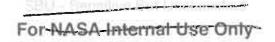


Section 7E Generic Ground Operations and Infrastructure Functions



Appendix 7E - Generic Ground Operations and Infrastructure Functions

This Appendix documents two different indentured lists of generic ground operations and infrastructure functions that were used to help guide and focus the ESAS Spaceport Tiger Team as it defined operations concepts and conducted cost estimations and outline requirements. The origin of these "catalogs" of generic functions is from NASA's Highly Reusable Space Transportation (HRST) Study, the Spaceport Synergy Team, NASA's Space Shuttle Design Root Cause Analysis (RCA), and the Advanced Spaceport technology Working Group (ASTWG).

1.0 LANDING/RECOVERY Facility and Equipment Preps for Vehicle Landing / Recovery Functional verification of ground recovery systems prior to flight element arrival commitment 1.01.02 Servicing of Ground Recovery systems for arrival Landing Facility Contamination control 1.01.03 Element Landing and Recovery Operations 1.02 Activate ground landing systems and position resources for element arrival 1.02.01 Position recovery equipment and provide services to vehicle element upon return 1,02.02 1.02.03 Perform active system shutdown, safing and check out for return to spaceport Payload Removal Operations 1.03 Internal payload item removal 1.03.01 1.03.02 Payload handling and transport operations 1.03.03 Attached payload item removal Crew and passenger egress 1.03.04 Post-Flight element ground handling and transport 1.04 Post flight element handling operations 1.04.01 Element ground transport from recovery point 1,04.02 Landing/Recovery Facility and Equipment Periodic Maintenance 1.05 Interval Maintenance of Landing Recovery Ground Systems 1.05.01 Recovery Ground System and Facility Modifications and Process Changes Remote Landing Site Recovery and Ferry Return Operations 1.06 Flight element system preparations for ferry 1.06.01 1.06.02 Ferry equipment and facility preps Flight element mate to ferry systems 1.06.03 1.06.04 Element Ferry operations support FLIGHT ELEMENT TURNAROUND 2.0 Facility Preps for Vehicle Turnaround Functional Verification of ground systems prior to Vehicle arrival Servicing and staging of ground systems prior to vehicle arrival 2.01.02 Contamination control 2,01.03

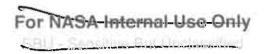


2.02.01 Vehicle Transport and Alignment

Positioning Vehicle, Connection to Services, Gaining Access, and Protection

2.02

	2.02.02	Ground access equipment positioning
	2.02.03	Connection to facility services
	2.02.04	Establish protective enclosures and install/remove flight vehicle protective covers
	2.02.05	Removal of flight equipment covers/panels to gain access
2.03	2.02.06 Vehicle E	Opening and closing of vehicle hatches and hinged/articulated doors lement Safing
	2.03.01	Hazardous Fluid Safing
	2.03.02	Pyro/Ordnance Safing
2,04	2.03.03 Vehicle E	Vehicle Purges for Personnel/Orbiter Safety lement Systems Servicing
	2.04.01	Landing Gear Mechanical Servicing
	2.04.02	Ordnance Handling and Installation
	2.04.03	Maintenance of Fuselage/PLB Vent Filters & Window Cavity Purge
	2.04.04	Flight Crew Systems Servicing
	2.04.05	Acreage Tile & TPS Blanket Servicing
	2.04.06	TPS Moldline Penetration, Leading Edge/Nose & Aerosurface Hingeline Seal Servicing
	2.04.07	Fluid Drain and Deservicing
	2.04.08	Fluid Servicing and Fill
	2.04.09	Routine Vehicle Cleaning & Filter Inspections
	2.04.10	Flight Pressurizations
	2.04.11	Navigation & Instrumentation Component Servicing
	2.04.12	Routine Replacement of Expendable and Limited Life Items
2.05	2.04.13 Inspection	Vehicle electrical power application, and data processing monitoring & control operation & Checkout
	2.05.01	Component/Subsystem Functional Verification
	2.05.02	Structural integrity inspections and mechanism functional verifications
	2.05.03	Propellant/fluid/gas system integrity verifications & inspections
2.06	2.05.04 Vehicle P	Vehicle power up/down, switch-lists, functional checks and on-board s/w config ayload Accommodations Turnaround
	2.06.01	Reconfigure unique payload thermal protection/insulation



2.06.02 Repositioning vehicle-fixed mechanisms

2.06.03 Remove/Install mission-unique mechanisms 2,06.04 Reconfigure vehicle supplied fluid services 2.06.05 Reconfigure vehicle supplied electrical and information services 2.06.06 Access to Payload accommodations 2.06.07 Payload accommodations cleaning and closeout 2.06.08 Payload accommodations turnaround unplanned troubleshooting and repair 2.06.09 Payload Accommodations Inspections & Testing 2.07 Processing Support Systems & Functions 2.07.01 Purge Operations & Monitoring 2.07.02 Hazard Monitoring Systems Operation 2.07.03 Vehicle System Reconfigurations Turnaround Unplanned Troubleshooting and Repair 2.08 2.08.01 Troubleshooting, Replacement, Disposition of Failed/Suspect LRUs 2.08.02 Troubleshooting and Repair of Leaks Fluid/Pneumatic System Decontamination/Cleaning 2.08.03 2.08.04 Troubleshooting, Retest and Repair of Electrical cables, connectors Repair or Replacement of Thermal Protection Systems (TPS) Hardware 2.08.05 Structural Repair/Refurbishment 2.08.06 Repair of Damaged Ducts, Tubes & Hoses 2.08.07 2.08.08 Troubleshooting & Repair of Mechanisms and Thermal/Pressure Seals Troubleshooting and Repair of Ground Equipment 2.08.09 Modifications and Special Tests 2.09 2.09.01 Flight Element Modifications and Process Changes 2.09.02 Special Tests and Fleet System Checks 2.09.03 Payload-Driven Flight Element Weight/CG Alterations Removal of Access/Umbilicals and Closeout 2.10 2.10.01 Removal of Umbilicals and Access equipment Flight Element System Closeouts for Vehicle and Ground Launch System Integration 2.10.02 2.10.03 Preps for Vehicle Element Transfer Turnaround Facility and Equipment Periodic Maintenance 2.11



Interval Maintenance of Ground Systems

2.11.01

		2.11.02	Ground System and Facility Modifications and Process Changes		
3.0	FLIGH 3.01	LIGHT ELEMENT ASSEMBLY 3.01 Element Transport, Lift and Handling for Assembly			
	3.01	3.01.01	Facility Preps for Element Assembly Operations		
		3.01.02	Ground Transport of Major Element Segments		
		3.01.03	Lift, Positioning and Connection to Assembly Facility Support Fixtures		
	3.02	3.01.04 Element 5	Activate Element Environmental and Safety Controls Structural Assembly		
		3.02.01	Flight Segment Handling Operations		
		3.02.02	Flight Segment Structural Connections		
	3.03	3.02.03 Subsystem	Structural Assembly Verification and Closeout m / Component Installations		
		3.03.01	Subsystem / Component Handling Ops		
		3.03.02	Facility Preps for Installations		
		3.03.03	Flight Component Installation onto Flight Element		
		3.03.04	Non-Flight Component Installations		
	3.04	3,03.05 Flight El	Flight Component Installation Closeouts ement Assembly Functional Verifications		
		3.04.01	Passive System Verifications		
		3.04.02	Active System Verifications		
	3.05	3.04.03 Assembly	Inspections and Alignment Verifications Unplanned Troubleshooting & Repair		
		3.05.01	Unplanned Element Disassembly/Reassembly		
		3.05.02	Flight Element Troubleshooting and Repair		
	3.06	3.05.03 Post-Ass	Flight Element Modifications and Process Changes embly Operations		
		3.06.01	Reconfigure/Relocate Facility and Ground Equipment		
	3.07	3.06.02 Assembly	Flight Element Preparations for Integration y Facility and Equipment Periodic Maintenance		
		3.07.01	Interval Maintenance of Assembly Ground Systems		
	3.08	3.07.02 Routine	Assembly Ground System and Facility Modifications and Process Changes Reusable Flight Element Module/Component Disassembly		



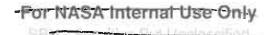
Disassembly Preps and Attach/closeout hardware removal

		3.08.01	
		3.08.02	Flight Element Component disassembly, handling, and transport
		3.08.03	Post-Disassembly
4.0	FLIGH 4.01		E INTEGRATION Transportation, Handling, Lift and Mate
		4.01.01	Facility Preps for Flight Element Integration Operations
		4.01.02	Ground Transport of Flight Elements
		4.01.03	Element Lift, Position and Mate
	4.02	4.01.04 Post-Mati	Post-Mate Servicing and Interface Closeouts ng Functional Verification
		4.02.01	Element to Ground System Interfaces
	4.03	4.02.02 Integration	Element to Element Interfaces n Unplanned Troubleshooting & Repair
		4.03.01	Disconnection of Flight Elements
		4.03.02	Interface Troubleshooting and Repair
		4.03.03	Post-Integration Flight Element Troubleshooting and Repair
	4.04	4.03.04 Perform in	Post-Integration Ground Element/Equipment Troubleshooting and Repair ntegration of payload / cargo
		4.04.01	Facility Preparations for Payload Installation
		4.04.02	Payload Installation into Vehicle
		4.04.03	Post Installation operations
		4,04.04	Payload handling and transport operations
	4.05	4.04.05 Configure	Payload Inspections and Testing systems for Vehicle Transfer to Launch Point
		4.05.01	Disconnect/Stow integration and mating ground h/w
		4.05.02	Configure Vehicle systems for launch functions
	4.06	4.05.03 Integration	Preps for Integrated Vehicle Transfer/Rotation to launch position n Facility and Equipment Periodic Maintenance
		4.06.01	Interval Maintenance of Integration Ground Systems
		4.06.02	Integration Ground System and Facility Modifications and Process Change
5.0	FLIGH 5.01		E LAUNCH/DEPARTURE GSE, Refurbishment, Reservicing & Preps for Vehicle Arrival



Launch Equipment Refurbishment/Reservicing

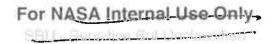
	5.01.01	
	5.01.02	Contamination Control
	5.01.03	Functional verifications of ground systems prior to flight vehicle mating
5.02	5.01.04 Position V	Servicing of ground systems prior to flight vehicle mating //ehicle at Launch Point, Mate to Ground Facility and Services & Provide Access
	5.02.01	Vehicle Transport and Alignment
5.03	5.02.02 Functional	Mate Umbilicals, Environmental Protection and Access positioning l Verif of Flt/Grd Systems for Launch
	5.03.01	Periodic Maintenance / Calibrations
	5.03.02	System Integrity Verification
	5.03.03	System Functionality Verification
5.04	5.03.04 Launch Sy	Human systems verification and training vstems Unplanned Troubleshooting/Repair
	5.04.01	Component Troubleshooting, Removal and Replacements
5.05	5.04.02 Crew Ingr	Ground Launch Structural Systems Repair ess, Late Payload Stowage & Functional Verification for Flight
	5.05.01	Flight Crew Ingress/Egress
	5.05.02	Late Payload Stowage
	5.05.03	Payload Functional Verification for Flight
5,06	5.05.04 Vehicle Sy	Unplanned Payload Troubleshooting and Repair ystem Servicing at Launch Point
	5.06.01	Local Servicing with facility/GSE by remote control room
	5.06.02	Local Manual Servicing at the Launch Facility
5.07	5.06.03 Access/Ur	Ordnance Hookups nbilical Removal & Closeout for Flight
	5.07.01	Payload Closeout tasks
	5.07.02	Access Removal tasks
	5.07.03	Umbilical Removal tasks
5.08	5,07.04 Remote A	Environmental Cover Removal tasks utomated Servicing and Propellant Loading
	5.08.01	Cryogenic Fluids transfer
	5 08 02	Thermal Management Fluid Servicing



Tank Gaseous Pressurization

	5.08.03	
	5.08.04	Flight Vehicle Press
	5.08.05	Environmental Ctl purging
	5.08.06	Engine Conditioning Purges
5.09	5.08.07 Launch th	Remote Fuel Cell Gas Supply ne Vehicle
	5.09 .01	Coordinate the network of local and offsite support functions
	5.09.02	Activate Flight Vehicle and Ground Systems for Launch
	5.09.03	Obtain Weather and Range Clearances for Launch
	5.09.04	Configure Flight Vehicle for Terminal (Final) Launch Operations
	5.09.05	Final Launch Sequencing
5.10	5.09.06 Post-Lau	Configure systems for launch abort/recycle, as needed nch Securing
	5.10.01	Post Launch System Safing Operations
5.11	5.10.02 Launch F	Post Launch Inspection of Facilities and Equipment acility and Equipment Periodic Maintenance
	5.11.01	Interval Maintenance of Launch Ground Systems
	5.11.02	Launch Ground System and Facility Modifications and Process Change
FLIGH		NT SHIPPING, RECEIVING & ACCEPTANCE Receiving and Handling Ops
	6.01.01	Receiving Facility and Equipment Preps and Functional Verification
	6.01.02	Element Transport Receiving and Positioning Ops
6.02	6.01.03 Element	Element Offload from Transport system Ground Transfer and Storage Operations at the Spaceport
	6.02.01	Element Ground Handling equipment and fixtures
	6.02.02	Element Environmental Shelter and Conditioning
6.03	6.02.03 Element	Remove and Stow Transportation Hardware Inspection and Receiving Acceptance
	6.03.01	Receiving Inspection
	6.03.02	Hardware Inventory
6.04	6.03.03 Conditio	Softgoods Inventory ning if required (purging, temperature and humidity control) Facility/GSE preps for Element Storage

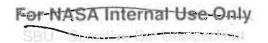
6.0



		6.04.01
	6.05	6.04.02 Activate/Monitor Element conditioning systems Perform design modifications (deferred work)
		6.05.01 Element/Subsystem modifications
	6.06	6.05.02 Fleet-wide tests & inspections Receiving Inspection discrepancy resolution & repairs
		6.06.01 Element Repair & Rework
	6.07	6.06.02 Inventory Discrepancy Resolutions Element Shipment from Spaceport
		6.07.01 Facility and Equipment Preps for Flight Element Hardware Shipment
		6.07.02 Shipment Kit installation on the element
		6.07.03 Element Handling and Connection with Transport System
		6.07.04 Softgoods preparation for shipment
7.0	FLIGH 7.01 7.02 7.03 7.04	TELEMENT, SUBSYSTEM & COMPONENT DEPOT MAINTENANCE Vehicle overhaul, inspection/verification, and modification (structural, flight controls, etc.) Modular element overhaul, remanufacture and inspection/verification Hot test propulsion hardware Spaceport software upgrades (non-flight)
8.0	TRAF 8.01 8.02 8.03 8.04 8.05	FIC/FLIGHT CONTROL Ground/flight vehicle inter-communications systems management and control Weather advisory for launch, landing, and ground operations Vehicle-related launch/flight/landing/ground operations control and monitoring Ascent/Reentry flight safety monitor and control Audio/visual monitor of ground operations
9.0	OFFLI 9.01 9.02 9.03 9.04 9.05 9.06 9.07 9.08 9.09 9.10	Receipt Packaging Assembly Test & Checkout Encapsulation Payload Commodity Servicing Transport to Vehicle Integration location Pre-Flight support Passenger pre-flight activities Post-flight payload processing
10.0	SPACI 10.01 10.02 10.03 10.04 10.05	EPORT SUPPORT INFRASTRUCTURE Shops and Labs Photographic Services Fire Protection, Medical Security Library (technical documents)

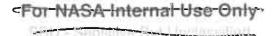


	10.06	Utilities
	10.07	Roads and Grounds
	10.08	Foods Services
	10.09	Heavy Equipment
	10,10	Communication/Information Services
	10.11	Ground Transportation Services
	10.12	Environmental Compatibility Management
	10.13	Pyrotechnic Storage and Handling
	10.14	Personal Environmental Protection Equipment
	10.15	Facility Maintenance Services and Shops
11.0	FLIGH	T SYSTEM-UNIQUE LOGISTICS
	11.01	Propellants (acquisition, storage, distribution, conditioning verification)
	11.02	Other fluids and gases and unique consumables
	11.03	LRU replacement hardware (flight and ground systems)
12.0		SPORTATION SYSTEMS OPS PLANNING & MANAGEMENT
	12.01	Customer Relations
	12.02	Vehicle Manifesting and Scheduling
	12.03	Ground Systems Scheduling and Management
	12.04	Software Production
	12.05	Personnel Management
	12.06	Sustaining Operations Engineering Work Control
	12.07	
	12.08	Economic Development
	12.09	5
	12.10	3
	12.11	Safety, Reliability & Quality Assurance (SR&QA)
13.0	COMM	MUNITY SUPPORT SERVICES INFRASTRUCTURE
	13.01	Shelter
	13.02	Connecting Utility Infrastructure
	13.03	Transportation Support
	13.04	Educational Support
	13.05	Community Police/Fire Protection
	13.06	Community Resources Infrastructure and Services
	13.07	Consumer Retail Support
	13.08	Community Medical Support
	13.09	Financial Institutions

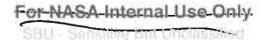


FLIGHT VEHICLE OPERATIONS

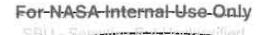
A1	RECEI	VE AND AC	CCEPT FLIGHT ELEMENT(S)			
	A1.01	Element Re	eceiving and Handling Ops			
		A1.01.01	Receiving Facility and Equipment Preps and Functional Verification			
		A1.01.02	Element Transport Receiving and Positioning Ops			
		A1.01.03	Element Offload from Transport system			
	A1.02		round Transfer and Storage Operations at the Spaceport			
		A1.02.01	Element Ground Handling equipment and fixtures			
		A1.02.02	Element Environmental Shelter and Conditioning			
		A1.02.03	Remove and Stow Transportation Hardware			
	A1.03		spection and Receiving Acceptance			
		A1.03.01	Receiving Inspection			
		A1.03.02	Hardware Inventory			
		A1.03.03	Softgoods Inventory			
	A1.04		ng if required (purging, temperature and humidity control)			
		A1,04.01	Facility/GSE preps for Element Storage			
		A1.04.02	Activate/Monitor Element conditioning systems			
	A1.05	Perform de	sign modifications (deferred work)			
		A1.05.01	Element/Subsystem modifications			
		A1.05.02	Fleet-wide tests & inspections			
	A1.06	Receiving	Inspection discrepancy resolution & repairs			
		A1.06.01	Element Repair & Rework			
		A1.06.02	Inventory Discrepancy Resolutions			
В1	ASSEN	ASSEMBLY FLIGHT ELEMENT(S)				
	B1.01		ransport, Lift and Handling for Assembly			
		B1.01.01	Facility Preps for Element Assembly Operations			
		B1.01.02	Ground Transport of Major Element Segments			
		B1.01.03	Lift, Positioning and Connection to Assembly Facility Support Fixture			
		B1.01.04	Activate Element Environmental and Safety Controls			
	B1.02		tructural Assembly			
		B1.02.01	Flight Segment Handling Operations			
		B1.02.02	Flight Segment Structural Connections			
		B1.02.03	Structural Assembly Verification and Closeout			
	B1.03	Subsystem	/ Component Installations			
		B1.03.01	Subsystem / Component Handling Ops			
		B1.03.02	Facility Preps for Installations			
		B1.03.03	Flight Component Installation onto Flight Element			
		B1.03.04	Non-Flight Component Installations			
		B1.03.05	Flight Component Installation Closeouts			
	B1.04	Flight Ele	ment Assembly Functional Verifications			
		B1.04.01	Passive System Verifications			
		B1.04.02	Active System Verifications			
		B1.04.03	Inspections and Alignment Verifications			
	B1.05		Unplanned Troubleshooting & Repair			
		B1.05.01	Unplanned Element Disassembly/Reassembly			



		B1.05.02	Flight Element Troubleshooting and Repair
		B1.05.03	Flight Element Modifications and Process Changes
	B1.06		ably Operations
		B1.06.01	Reconfigure/Relocate Facility and Ground Equipment
		B1.06.02	Flight Element Preparations for Integration
C 1	SERVIC	CE AND CH	ECKOUT FLIGHT ELEMENT(S)
	C1.01	Vehicle Ele	ment Systems Servicing
		C1.01.01	Landing Gear Mechanical Servicing
		C1.01.02	Ordnance Handling and Installation
		C1.01.03	Maintenance of Fuselage/PLB Vent Filters & Window Cavity Purge
		C1.01.04	Flight Crew Systems Servicing
		C1.01.05	Acreage Tile & TPS Blanket Servicing
			TPS Moldline Penetration, Leading Edge/Nose & Aerosurface Hingeline Seal
		C1.01.06	Servicing
		C1.01.07	Fluid Drain and Deservicing
		C1.01.08	Fluid Servicing and Fill
		C1.01.09	Routine Vehicle Cleaning & Filter Inspections
		C1.01.10	Flight Pressurizations
		C1.01.11	Navigation & Instrumentation Component Servicing
		C1.01.12	Routine Replacement of Expendable and Limited Life Items
		C1.01.13	Vehicle electrical power application, and data processing monitoring & control operations
	C1.02		& Checkout
	C1.02	C1.02.01	Component/Subsystem Functional Verification
		01,02.01	Component outsigned in a mountain
		C1.02.02	Structural integrity inspections and mechanism functional verifications
		C1.02.03	Propellant/fluid/gas system integrity verifications & inspections
		C1.02.04	Vehicle power up/down, switch-lists, functional checks and on-board s/w config
	C1.03	Removal of	Access/Umbilicals and Closeout
		C1.03.01	Removal of Umbilicals and Access equipment
			Flight Element System Closeouts for Vehicle and Ground Launch System
		C1.03.02	Integration
		C1.03.03	Preps for Vehicle Element Transfer
D	INTEGI	RATE FLIG	HT SYSTEM AND PAYLOAD
	D.01		ansportation, Handling, Lift and Mate
		D.01.01	Facility Preps for Flight Element Integration Operations
		D.01.02	Ground Transport of Flight Elements
		D.01.03	Element Lift, Position and Mate
		D.01.04	Post-Mate Servicing and Interface Closeouts
	D.02	Post-Matin	g Functional Verification
		D.02.01	Element to Ground System Interfaces
		D.02.02	Element to Element Interfaces
	D.03	-	Unplanned Troubleshooting & Repair
		D.03.01	Disconnection of Flight Elements
		D.03.02	Interface Troubleshooting and Repair
		D.03.03	Post-Integration Flight Element Troubleshooting and Repair
		D.03.04	Post-Integration Ground Element/Equipment Troubleshooting and Repair
		D.03.04	1 031-1110 Bration Oround Element Equipment 1 tout testioning and Repair



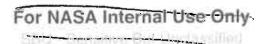
	D.04	Perform in	ntegration of payload / cargo
		D.04.01	Facility Preparations for Payload Installation
		D.04.02	Payload Installation into Vehicle
		D.04.03	Post Installation operations
		D.04.04	Payload handling and transport operations
		D.04,05	Payload Inspections and Testing
	D.05		systems for Vehicle Transfer to Launch Point
		D.05.01	Disconnect/Stow integration and mating ground h/w
		D.05,02	Configure Vehicle systems for launch functions
		D.05.03	Preps for Integrated Vehicle Transfer/Rotation to launch position
	D.06	Position V	Vehicle at Launch Point, Mate to Ground Facility and Services & Provide Access
		D.06.01	Vehicle Transport and Alignment
		D.06.02	Mate Umbilicals, Environmental Protection and Access positioning
E	EXECU		RTURE OPERATIONS
	E.01	Functiona	l Verif of Flt/Grd Systems for Launch
		E.01.01	Periodic Maintenance / Calibrations
		E.01.02	System Integrity Verification
		E.01.03	System Functionality Verification
		E.01.04	Human systems verification and training
	E.02	Launch S	ystems Unplanned Troubleshooting/Repair
		E.02.01	Component Troubleshooting, Removal and Replacements
		E.02.02	Ground Launch Structural Systems Repair
	E.03	Crew Ingo	ress, Late Payload Stowage & Functional Verification for Flight
		E,03.01	Flight Crew Ingress/Egress
		E.03.02	Late Payload Stowage
		E.03.03	Payload Functional Verification for Flight
		E.03.04	Unplanned Payload Troubleshooting and Repair
	E.04		ystem Servicing at Launch Point
		E.04.01	Local Servicing with facility/GSE by remote control room
		E.04.02	Local Manual Servicing at the Launch Facility
		E.04.03	Ordnance Hookups
	E.05	Access/U	mbilical Removal & Closeout for Flight
		E.05.01	Payload Closeout tasks
		E.05.02	Access Removal tasks
		E.05.03	Umbilical Removal tasks
		E.05.04	Environmental Cover Removal tasks
	E.06		Automated Servicing and Propellant Loading
	_,,,,	E.06.01	Cryogenic Fluids transfer
		E.06.02	Thermal Management Fluid Servicing
		E.06.03	Tank Gaseous Pressurization
		E.06.04	Flight Vehicle Press
		E.06.05	Environmental Ctl purging
		E.06.06	Engine Conditioning Purges
		E.06.07	Remote Fuel Cell Gas Supply
	E.07	Launch th	•
	1.07	E.07.01	Coordinate the network of local and offsite support functions
		E.07.01 E.07.02	Activate Flight Vehicle and Ground Systems for Launch
		E.07.02 E.07.03	Obtain Weather and Range Clearances for Launch
		E.07.03 E.07.04	Configure Flight Vehicle for Terminal (Final) Launch Operations
		L.U/.UH	Company them to not formular (that) beautin Operations



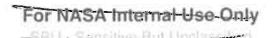
		E.07.05 E.07.06	Final Launch Sequencing Configure systems for launch abort/recycle, as needed
F	MONIT	OR AND M	IANAGE THE FLIGHT
	F.01	Ascent/Ree	entry flight safety monitor and control
G	LAND/	RECOVER	FLIGHT ELEMENT(S) AND PAYLOAD
Ū	G.01		d Equipment Preps for Vehicle Landing / Recovery
		G.01.01	Functional verification of ground recovery systems prior to flight element arrival
		G,01.02	Servicing of Ground Recovery systems for arrival
		G.01.03	Landing Facility Contamination control
	G.02	Element La	anding and Recovery Operations
		G.02.01	Activate ground landing systems and position resources for element arrival
		G.02.02	Position recovery equipment and provide services to vehicle element upon return
		G.02.03	Perform active system shutdown, safing and check out for return to spaceport
	G.03	•	emoval Operations
		G.03.01	Internal payload item removal
		G.03.02	Payload handling and transport operations
		G.03.03	Attached payload item removal
	0.04	G.03.04	Crew and passenger egress
	G.04	_	t element ground handling and transport
		G.04.01 G.04.02	Post flight element handling operations Element ground transport from recovery point
	G.05		anding Site Recovery and Ferry Return Operations
	G.03	G.05.01	Flight element system preparations for ferry
		G.05.01 G.05.02	Ferry equipment and facility preps
		G.05.02 G.05.03	Flight element mate to ferry systems
		G.05.04	Element Ferry operations support
H1	PREPA	RE FLIGH	Γ ELEMENT(S) FOR TURNAROUND
	H1.01	Facility Pr	eps for Vehicle Turnaround
		H1.01.01	Functional Verification of ground systems prior to Vehicle arrival
		H1.01.02	Servicing and staging of ground systems prior to vehicle arrival
		H1.01.03	Contamination control
	H1.02		g Vehicle, Connection to Services, Gaining Access, and Protection
		H1.02.01	Vehicle Transport and Alignment
		H1.02.02	Ground access equipment positioning
		H1.02.03	Connection to facility services
		H1.02.04	Establish protective enclosures and install/remove flight vehicle protective covers
		H1.02.05	Removal of flight equipment covers/panels to gain access
		H1.02.06	Opening and closing of vehicle hatches and hinged/articulated doors
	H1.03	Vehicle Ele	ement Safing
		H1.03.01	Hazardous Fluid Safing
		H1.03.02	Pyro/Ordnance Safing
		H1.03.03	
	H1.04	Processing	Support Systems & Functions



		H1.04.01 Purge Operations & Monitoring
		H1.04.02 Hazard Monitoring Systems Operation
	II1 05	H1.04.03 Vehicle System Reconfigurations Power Payable Flight Florent Module/Component Disassembly
	H1.05	Routine Reusable Flight Element Module/Component Disassembly H1.05.01 Disassembly Preps and Attach/closeout hardware removal
		H1.05.02 Flight Element Component disassembly, handling, and transport
		H1.05.03 Post-Disassembly
		·
I1		RE FLIGHT ELEMENT(S)
	I1.01 I1.02	Troubleshooting, Replacement, Disposition of Failed/Suspect LRUs Troubleshooting and Repair of Leaks
	I1.02 I1.03	Fluid/Pneumatic System Decontamination/Cleaning
	I1.04	Troubleshooting, Retest and Repair of Electrical cables, connectors
	I1.05	Repair or Replacement of Thermal Protection Systems (TPS) Hardware
	I1.06	Structural Repair/Refurbishment
	I1.07	Repair of Damaged Ducts, Tubes & Hoses
	11.08	Troubleshooting & Repair of Mechanisms and Thermal/Pressure Seals
	I1.09	Troubleshooting and Repair of Ground Equipment
J	RESTO	RE GROUND SYSTEMS FOR REUSE
	J.01	Post-Launch Securing
		J.01.01 Post Launch System Safing Operations
	7.00	J.01.02 Post Launch Inspection of Facilities and Equipment
	J.02	Facility/GSE, Refurbishment, Reservicing & Preps for Vehicle Arrival J.02.01 Launch Equipment Refurbishment/Reservicing
		J.02.02 Contamination Control
		J.02.03 Functional verifications of ground systems prior to flight vehicle mating
		J.02.04 Servicing of ground systems prior to flight vehicle mating
PAY	LOAD E	LEMENT OPERATIONS
A2	RECEIV	/E AND ACCEPT PAYLOAD ELEMENT(S)
	A2.01	Payload Element Receipt
D2	ACCEM	IBLY PAYLOAD ELEMENT(S)
B2	B2.01	Payload Element Packaging
	B2.02	Payload Element Assembly
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C2	C2.01	CE AND CHECKOUT PAYLOAD ELEMENT(S) Test & Checkout
	C2.01	Encapsulation
	C2.03	Payload Commodity Servicing
	C2.04	Transport to Vehicle Integration location
	C2.05	Pre-Flight support
	C2.06	Passenger pre-flight activities
H2	PREPA	RE PAYLOAD ELEMENT(S) FOR TURNAROUND OR DISPOSAL
	H2.01	Vehicle Payload Accommodations Turnaround
		H2.01.01 Reconfigure unique payload thermal protection/insulation
		H2.01.02 Repositioning vehicle-fixed mechanisms
		H2.01.03 Remove/Install mission-unique mechanisms
		H2.01.04 Reconfigure vehicle supplied fluid services



		H2.01.05 Reconfigure vehicle supplied electrical and information services H2.01.06 Access to Payload accommodations H2.01.07 Payload accommodations cleaning and closeout		
	H2.02	H2.01.08 Payload accommodations turnaround unplanned troubleshooting and repair H2.01.09 Payload Accommodations Inspections & Testing Post-flight payload processing		
I2	RESTORE PAYLOAD ELEMENT(S)			
FLI	GHT &	GROUND TRAFFIC CONTROL AND SAFETY OPERATIONS		
K	TRAFFIC CONTROL AND SAFETY			
	K.01 K.02 K.03 K.04	.02 Weather advisory for launch, landing, and ground operations .03 Vehicle-related launch/flight/landing/ground operations control and monitoring		
ENA	BLING	OPERATIONS		
L	SPACEPORT LOGISTICS			
M 1	MANAGEMENT OF FLIGHT SYSTEM OPERATIONS			
M2	MANAGEMENT OF THE SPACEPORT			
N	SPACEPORT-PROVIDED SUPPORT SERVICES			
O	OFF-LINE MAINTENANCE, REPAIR, AND OVERHAUL			
	O.01	Landing/Recovery Facility and Equipment Periodic Maintenance O.01.01 Interval Maintenance of Landing Recovery Ground Systems		
	O.02	O.01.02 Recovery Ground System and Facility Modifications and Process Changes Mods & Special Tests O.02.01 Flight Element Modifications and Process Changes O.02.02 Special Tests and Fleet System Checks		
	O.03	O.02.02 Special Tests and Fleet System Checks Turnaround Facility and Equipment Periodic Maintenance O.03.01 Interval Maintenance of Ground Systems O.03.02 Ground System and Facility Modifications and Process Changes		
	O.04	Assembly Facility and Equipment Periodic Maintenance O.04.01 Interval Maintenance of Assembly Ground Systems		
	O.05	O.04.02 Assembly Ground System and Facility Modifications and Process Changes Integration Facility and Equipment Periodic Maintenance O.05.01 Interval Maintenance of Integration Ground Systems		
	O.06	O.05.02 Integration Ground System and Facility Modifications and Process Changes Launch Facility and Equipment Periodic Maintenance O.06.01 Interval Maintenance of Launch Ground Systems		
	O.07 O.08	O.06.02 Launch Ground System and Facility Modifications and Process Changes Vehicle overhaul, inspection/verification, and modification (structural, flight controls, etc.) Modular element overhaul, remanufacture and inspection/verification		



	O.09	Hot test propulsion hardware	
	O.10	Spaceport software upgrades (non-flight)	
P	PUBLIC AND COMMUNITY SUPPORT SERV		
	P.01	Shelter	
	P.02	Connecting Utility Infrastructure	
	P.03	Transportation Support	
	P.04	Educational Support	
	P.05	Community Police/Fire Protection	
	P.06	Community Resources Infrastructure and Service	
	P.07	Consumer Retail Support	
	P.08	Community Medical Support	
	P.09	Financial Institutions	