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Wakeshield: A Space Experiment Platform

**Dr. Joseph Allen
President and Chief Executive Officer
Space Industries, Inc.**



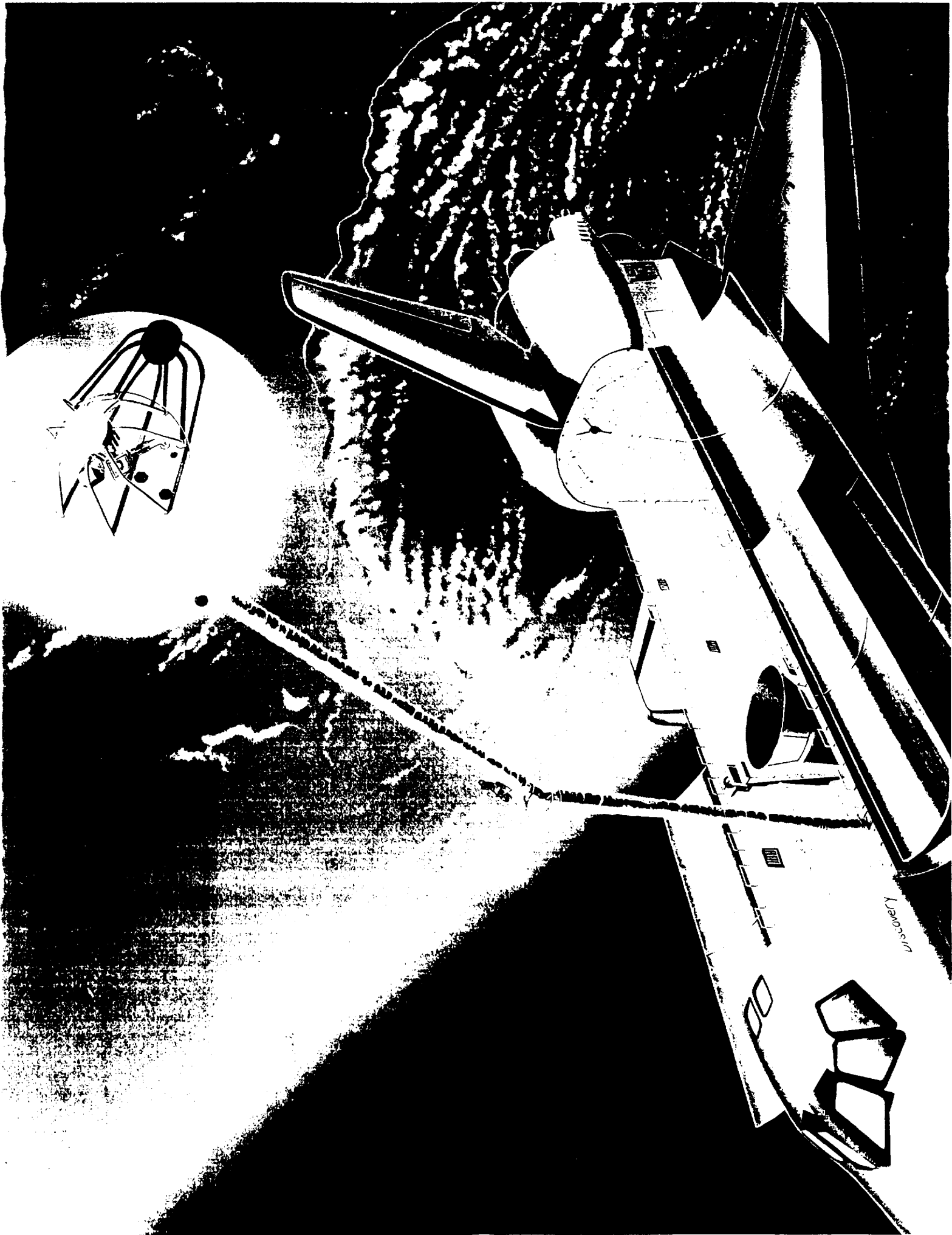
Space
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Center

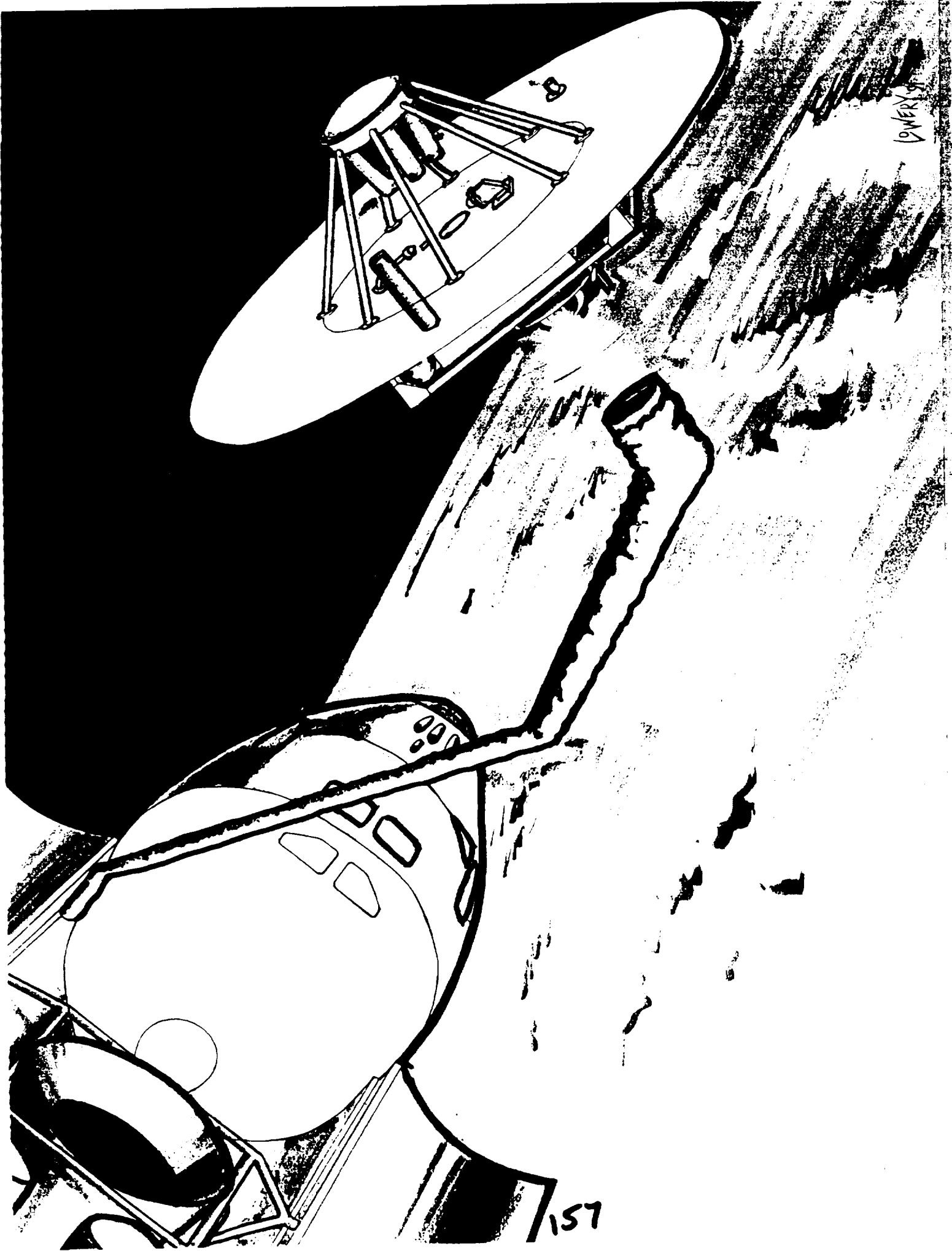
The Wake Shield Facility: A Space Experiment Platform



May 14, 1991
J. P. Allen
Space Industries, Inc.

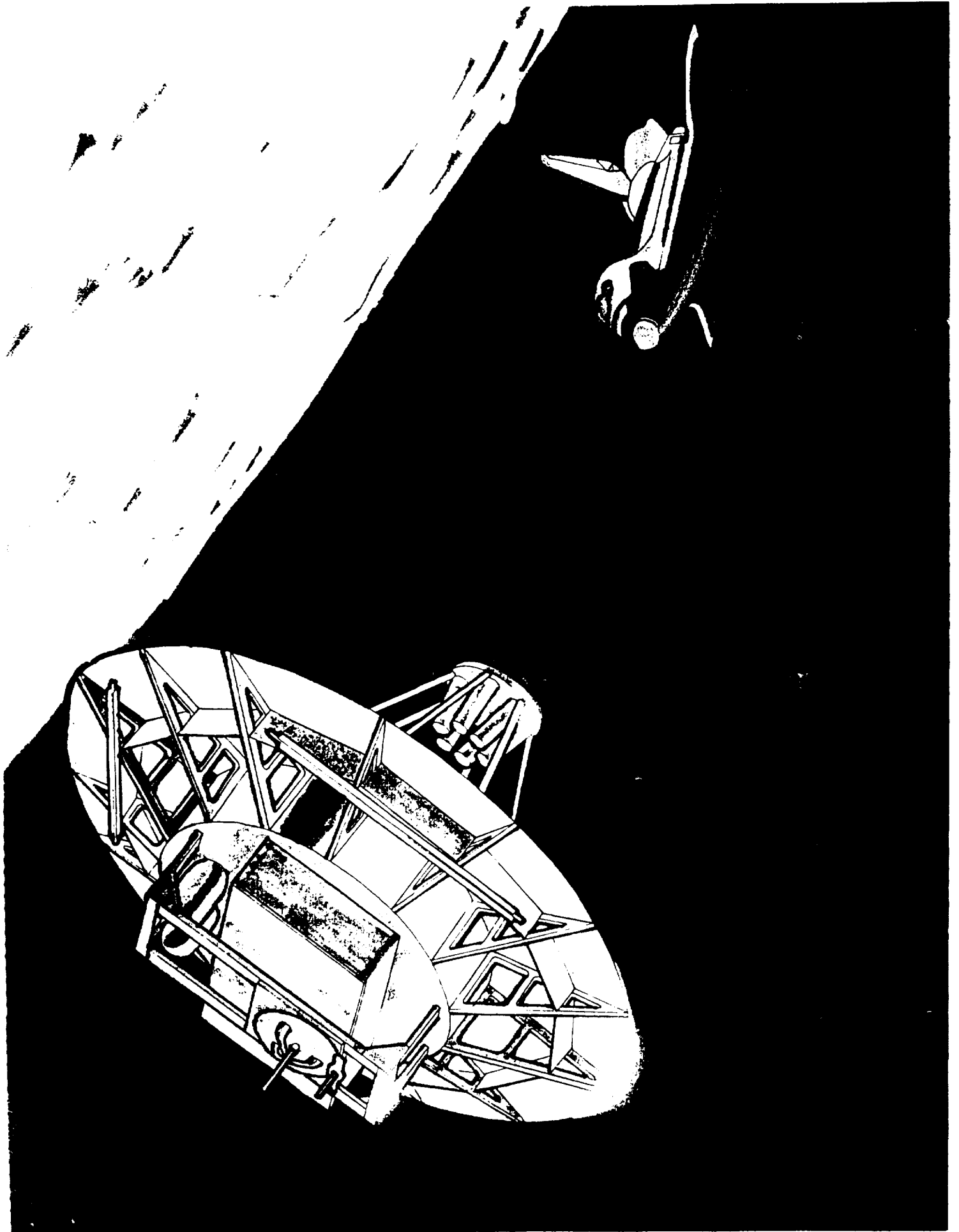
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University of Houston
CCDS
Space Vacuum Epitaxy Center

CCDS Objectives:

- Produce new industry-driven electronic, magnetic, and super-conducting thin-film materials and devices both in terrestrial laboratories and in space
- Utilize the ultra-vacuum of space for thin-film epitaxial growth and materials processing
- Explore commercial possibilities of space for:
 - epitaxial thin-film growth
 - materials purification
- Develop commercial space hardware for research and development and enhanced access to space

Importance of WSF Flight Program:

- Access to space ultra-vacuum which will allow for advanced technologies in materials processing
 - ultra-vacuum feature of space has never been used
 - vacuum 10,000 times better than on earth systems
- Provides future national resource with a unique capability to produce advanced semi-conducting and super-conducting materials leading to future computer, communications and sensor systems

The SYEC - WSF Team:

<p>NASA U of H University of Illinois (Urbana) Univ. of Colorado (Col. Springs) University of Toronto Case Western Reserve Univ. U.S. Army - AMTL U.S. Army - CERL Battelle Laboratories</p>	<p>Space Industries, Inc. AT&T Bell Laboratories Schmidt Industries, Inc. Perkin-Elmer Instruments S. A., Inc. Ionworks</p>
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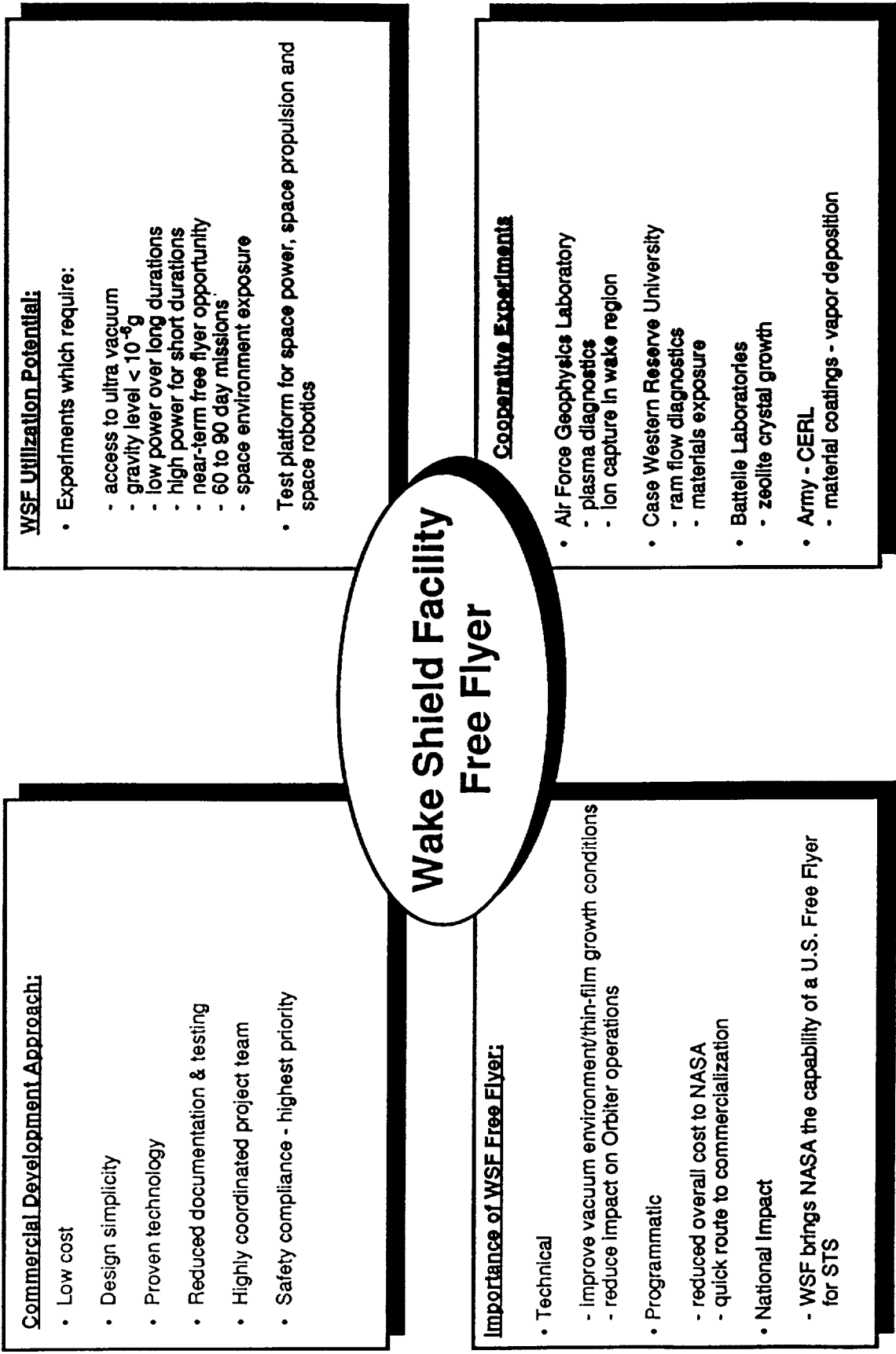
Product Applications:

- High-quality, thin-film semiconductor materials used in computer and other microelectronic applications; superconducting thin-film development for device applications
- Epitaxial thin-film products for fiber-optic communication applications
- Epitaxial thin-film products used in infrared surveillance devices
- Solid-state, thin-film laser diodes used for next generation tuned laser sources



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Wake Shield Facility (WSF) Flight Program



Commercial Development Approach:

- Low cost
- Design simplicity
- Proven technology
- Reduced documentation & testing
- Highly coordinated project team
- Safety compliance - highest priority

WSF Utilization Potential:

- Experiments which require:
 - access to ultra vacuum
 - gravity level < 10⁻⁶g
 - low power over long durations
 - high power for short durations
 - near-term free flyer opportunity
 - 60 to 90 day missions
 - space environment exposure
- Test platform for space power, space propulsion and space robotics

Wake Shield Facility Free Flyer

Importance of WSF Free Flyer:

- Technical
 - improve vacuum environment/thin-film growth conditions
 - reduce impact on Orbiter operations
- Programmatic
 - reduced overall cost to NASA
 - quick route to commercialization
- National Impact
 - WSF brings NASA the capability of a U.S. Free Flyer for STS

Cooperative Experiments

- Air Force Geophysics Laboratory
 - plasma diagnostics
 - ion capture in wake region
- Case Western Reserve University
 - ram flow diagnostics
 - materials exposure
- Battelle Laboratories
 - zeolite crystal growth
- Army - CERL
 - material coatings - vapor deposition

