MAMBATRON PLASMA PROPULSION SYSTEM

PHASE I EXPERIMENTAL TEST PLAN

Company

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Program Objective

The objective of Phase I is to establish measurable, repeatable, and independently verifiable experimental data for the Mambatron Plasma Propulsion System.

Testing will focus on:

- Plasma generation and stability
- Electromagnetic field characterization
- Plasma acceleration performance
- Direct thrust measurement
- Power-to-thrust efficiency
- Thermal and structural behavior
- Independent validation of experimental results

The primary goal is to determine whether the system produces repeatable thrust correlated with plasma conditions, electromagnetic field characteristics, input power, and propellant flow rate while eliminating potential measurement artifacts.

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1. TEST FACILITY AND EQUIPMENT

Vacuum Test Facility

- High-vacuum chamber
- Single-stage vacuum pump
- Two-stage liquid-cooled vacuum pump
- Vacuum pressure monitoring system
- Gas handling and flow control system

Power Systems

- Adjustable DC power supplies
- RF/Microwave plasma generation equipment
- Electromagnetic field control systems
- Data acquisition and recording systems

Diagnostics and Instrumentation

Plasma Diagnostics

- Langmuir probes for plasma density measurement
- Langmuir probes for electron temperature measurement
- Mach probes for plasma velocity determination
- Optical emission spectroscopy system

Electromagnetic Diagnostics

- Hall-effect magnetic field sensors
- Flux probes
- Electrostatic field measurement instrumentation

Propellant Flow Diagnostics

- Precision gas flow meters
- Mass flow measurement systems

Thrust Measurement

- High-sensitivity thrust stand
- Torsional balance system
- Micro-Newton force measurement capability

Thermal Monitoring

- Infrared thermal imaging
- Temperature sensors
- Structural temperature monitoring

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2. PHASE I EXPERIMENTAL PROGRAM

2.1 Plasma Generation and Stability Testing

A controlled ionization chamber will generate high-density plasma using inert propellant gases such as xenon, argon, or other noble gases.

Ionization will be achieved through RF or microwave excitation.

The following parameters will be measured:

- Plasma density
- Electron temperature
- Plasma stability
- Ionization efficiency
- Power consumption

Data will be continuously recorded throughout each test cycle.

2.2 Plasma Acceleration Testing

Generated plasma will enter the acceleration chamber where electromagnetic field interactions are applied.

Testing objectives include:

- Characterization of plasma acceleration
- Measurement of plasma velocity
- Electromagnetic field mapping
- Analysis of acceleration efficiency

Measured parameters:

- Plasma velocity
- Magnetic field intensity
- Electric field intensity
- Input power
- Propellant flow rate

2.3 Thrust Measurement Testing

Direct thrust measurements will be conducted using a calibrated high-sensitivity thrust stand.

Measured parameters include:

- •Net thrust
- •Thrust-to-power ratio
- •Thrust-to-mass-flow ratio
- •Operational stability

Multiple repeatability tests will be performed to establish statistical confidence.

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3. CONTROL AND BASELINE TESTING

To eliminate false-positive results, the following control tests will be conducted.

Baseline A

No power

No propellant flow

No plasma

Baseline B

Propellant flow only

No power

No plasma

Baseline C

Power applied

No propellant flow

No plasma

Baseline D

Power applied

Propellant flow active

No plasma ignition

Experimental Configuration

Power applied

Propellant flow active

Plasma ignition active

Electromagnetic acceleration active

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4. ARTIFACT REJECTION TESTING

Additional testing will be performed to eliminate non-propulsive forces.

Thermal Effects

- Thermal drift monitoring
- Thermal expansion analysis

Electromagnetic Effects

- Sensor isolation testing
- Electromagnetic interference assessment

Mechanical Effects

- Vibration monitoring
- Structural resonance assessment

Orientation Verification

- Forward orientation tests
- Reverse orientation tests

Calibration Verification

- Pre-test calibration
- Post-test calibration
- Repeatability verification

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5. VACUUM AND ATMOSPHERIC TESTING

Testing will be conducted under two operating environments.

Environment A

Atmospheric operation

Environment B

Vacuum operation

Results from both environments will be compared to evaluate performance characteristics and operational behavior.

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6. TEST SCHEDULE

Initial Characterization

Test durations:

- 1 minute
- 5 minutes
- 10 minutes

Testing intervals:

- Every three hours during active test campaigns

Long-Term Repeatability

Testing period:

- 1 to 2 months

Frequency:

- Weekly validation tests
- Repeatability verification runs

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7. DATA COLLECTION

The following parameters will be continuously recorded:

- Date and time
- Chamber pressure
- Input voltage
- Input current
- Power consumption
- Propellant flow rate
- Plasma density

- •Electron temperature
- •Plasma velocity
- •Magnetic field strength
- •Electric field strength
- •Thrust measurements
- •Thermal measurements

All data will be archived for independent review and analysis.

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8. DELIVERABLES

Phase I testing will produce:

Technical Test Report

- •Experimental setup
- •Calibration procedures
- •Raw test data
- •Processed results
- •Statistical analysis

Plasma Stability Report

- •Plasma generation performance
- •Operational stability assessment

Electromagnetic Characterization Report

- •Field measurements
- •Acceleration chamber performance

Thrust Validation Report

- •Direct thrust measurements
- •Repeatability analysis
- •Uncertainty calculations

Efficiency Assessment

- •Thrust-to-power ratio

- System efficiency analysis

Independent Review Package

- Experimental methodology
- Data records
- Verification documentation

SUCCESS CRITERIA

Phase I will be considered successful if measurable, repeatable, and independently reviewable evidence demonstrates controlled plasma generation, stable operation, and statistically significant thrust correlated with system operating conditions.

Successful completion will support advancement to Phase II prototype optimization and expanded performance testing.