
Space Shuttle Orbiter and Component Handling

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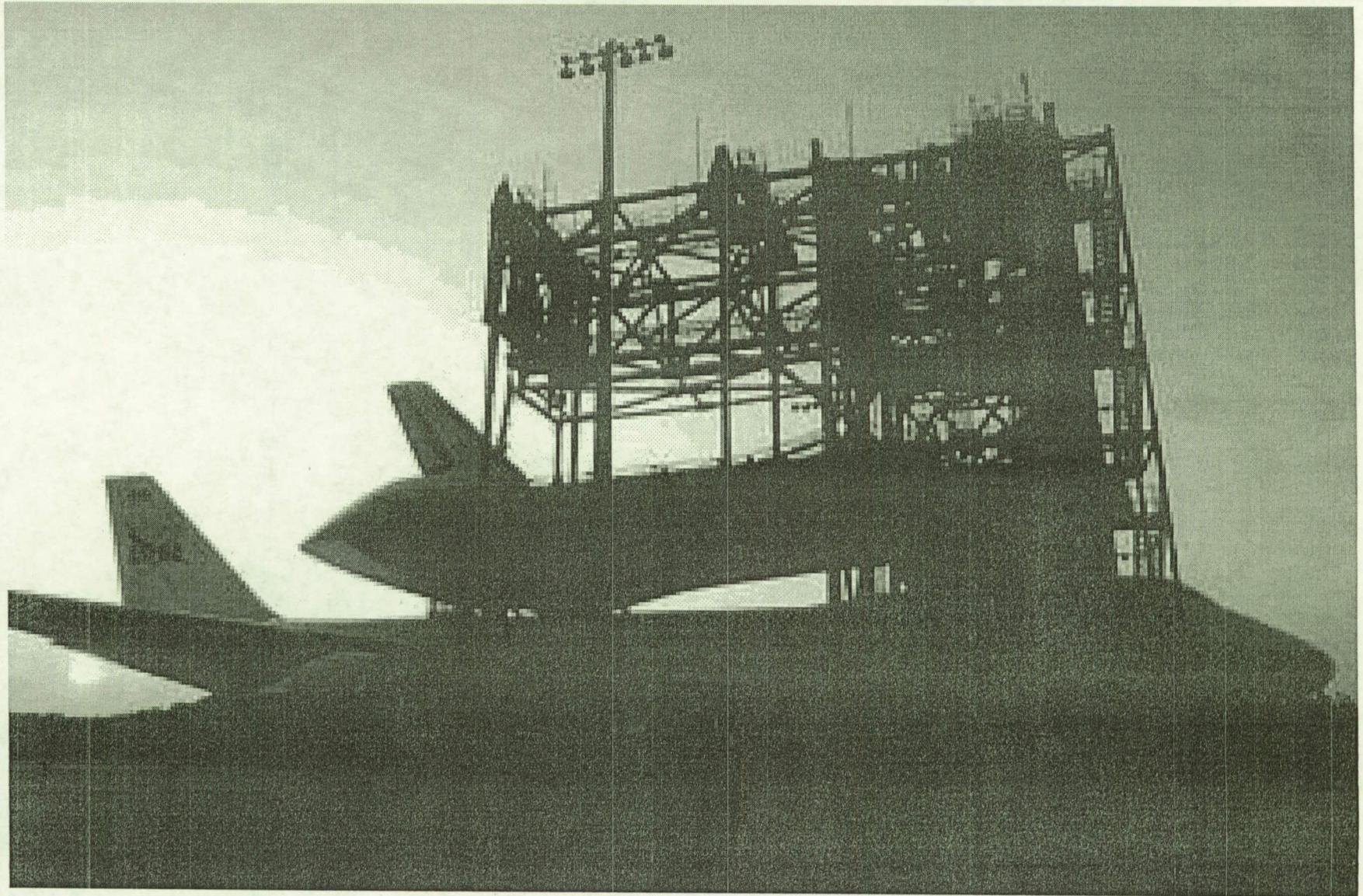
Introduction

- **Who am I?**
 - **17 years in Orbiter Handling Engineering group at United Space Alliance (formerly with Lockheed)**
- **What do I do?**
 - **Responsible for procedures**
 - **Responsible for flight hardware handling policy**
 - **Serve on Move Director Guidance Committee**

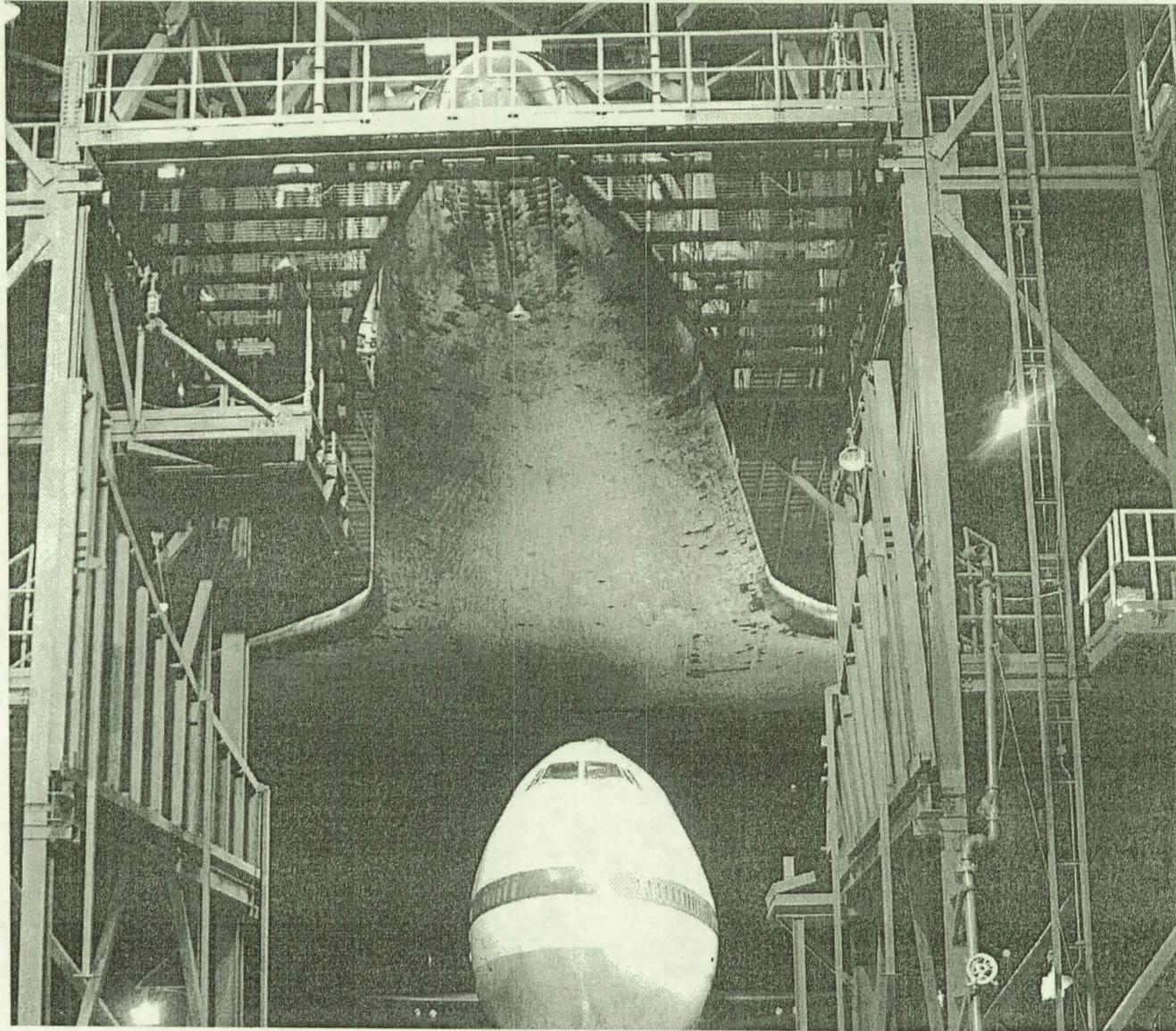
Overview

- **Types of moves we do**
 - **Single crane lifts**
 - **Dual crane lifts**
 - **Transportation**
- **Issues and incidents we have had**
- **Our policies**
- **Move Director Oversight and Guidance Committee**
- **Move director proficiency and training**
- **Questions?**

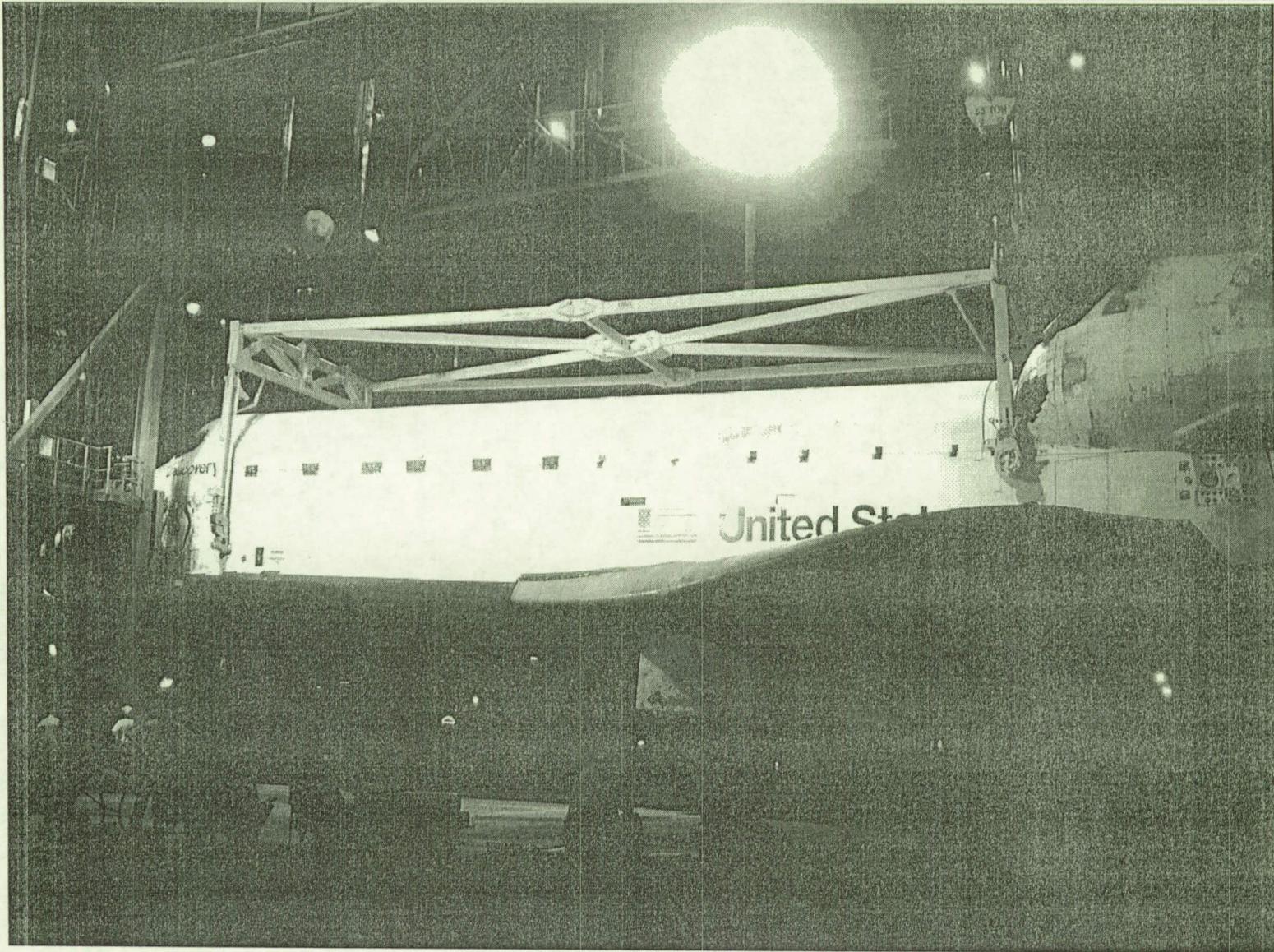
Dual Crane Lifts



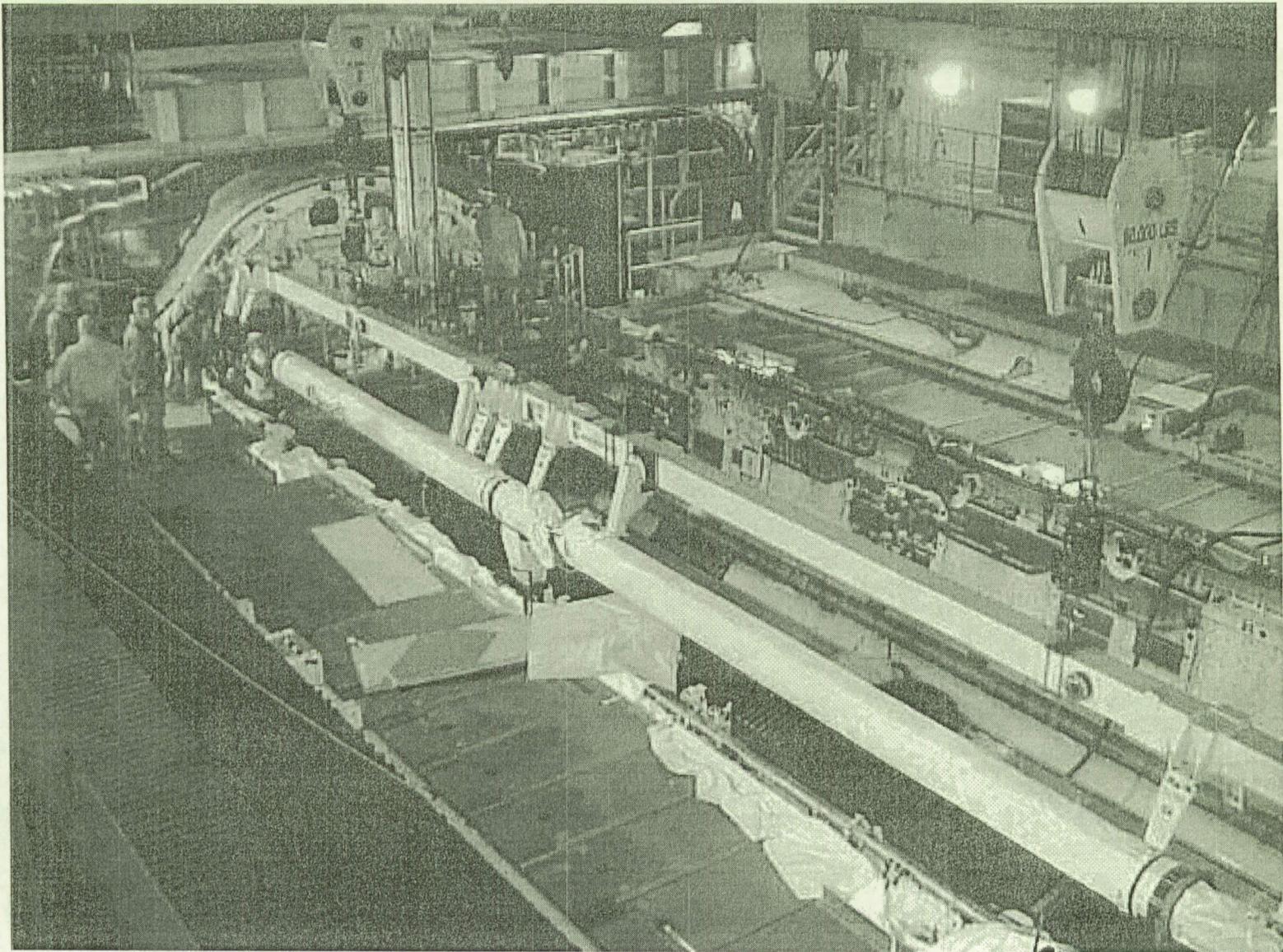
Dual Crane Lifts



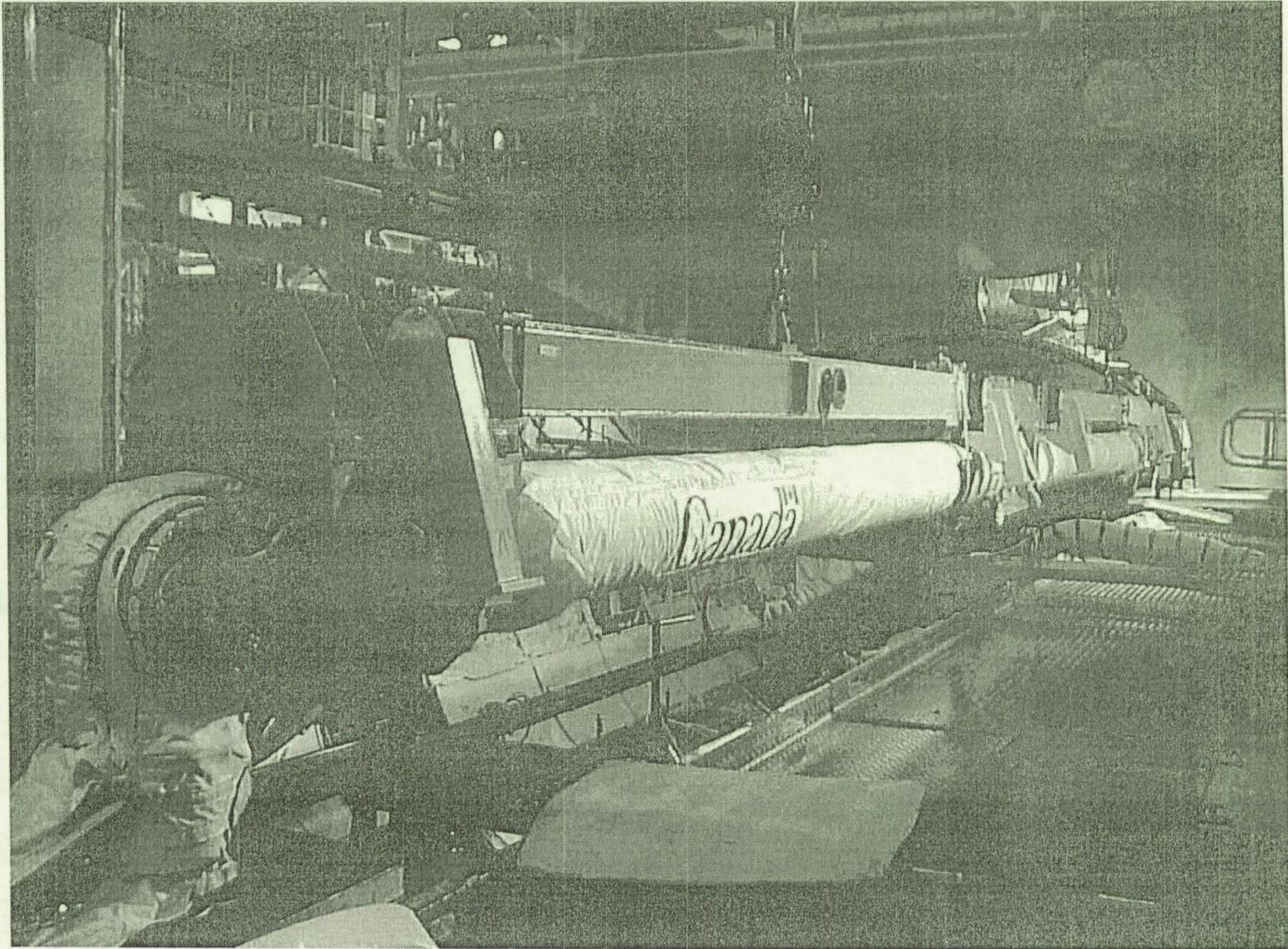
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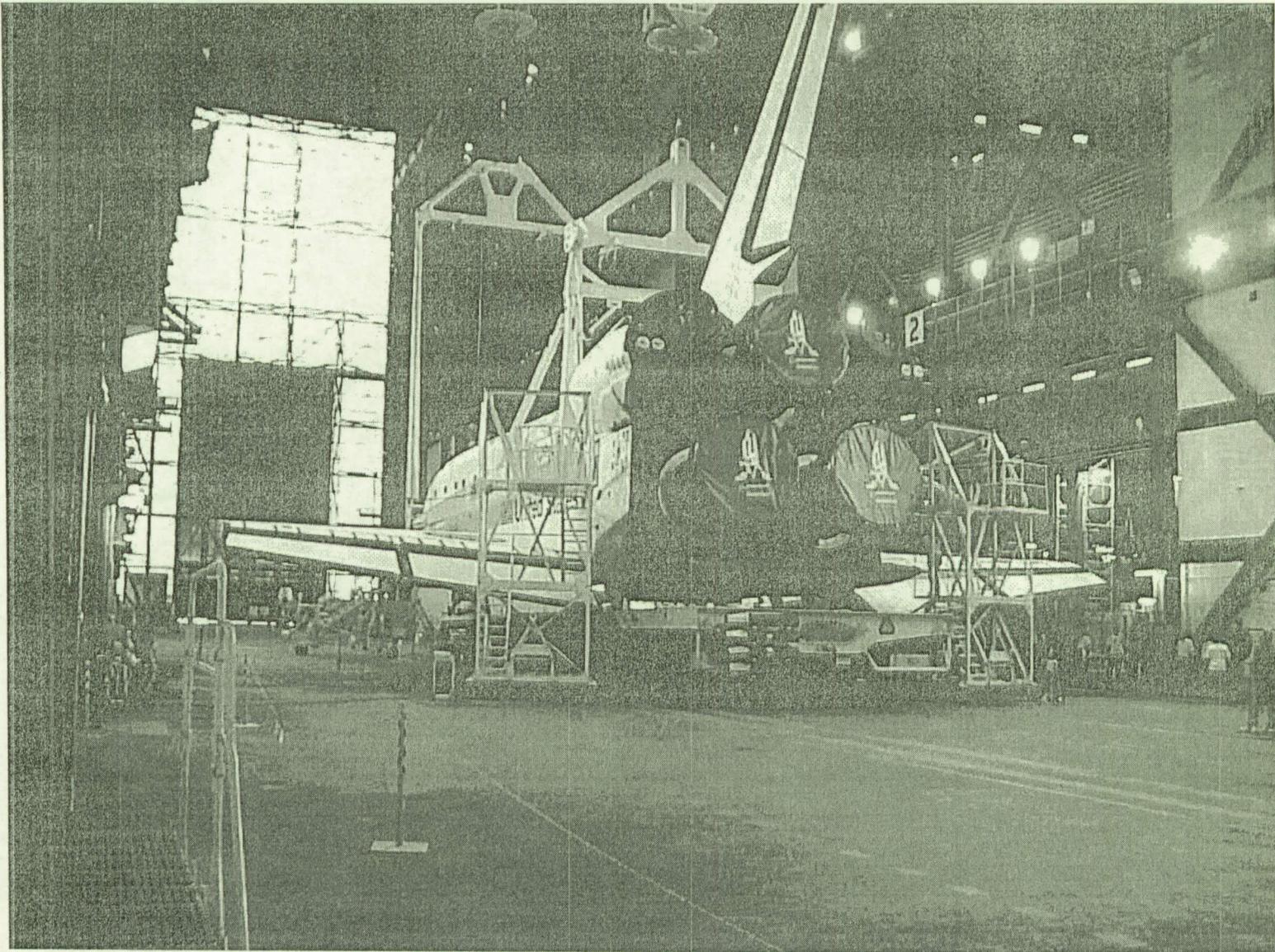
Dual Crane Lifts



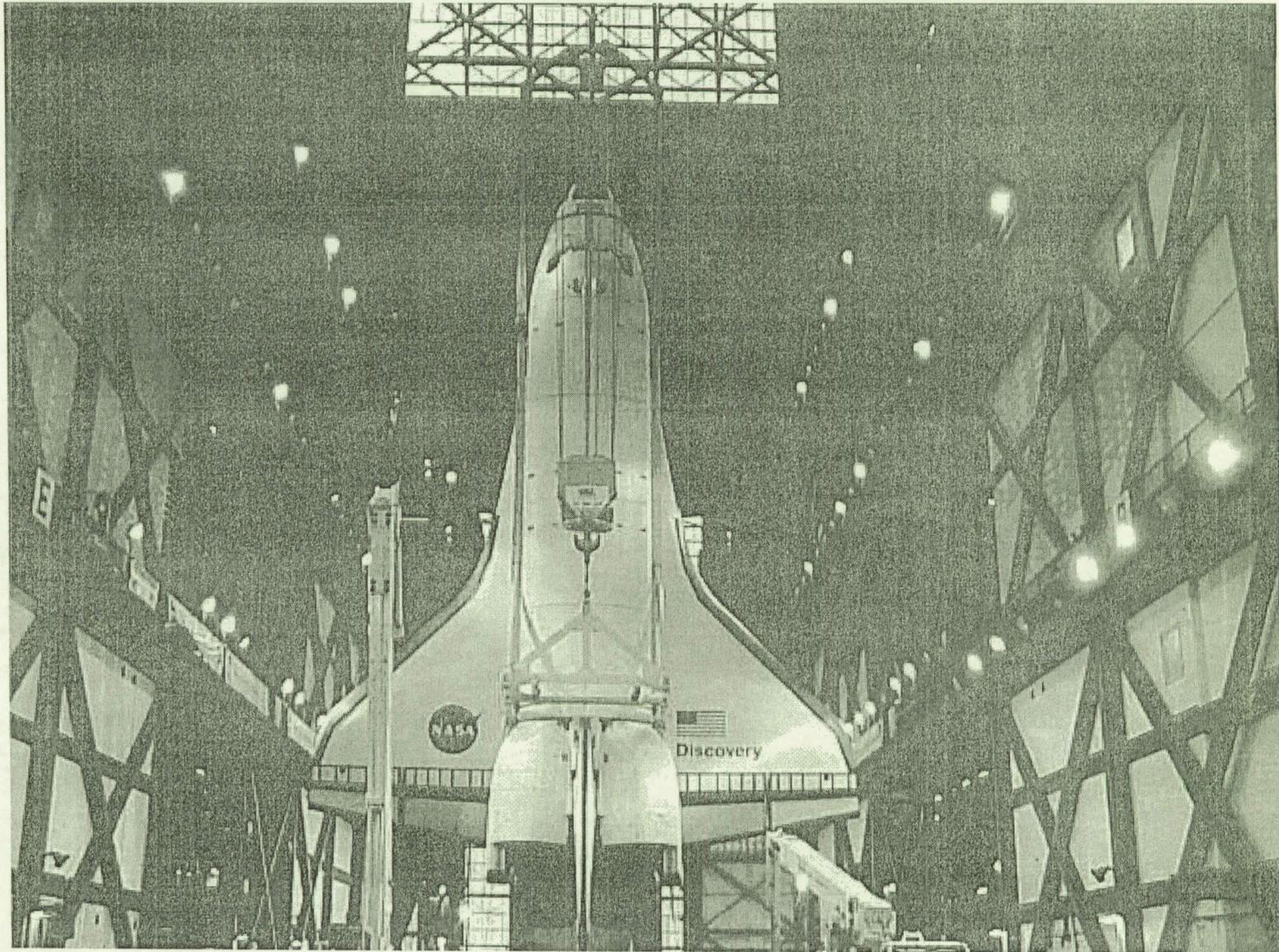
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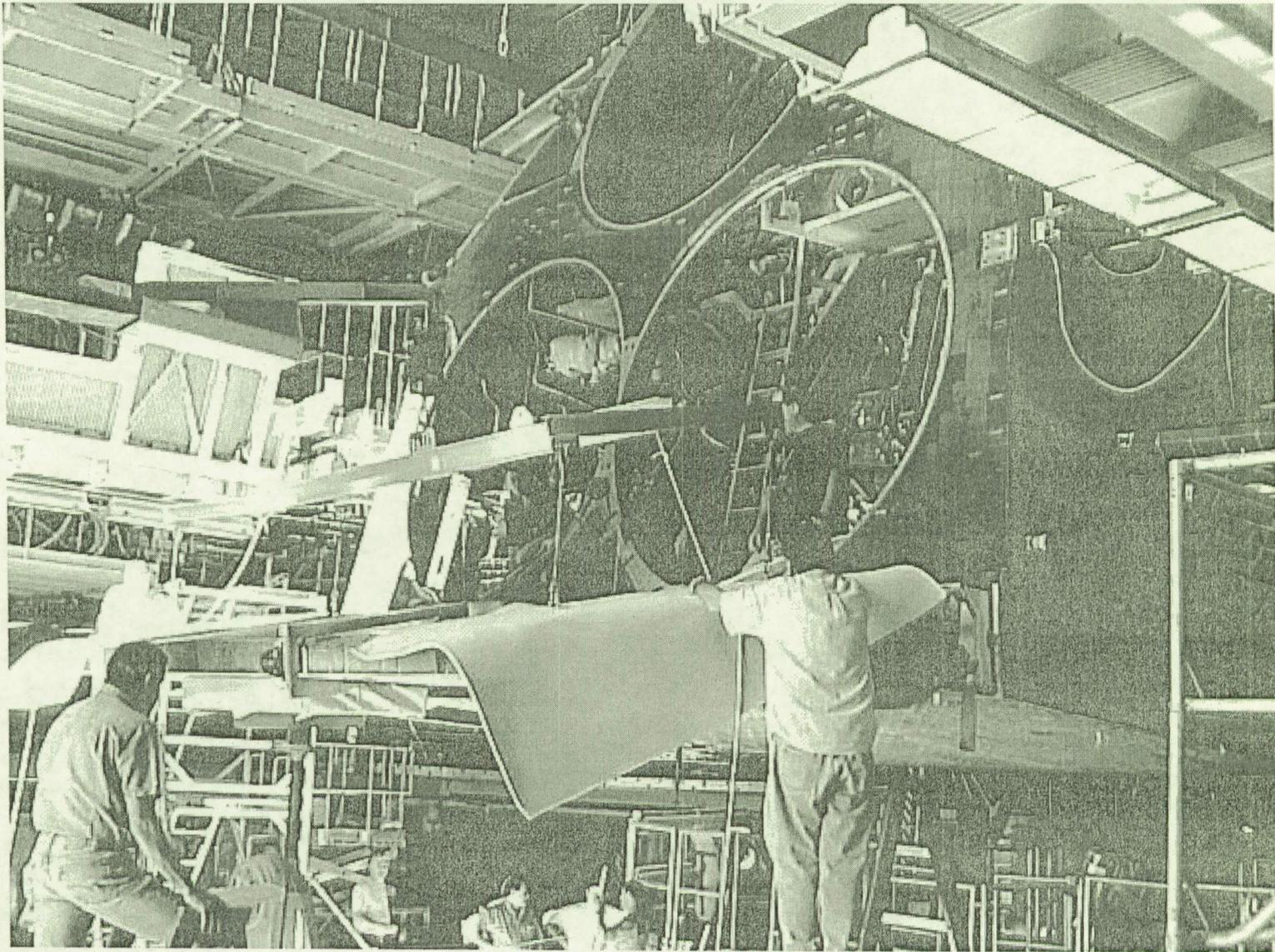
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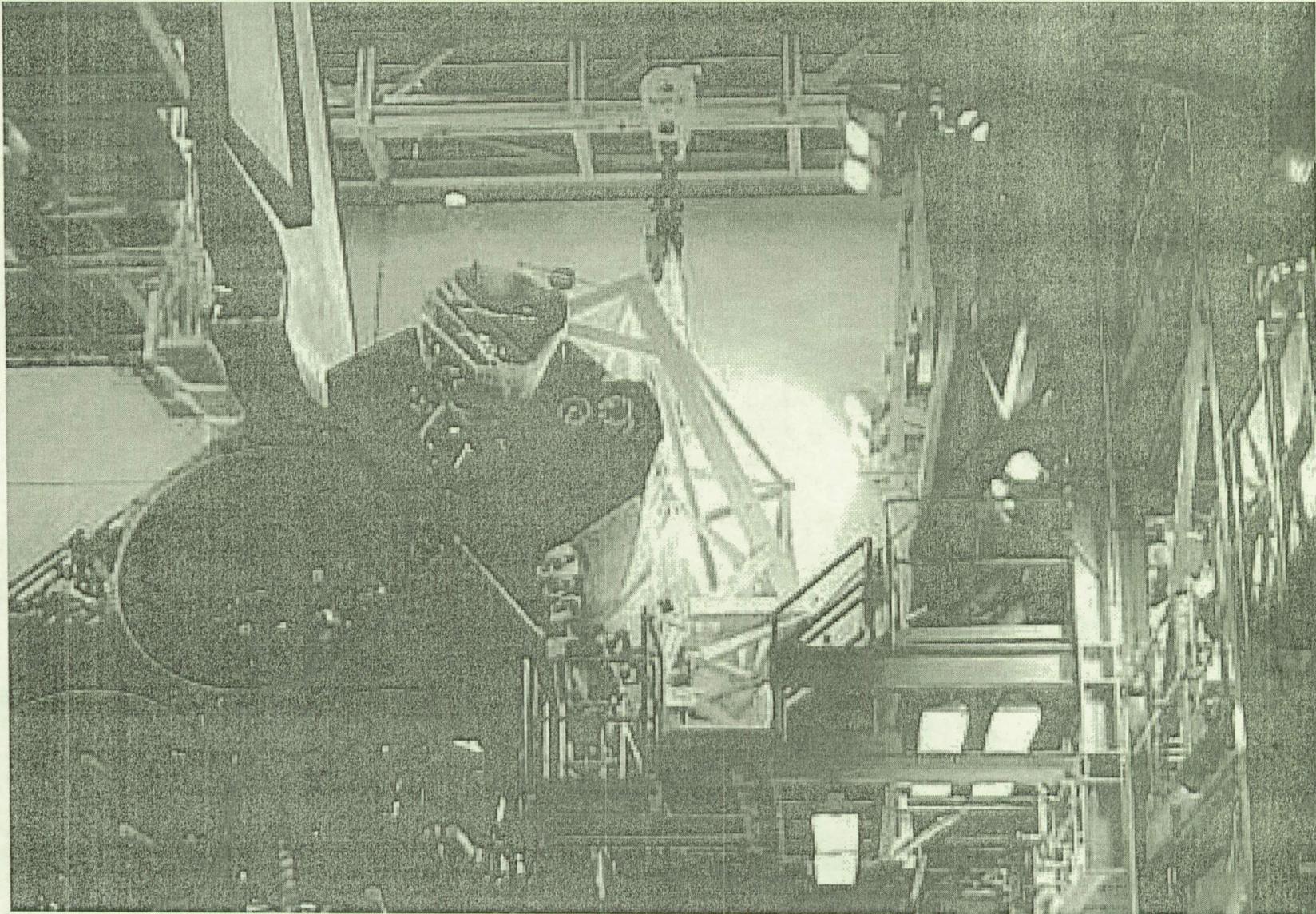
Single Crane Lifts



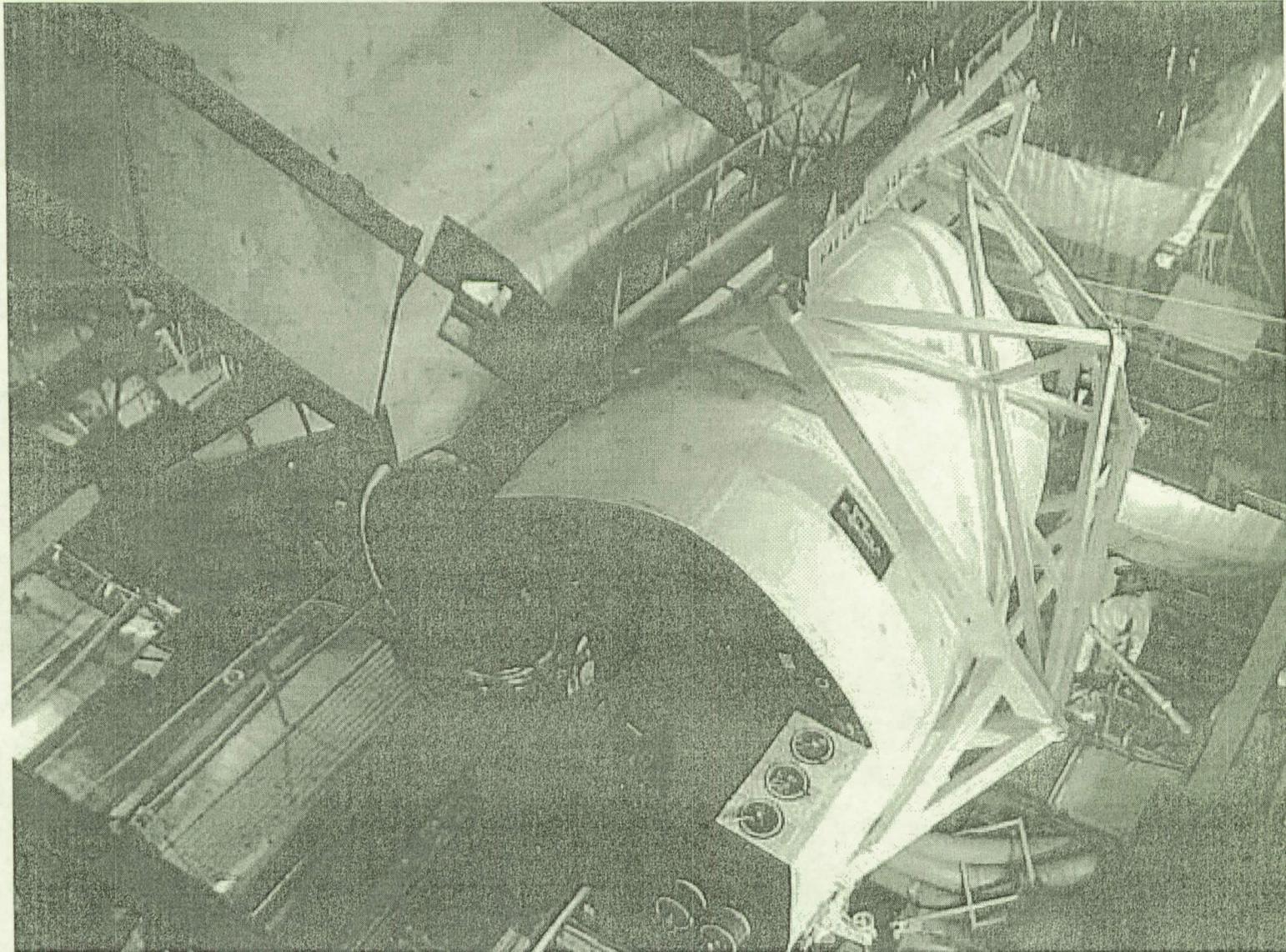
Single Crane Lifts



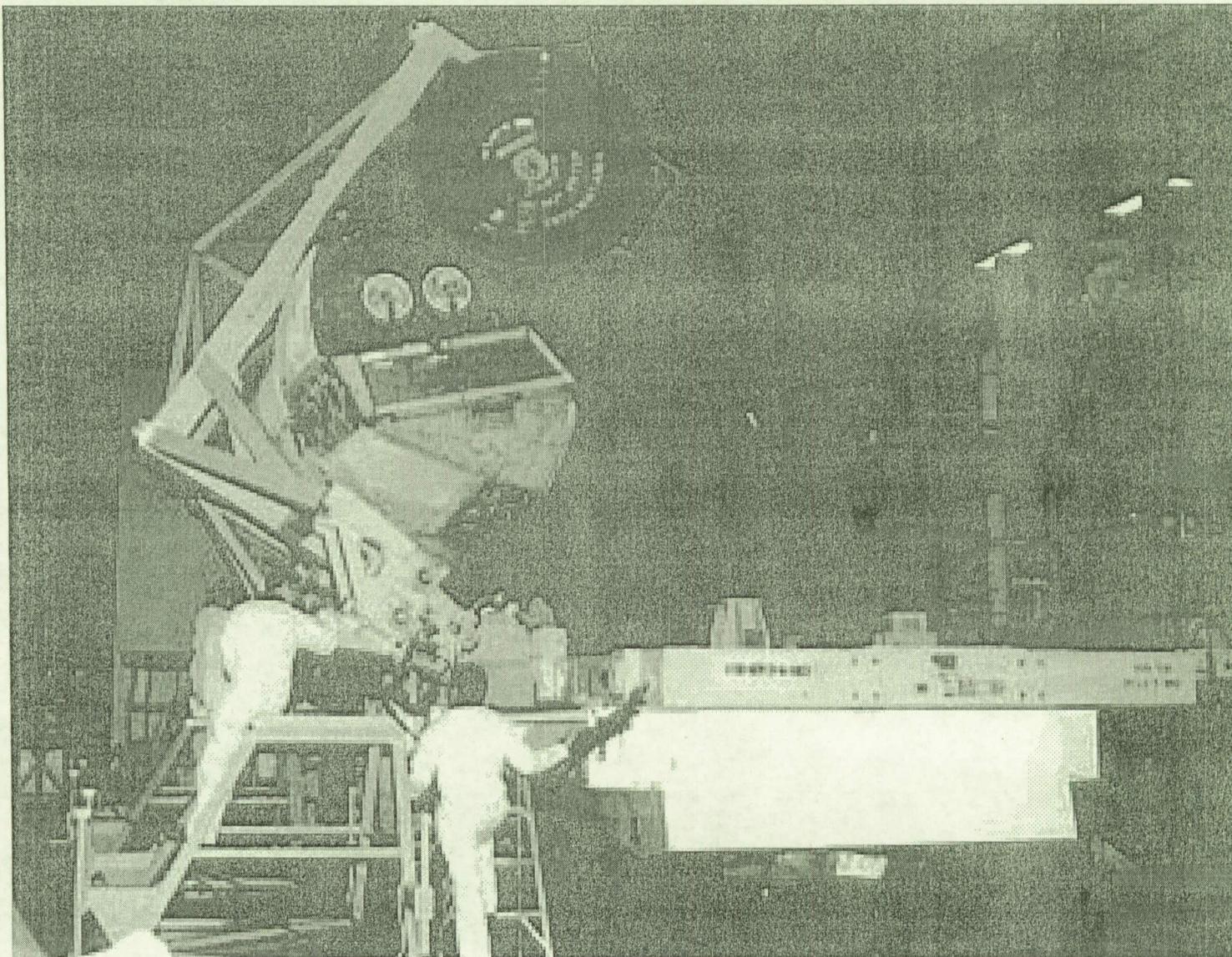
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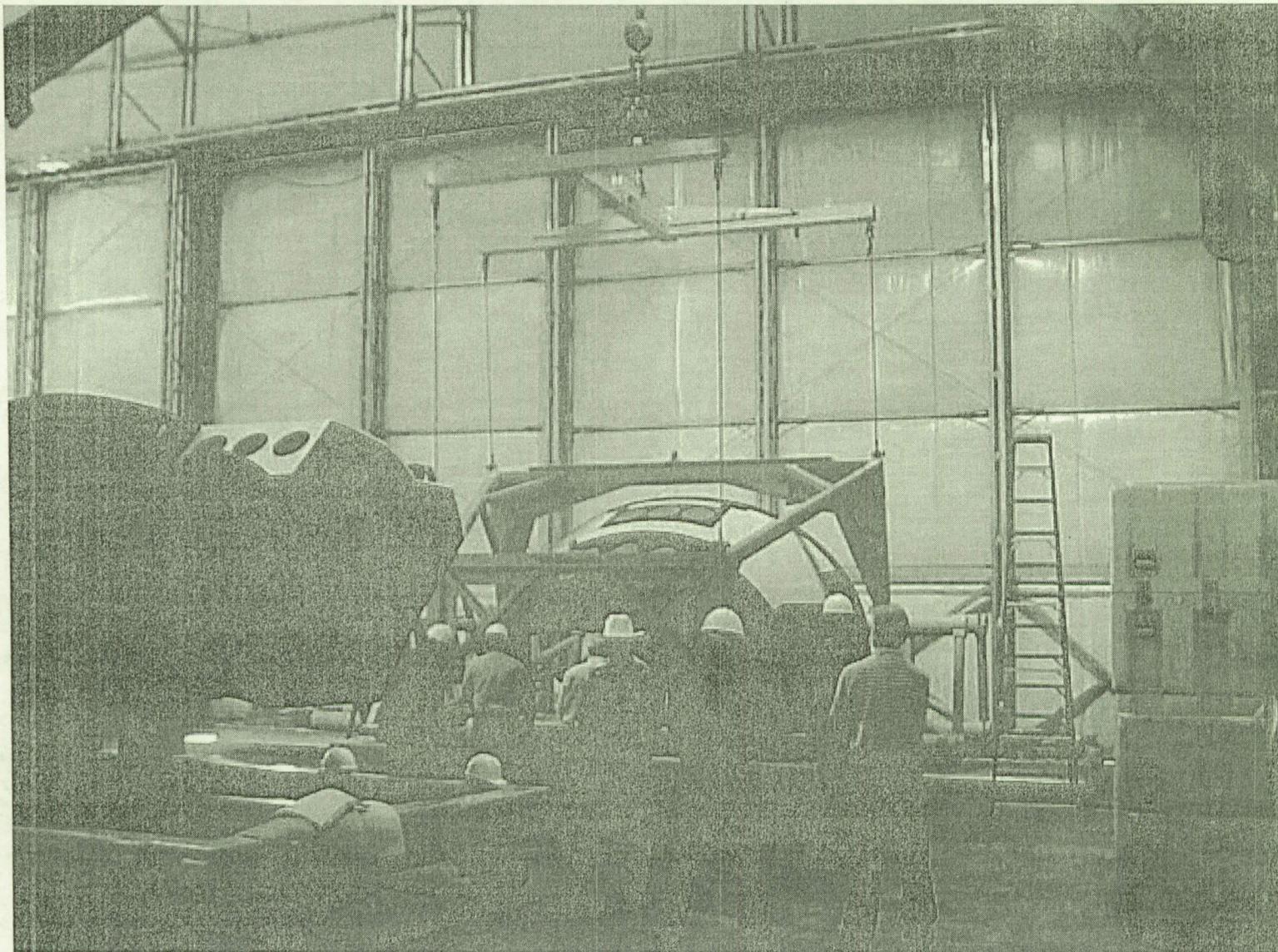
Single Crane Lifts



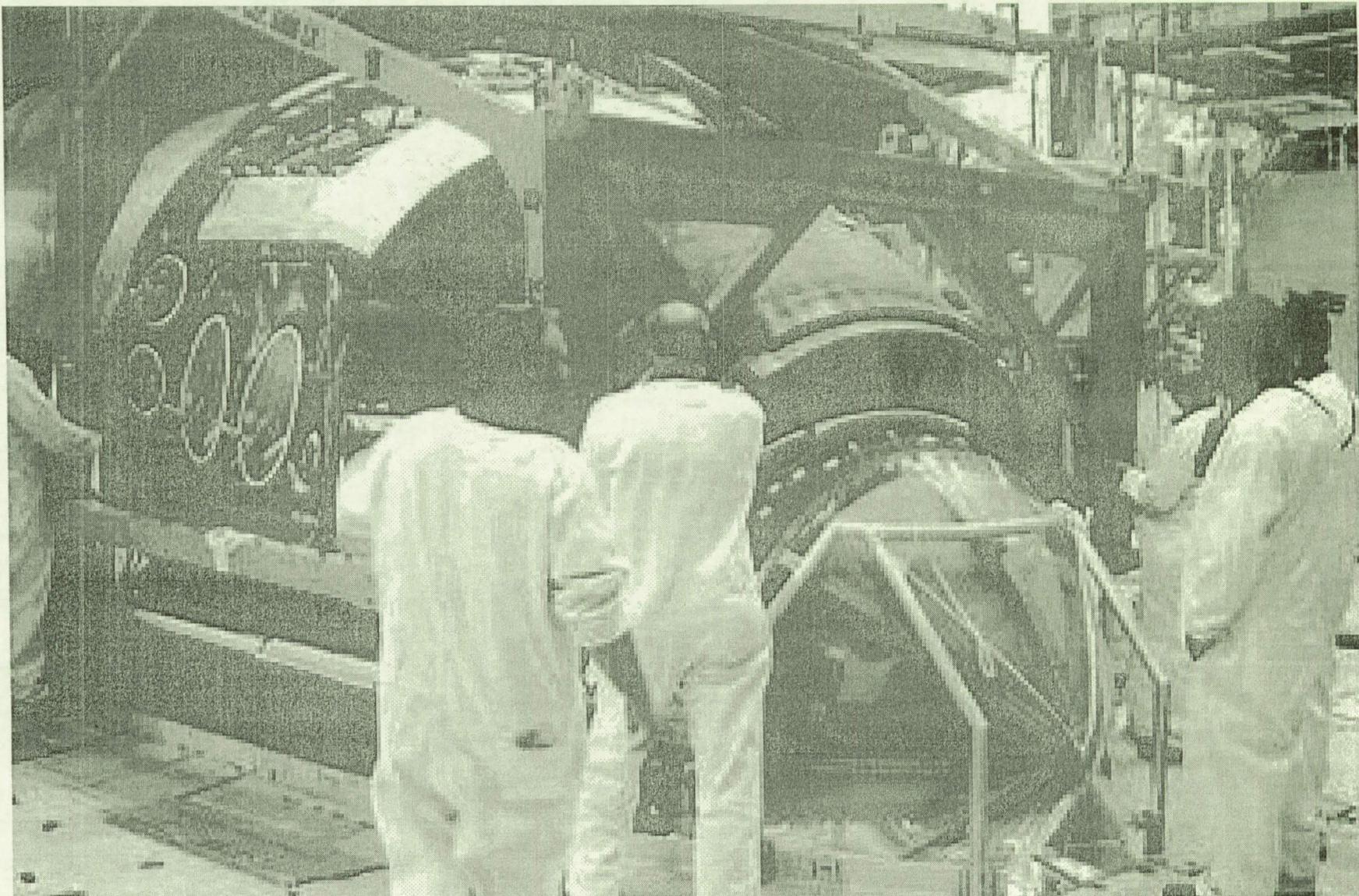
Single Crane Lifts



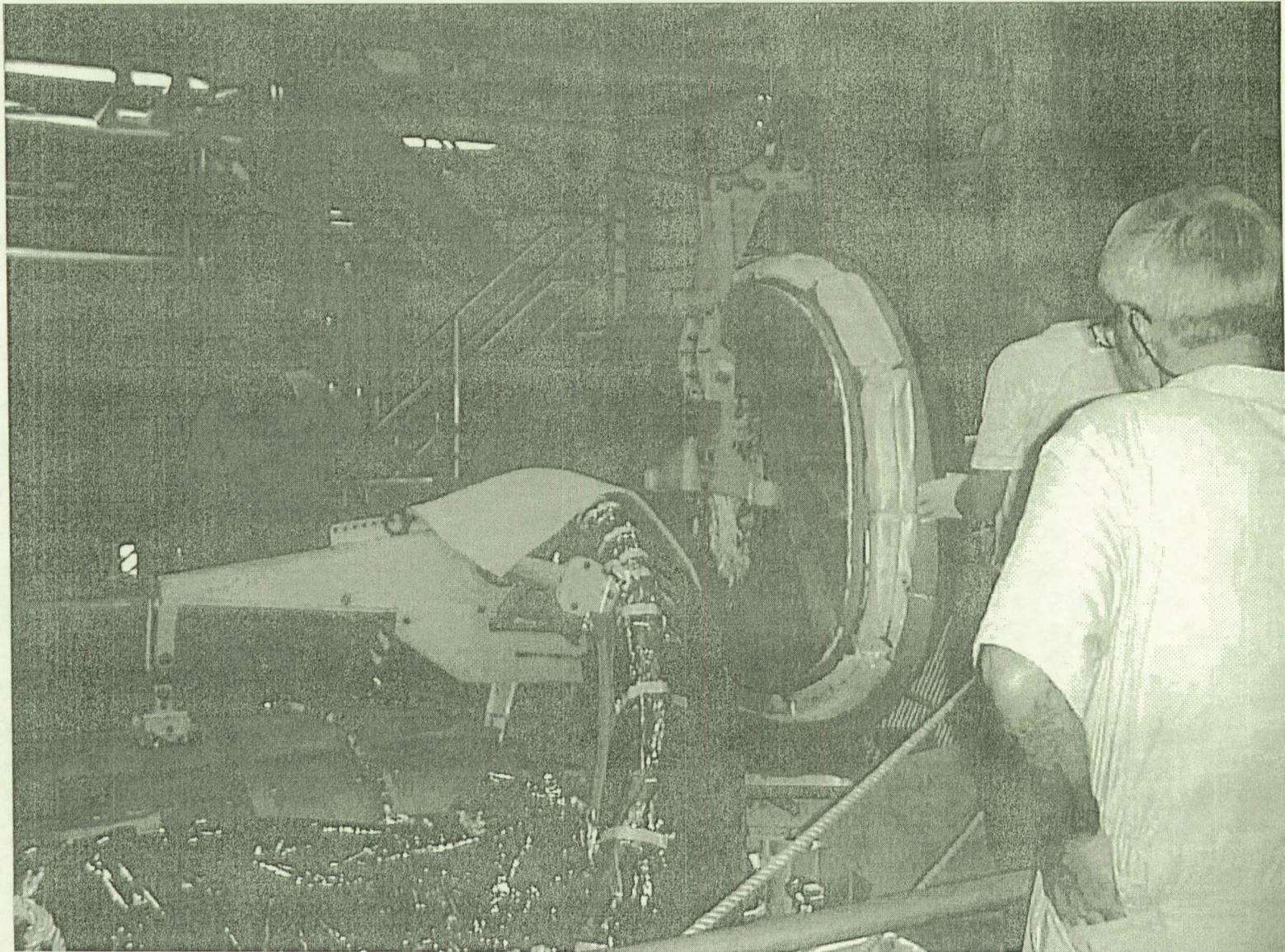
Single Crane Lifts



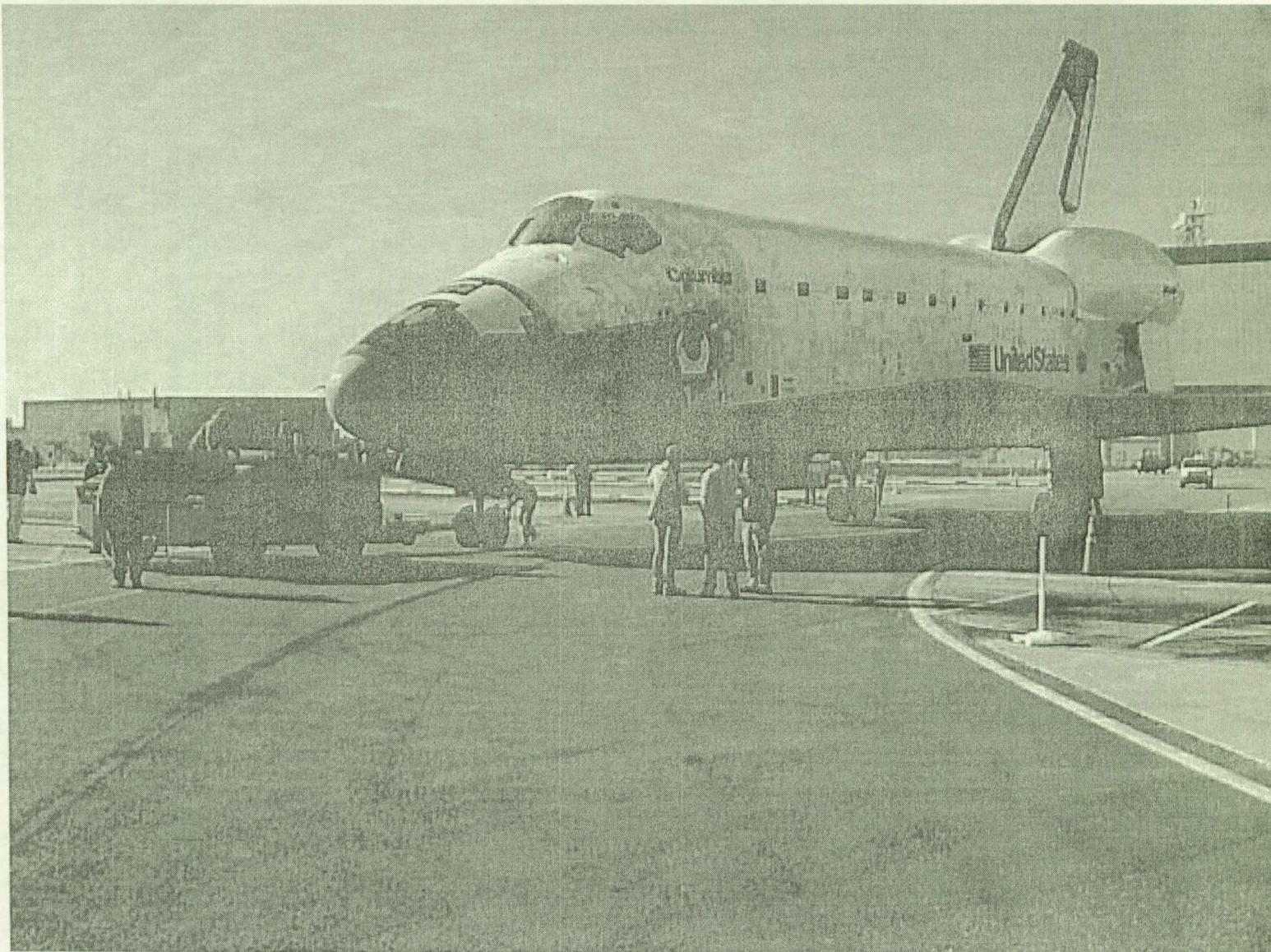
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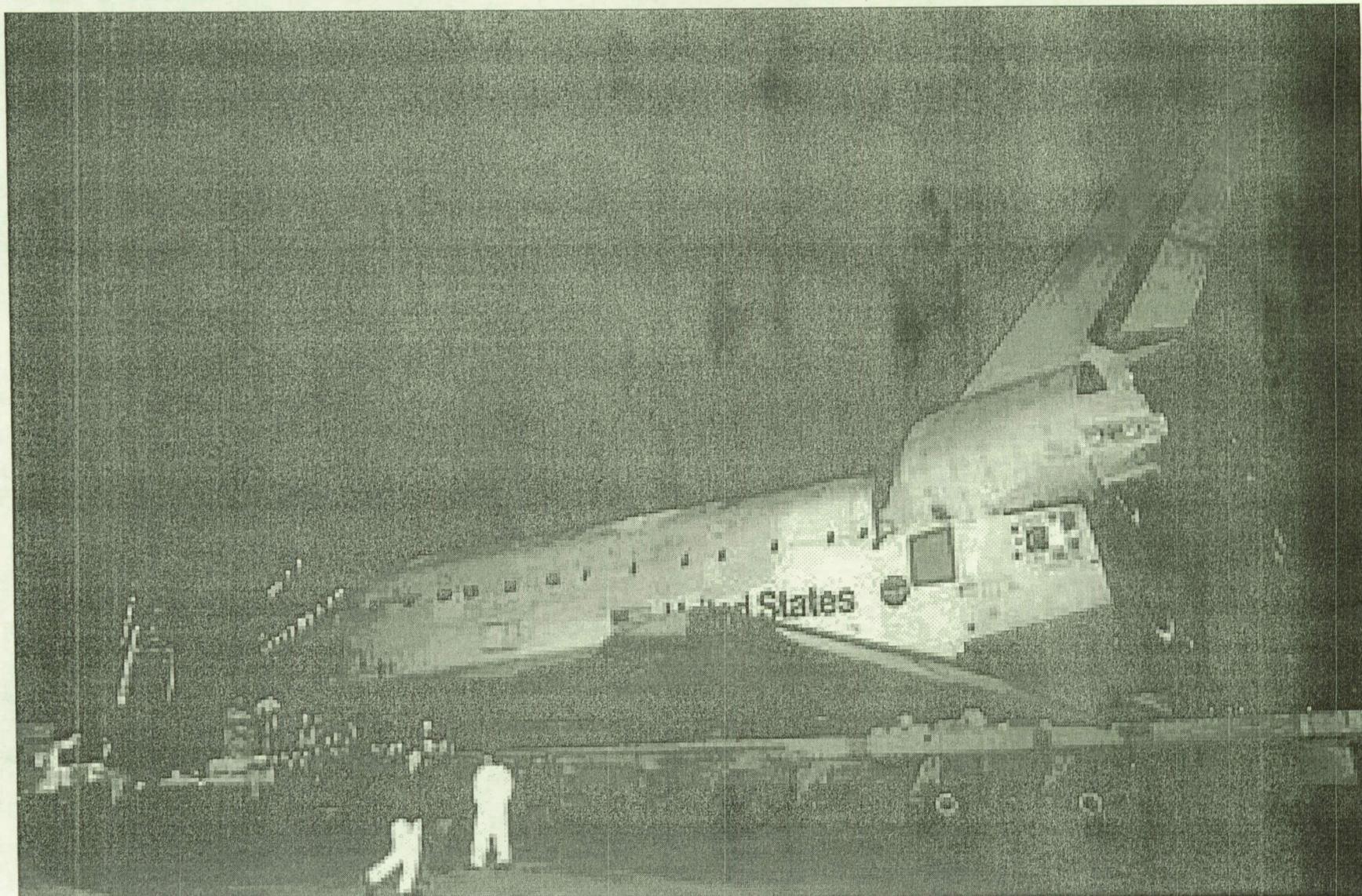
Single Crane Lifts



Transportation

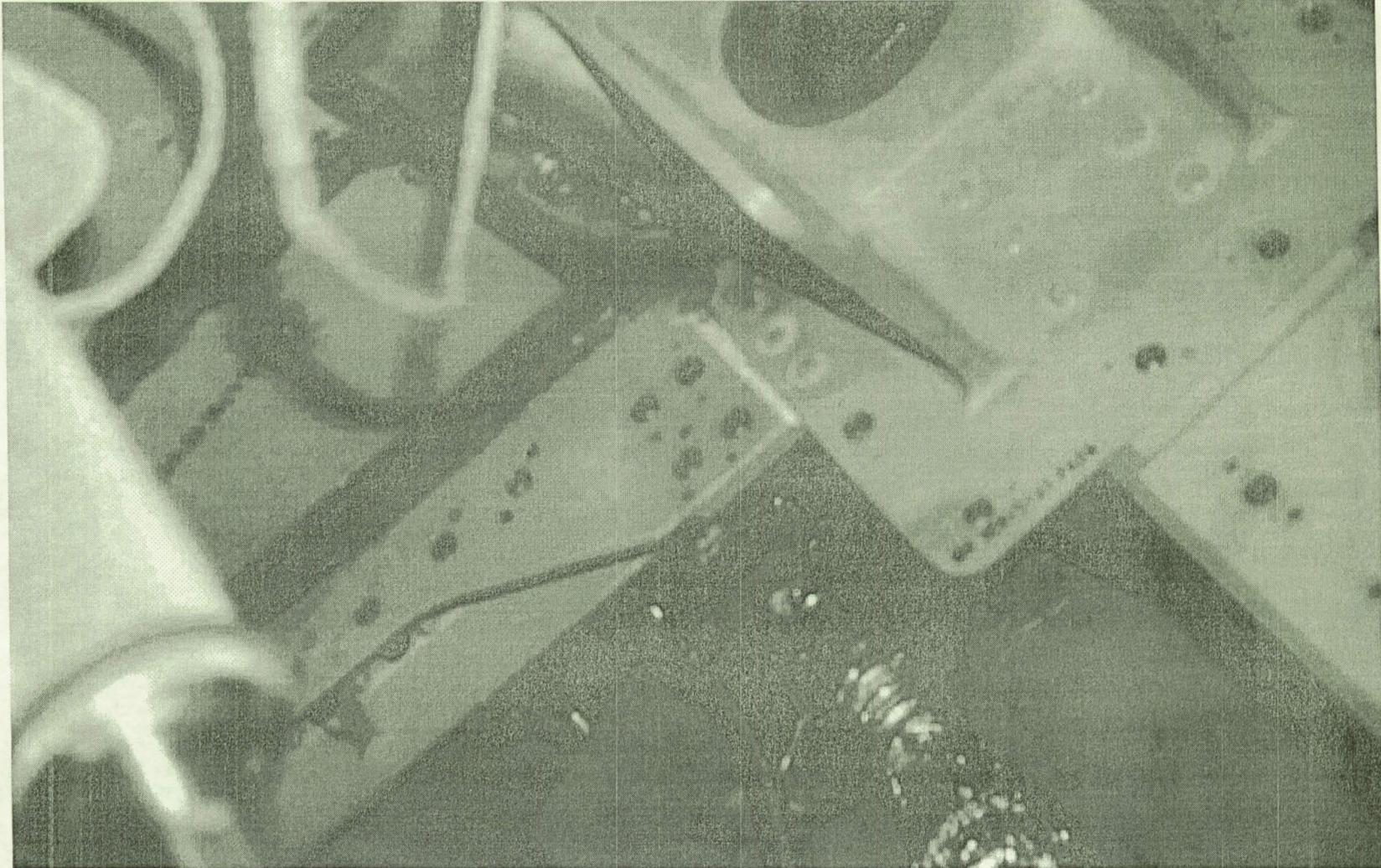


Transportation



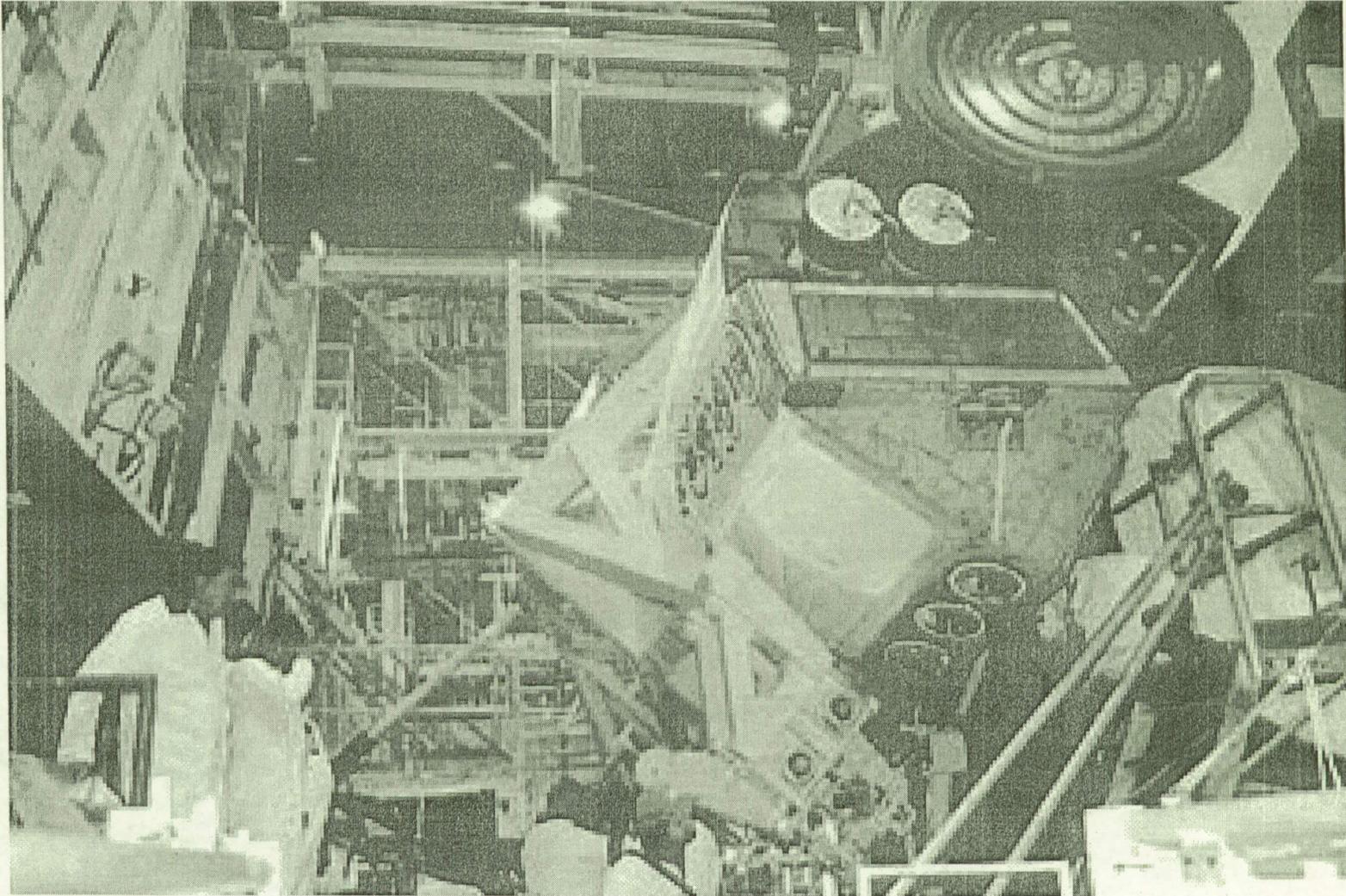
Issues and Incidents

- Observers - Cracked OMS pod line



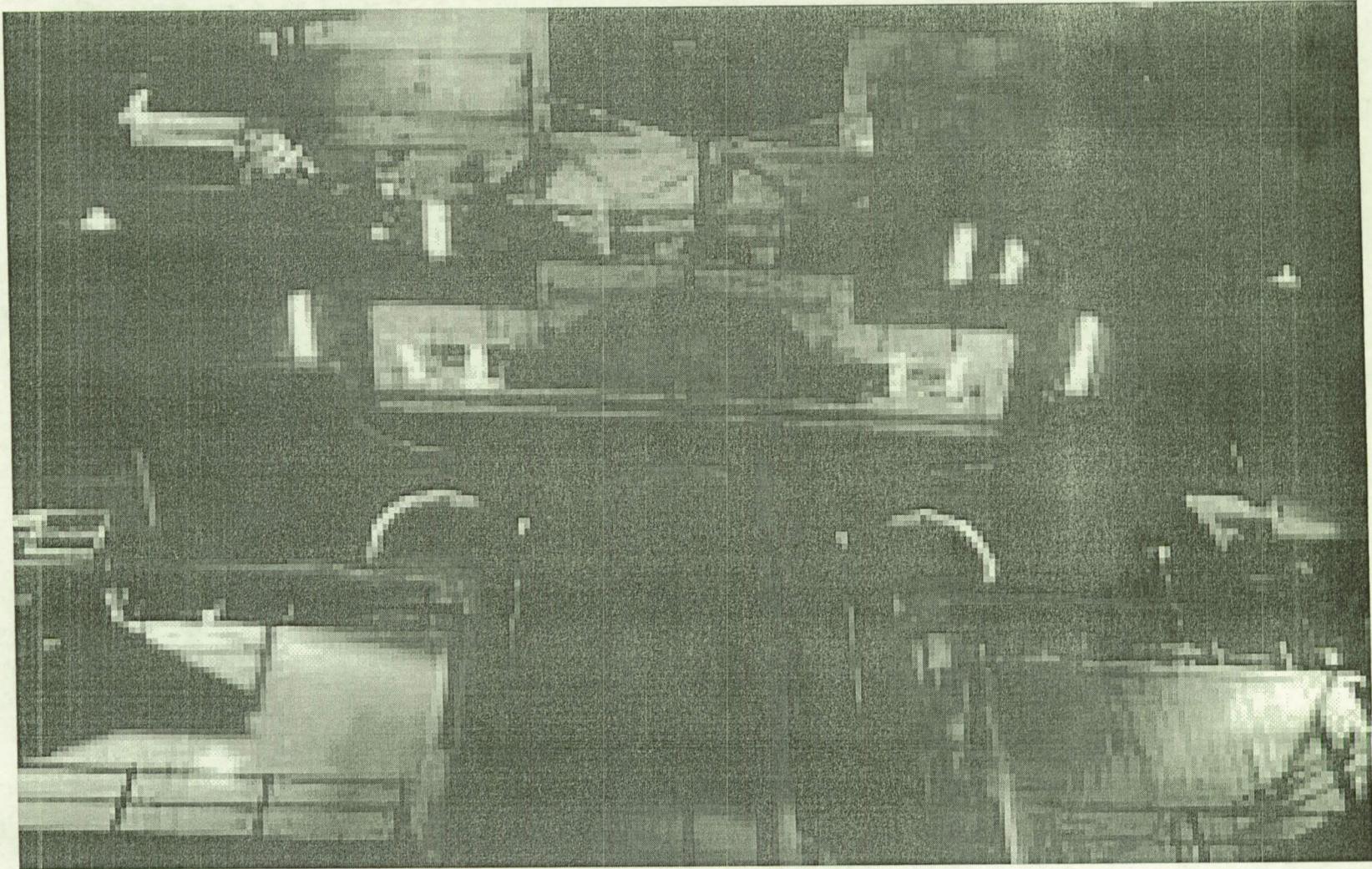
Issues and Incidents

- Unfamiliarity with equipment - Bent OMS pod rotator



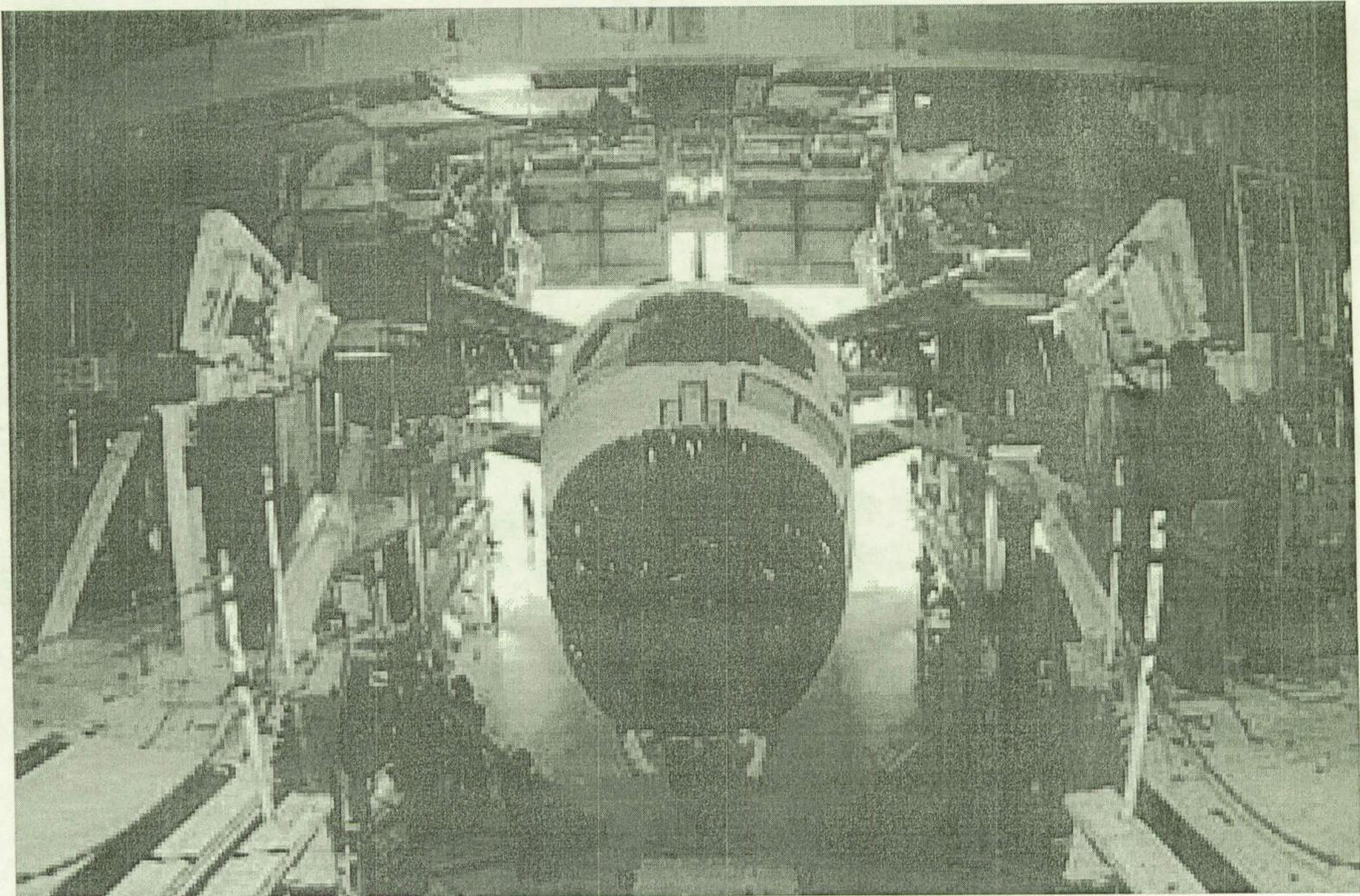
Issues and Incidents

- Infrequent tasks - External tank contacted solid rocket booster



Issues and Incidents

- Communication issues - Orbiter tail hit a platform



Policies

- Operating Procedure
 - Guidelines for moving flight hardware and critical ground support equipment
 - Outlines function of move directors
 - Pre-task briefings
 - Assigning personnel
 - Communication
 - Emergency procedures
 - Use of hydra-set and crane scales
 - Requirements to include in procedures
 - Definitions

Move Director Oversight and Guidance Committee

- Team of experienced move directors, managers and engineers
- Independent reviews of move related incidents
- Proficiency and training of move directors
 - Limited numbers of move directors
 - Review training requirements
 - Conduct move director stand-boards
- Maintains move director website
 - Suggestions, problems and questions are assigned to the committee
 - Lessons learned are posted
 - Move directors can record moves performed
 - Links to all move directors and/or their managers
- Identify and resolve systemic problem in handling processes
- Seek improvements for handling procedures, safety and policies

Move Director Proficiency and Training

- Perform each task several times with certified move director
- Limit number of move directors certified for different tasks
- Two year re-certification program
- Review of infrequently performed procedures
- Intangible qualities
 - Ability to communicate
 - Ability to instruct/train
 - Ability to look ahead
 - Ability to lead and direct team
 - Earn of respect among team members

Questions

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