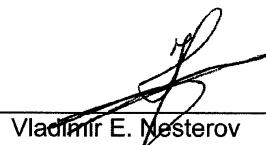
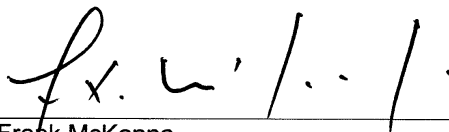


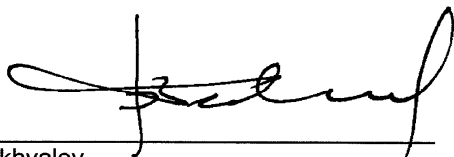
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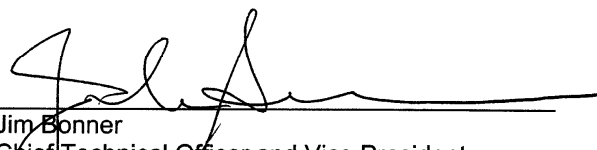
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REVISION NOTICE

This document supersedes the Proton Launch System
Mission Planner's Guide - Revision 6, dated December 2004

DISCLOSURE OF DATA LEGEND

The technical data included in this document has been cleared
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FOREWORD

The Proton Launch System Mission Planner's Guide is intended to provide information to potential Customers and spacecraft (SC) suppliers, concerning SC design criteria, Baikonur processing facilities, Proton launch capability, available mission analysis and custom engineering support, documentation availability and requirements, and program planning. It is intended to serve as an aid to the planning of future missions but should not be construed as a contractual commitment.

The units of measurement referred to in this document are based on the International System of Units (SI), with English units given in parentheses and all identified dimensions shown should be considered as approximate. In the event that one or more dimensions are critical to a specific payload integration or processing operation, the SC Customer should obtain accurate dimensions from International Launch Services (ILS).

This Guide will be updated periodically. Change pages to this printed document will not be provided, however, the version on the ILS website will be maintained as approved for public release by the U.S. Government. The most current version of this document can be found on the Internet at: <http://www.ilslaunch.com>.

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February 1997	3, Issue 1	<p>Section 1</p> <ul style="list-style-type: none"> • Updated Integration Schedule • Minor typographical corrections <p>Section 2</p> <ul style="list-style-type: none"> • Proton M fairing dimension update • Launch history update and corrections • Failure/Corrective Action update <p>Section 3</p> <ul style="list-style-type: none"> • Addition of Proton K/Block DM performance with use of standard kerosene <p>Section 4</p> <ul style="list-style-type: none"> • Ground Ops Instrumentation measurement capabilities update • Updated Proton LV radiated emissions • Updated flight instrumentations capabilities • Updated flight loads environments • Updated flight acoustics <p>Section 6</p> <ul style="list-style-type: none"> • Updated Proton/Block DM useable fairing envelopes with standard adapters <p>Section 7</p> <ul style="list-style-type: none"> • Updated Mission Integration schedule • Updated analysis, meetings and documentation schedules 	Eric Laursen Chief Engineer, LKEI Proton Division, ILS
March 1999	4, Issue 1	<ul style="list-style-type: none"> • Complete rewrite/update of document to reflect flight measured environments, interfaces and performance • Addition of Proton M/Breeze M vehicle data • Discussion of Baikonur payload processing and launch operations facilities 	Eric Laursen Proton Chief Engineer, ILS Rich Waterman Manager Mission Development, ILS

REVISION HISTORY (Continued)

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July 2009	7	<ul style="list-style-type: none"> • Updated Proton M/Breeze M vehicle description and performance tables/curves <ul style="list-style-type: none"> • Included Perigee Injection Supersynchronous Transfer Orbit (SSTO) • Updated transportation and launch induced environments, including low-shock CBOD pyroshock levels • Updated launch facilities descriptions • Updated payload adapter (PLA) data in Appendix D • Updated standard payload fairing (PLF) data and moved from Appendix A.4 and Appendix D to new Appendix E • Clarified standard versus optional mission capabilities and services <ul style="list-style-type: none"> • SSTO performance, Earth escape performance, etc. moved to new Appendix F • Previous Section 8 data moved to new Appendix F • Updated Quality Management System description (Appendix B) • Removed obsolete data 	Jim Bonner, Chief Technical Officer, ILS

PREFACE

International Launch Services (ILS) is pleased to offer one of the most capable commercial launch vehicles, and the most comprehensive launch services, available today. The Proton's services are now available to worldwide Customers at a most competitive price.

ILS is the exclusive marketing agent for commercial sales of the Proton Launch Vehicle (LV) worldwide, and is supported in its operations by full access to the incomparable technological expertise of its partner, Khrunichev State Research and Production Space Center (KhSC). ILS provides customers with a single point of contact for all mission analyses, custom engineering, and launch support tasks involved in using the Proton LV. Both individually and collectively, the members of the ILS team are committed to providing the most cost-effective launch services available in the world - from initial program planning to successful SC launch.

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ABBREVIATIONS AND ACRONYMS

A	
A	Ampere
A/C	Air Conditioning
APM	Amplitude Pulse Modulation
APT	Auxiliary Propellant Tank
AS	Adapter System
ATMCS	Air Thermal Mode Control System
AU	Ascent Unit
B	
bps	Bit(s) Per Second
C	
°C	Degree(s) Celsius
CBOD	Clampband Opening Device
CCAM	Collision and Contamination Avoidance Maneuver
CCTV	Closed-Circuit Television
CDR	Critical Design Review
CG	Center of Gravity
CLA	Coupled Loads Analysis
cm	Centimeter(s)
COPV	Composite Overwrapped Pressure Vessels
CPT	Central Propellant Tank
CTRD	Central Transmitter/Receiver Device
D	
dB	Decibel(s)
DB	Design Bureau
dBm	Decibel(s) Relative to 1 Milliwatt
dBW	Decibel(s) Relative to 1 Watt
dc	Direct current
Deg	Degree(s)
Deg/s	Degree(s) Per Second
DT	Direct Transmission (mode)
DTSA	Defense Technology Security Administration (U.S.)
E	
e	Eccentricity
EGSE	Electrical Ground Support Equipment
EM	Electromagnetic
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
EMIRM	EMI Reserve Margin
EMISF	EMI Safety Factor

F	
FEM	Finite Element Model
FM	Frequency Modulation
FMHF	Free Molecular Heat Flux
FODTS	Fiber-Optic Data Transmission System
FSA	Federal Space Agency/Roscosmos (Russian Federation)
ft	Foot; Feet
G	
g	Gravity or Gram
GEO	Geosynchronous Orbit
GHe	Gaseous Helium
GHz	Gigahertz
GLSTE	Ground Launch Support and Test Equipment
GMT	Greenwich Mean Time
GN&C	Guidance, Navigation, and Control
GN ₂	Gaseous Nitrogen
GOWG	Ground Operations Working Group
GSE	Ground Support Equipment
GSO	Geostationary Orbit
GTO	Geosynchronous Transfer Orbit
H	
H _a	Apogee Altitude
H _p	Perigee Altitude
He	Helium
HEO	Highly Elliptical Orbit
HEPA	High-Efficiency Particulate Air
HERO	Hazard of Electromagnetic Radiation to Ordnance
Hg	Mercury
hr	Hour(s)
HVAC	Heating, Ventilation and Air Conditioning
Hz	Hertz
I	
i	Inclination
ICD	Interface Control Document
IFD	In-Flight Disconnect
ILS	International Launch Services
IRD	Interface Requirements Document
ISDN	Integrated Services Digital Network

ISP	Internet Service Provider
ISS	International Space Station
J	
J	Joule(s)
K	
kbps	Kilobits per second
kg	Kilogram(s)
KhSC	Khrunichev State Research and Production Space Center
km	Kilometer(s)
kN	Kilonewton(s)
kPa	Kilopascal(s)
KQM	KhSC Quality Manual
L	
lbf	Pound(s)-Force
lbm	Pound Mass
LEO	Low-Earth Orbit
LHCP	Left Hand Circular Polarization
LKEI	Lockheed-Khrunichev-Energia International
LN ₂	Liquid Nitrogen
LSA	Launch Service Agreement
LSC	Launch Services Contractor
LTMCS	Liquid Thermal Mode Control System
LV	Launch Vehicle
M	
m	Meter(s)
mA	Milliampere(s)
MEO	Medium Earth Orbit
MHz	Megahertz
MIL-I-23659	Military Specification, Initiators Electric, General Design Specifications for
MLI	Multi-Layer Insulation
mm	Millimeter(s)
MMH	Monomethyl Hydrazine
MN	Meganewton(s)

Mohm	Megohm(s)
mohm	Milliohm(s)
MOU	Memorandum of Understanding
MPa	Megapascal(s)
ms	Millisecond(s)
m/s	Meters Per Second
MST	Mobile Service Tower
MT	Metric Ton(s)
MUX	Multiplexer
μ V	Microvolt(s)
mV	Millivolt(s)
N	
N	Newton(s)
N/A	Not Applicable
NASA	National Aeronautics and Space Administration (U.S.)
N ₂ H ₄	Hydrazine
nmi	Nautical Mile(s)
N ₂ O ₄ , NTO	Nitrogen Tetroxide
NPSK	Noise-Like Phase Shift Keying
O	
OASPL	Overall Sound Pressure Level
OBDC	On-Board Digital Computer
OFOISR	Office of Freedom of Information and Security Review (U.S.)
OU	Orbital Unit
P	
Pa	Pascal
PBX	Private Branch Exchange
PCM	Pulse Code Modulation
PDR	Preliminary Design Review
PhM	Phase Modulation
PLA	Payload Adapter
PLCG	Proton Launch Campaign Guide

PLE	Payload Envelope (or Useable Volume)
PLF	Payload Fairing
PM	Pulse Modulation
PMPG	Proton Mission Planner's Guide
POP	Point of Presence
PPE	Personal Protective Equipment
PPF	Payload Processing Facility
PSD	Power Spectral Density
PSK	Phase Shift Keying
PSM	Payload Systems Mass
PTRD	Peripheral Transmitter/Receiver Device
Q	
q	Dynamic Pressure
Q	Damping Factor
QA	Quality Assurance
QMS	Quality Management System
QSL	Quasi-Static Loads
R	
RAAN	Right Ascension of the Ascending Node
RF	Radio Frequency
RHCP	Right Hand Circular Polarization
S	
s	Second(s)
SC	Spacecraft
SCAPE	Self-Contained Atmospheric Protective Ensemble
SI	International System of Units
SNR	Signal-to-Noise Ratio
SOW	Statement of Work
SSTO	Supersynchronous Transfer Orbit
STE	System Test Equipment

T	
TBD	To Be Determined
TCP/IP	Transmission Control Protocol/Internet Protocol
TIM	Technical Interchange Meeting
TLM	Telemetry
TLS	Tandem Launch System
TNT	Trinitrotoluene
TV	Television
U	
UDMH	Unsymmetrical Dimethylhydrazine
UPS	Uninterruptible Power Supply
UR	Universal Rockets
U.S.	United States
US	Upper Stage - Proton Fourth Stage
V	
V	Volt(s), Velocity or Vertical
VCR	Videocassette Recorder
W	
W	Watt(s)
W/m ²	Watts Per Square Meter
Z	
ZERKT	Rocket Operations Plant (transliterated)