

VG Khurana. LISTER manuscript (2022)

Table I. Technical specifications of LISTER.

<u>Item/Feature</u>	<u>Specification</u>	<u>Comment</u>
Empty weight	450 lbs (204 kg)	No payload (modules) or drone
Payload (drone + modules)	150 lbs (68 kg)	Max.; excl. JPS
Length	4 feet	Excluding arms
Width	3 feet	Excluding lateral extenders
Height	6 feet	Wheels to antennae
Max. range	80 miles	Conventional propulsion
Max. endurance	6 hours	Conventional propulsion
Manipulator arms	4 feet (extended)	x2 arms; 6 DOF; Joint MSMs
Arm components	5 fingers each	Dexterous; CLUs; FSR
Arm payload	12.5 lbs each	2.5 lbs per finger
Proximity sensors	20	US; on body, arms, modules
Conventional propulsion system	Electric motors x2	Titanium wheels; RBS
Conventional power supply	Batteries (multiple)	Lithium-ion or solid state
Backup power supply	Solar panel	Battery recharge; 'safe return'
Maximum ground speed	12 mph (battery)	2 mph (solar)
Communication systems + EPIRB	AV; holographic	VHF; UHF; X-, Ka-band; IR
Digital HR stereo-cameras	Mini-turret x 4	D/N; navigation, surveillance
LED lighting	Compact x 12	Excl. arm-mounted CLUs
CPU	AI-capable	Flash, DRAM, PROM
MCU	Multiple	Each specific task-oriented
Modules:		
Medical pack	15 lb	Defibrillator; oxygen; medicines
Survival kit	6 lb	First aid; HE food; E-drinks
Telemetry unit	2 lb	Astronaut vitals; suit adaptor
Analysis units (customizable on gantries)	On front + side extender	3 DOF; integrated CLU
IR spectrometer	5 lb	
Mass spectrometer(s)	5 lb each	Interchangeable; breath; blood
Echo-US	5 lb	
X-ray	10 lb	
IR camera	2 lb	Thermal screening
Alternative/additional propulsion system	Mini-JPS; turbojet	Liquid or metal-CO ₂ propellants
Atmosphere propulsion avg speed ('hop')	36 mph	VTOL; vectored thrust
Drone:		
Empty weight (incl. batteries; no payload)	10 lbs	CLUs; MCUs; Comms; TP
Payload	5 lbs	Survival kit; compact telemetry
Length	30 cm	Excl. landing gear
Width	30 cm	Excl. propeller blades
Height	25 cm	Gear to base of propellers
Max. speed	25 mph	
Max. range	10 miles	
Max. endurance	2 hours	Incl. 'safe return'
Power	Batteries	Lithium ion or solid state
Propulsion	Mini electric motors	Propellers x4

Abbreviations: AV=Audiovisual; Avg = Average; CLU=Camera and light unit; Comms=Communication system (e.g., VHF, UHF); CPU=Central processing unit; D/N=Day/night vision; DOF=Degrees of freedom; DRAM=Dynamic random access memory; E=Electrolyte; EPIRB=Emergency position indicating radio beacon; Excl.=Excluding; FSR=Force sensing resistors; HE=High energy; HR=High resolution; Incl.=Including; IR=Infrared; JPS=Jet propulsion system; LED=Light emitting diode; Max.=Maximum; MCU=Microcontroller unit; Mph=Miles per hour; MSM=Mini servo motor; PROM=Programmable read-only memory; RBS=Rocker-bogie suspension; TP=Transponder system; UHF=Ultra high frequency; US=Ultrasound/ultrasonic; VHF=Very high frequency