply

Hybrid Ultimate Lifting Kit (HULK)

— Similar mass and size of ATLAS to meet exploration medical and vehicle requirements
— Dual or single cable for both rowing and resistive exercises
— Resistive loading up to 600-lbf for full suite of exercises
— Hybrid motorized and pneumatic device—reduces vehicle power demand
— Flown on multiple parabolic flight campaigns
— Can operate completely UNPOWERED if desired, using built-in safe and simple pneumatic cylinders

Power-Generating Cycle Ergometer





— Generates power during use to power on display and can be used to power other devices over USB
— Outputs and logs data including power, voltage, calories burned, and elapsed time
— Ultra-compact volume and weight
  • 17 by 8 by 4 in.
  • ~25 lb of mass
— Ten configurable resistance levels
— Capable of handling energy inputs up to 400 W
— Built-in single strap at top of device allows for upper body exercise via T-bar grip (not shown); strap also engages power generation system on device