

Cynthia Snoddy

USA/MSFC Chief Engineer
Program Integration

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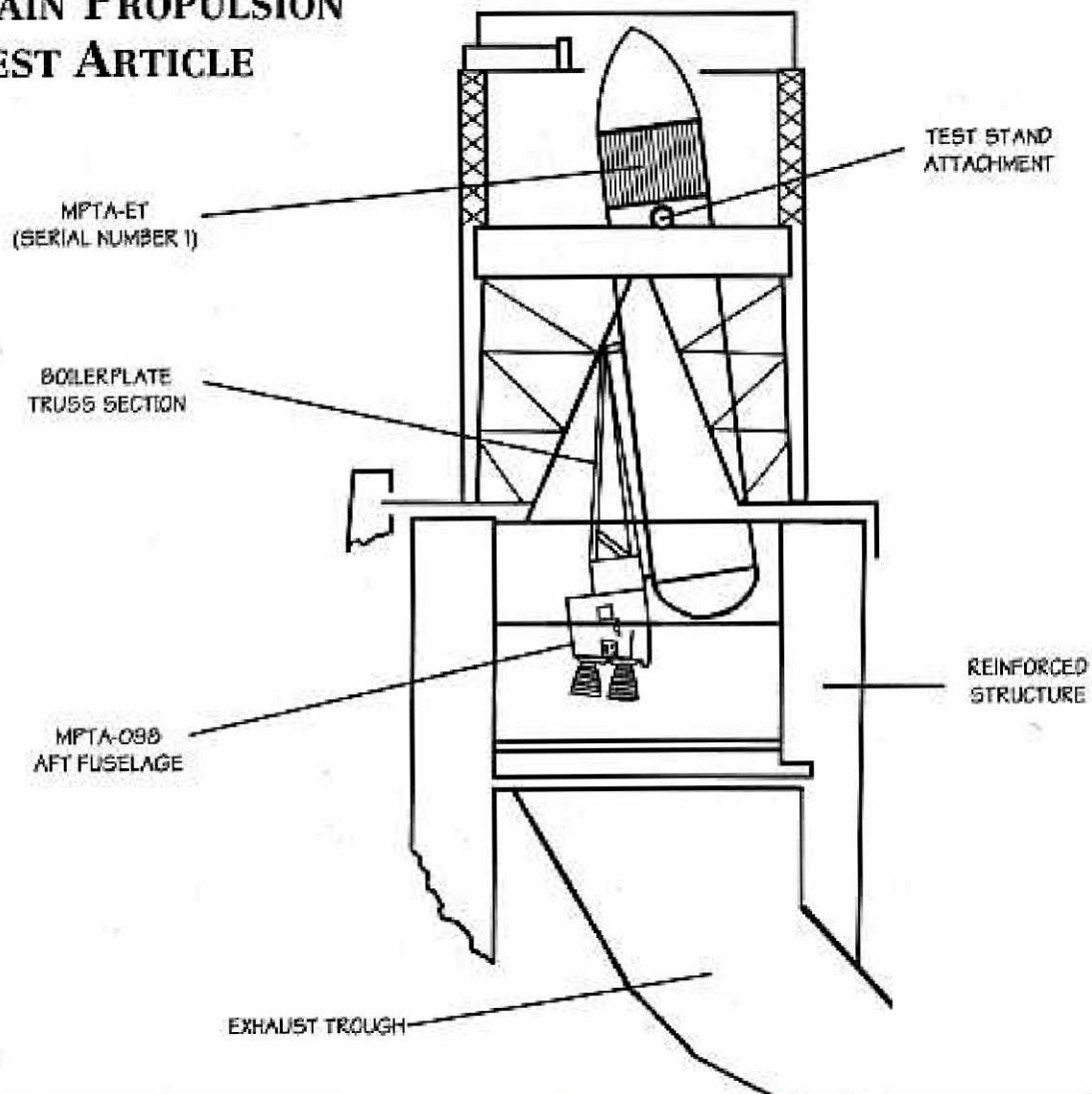
Main Propulsion Test Article (MPTA)



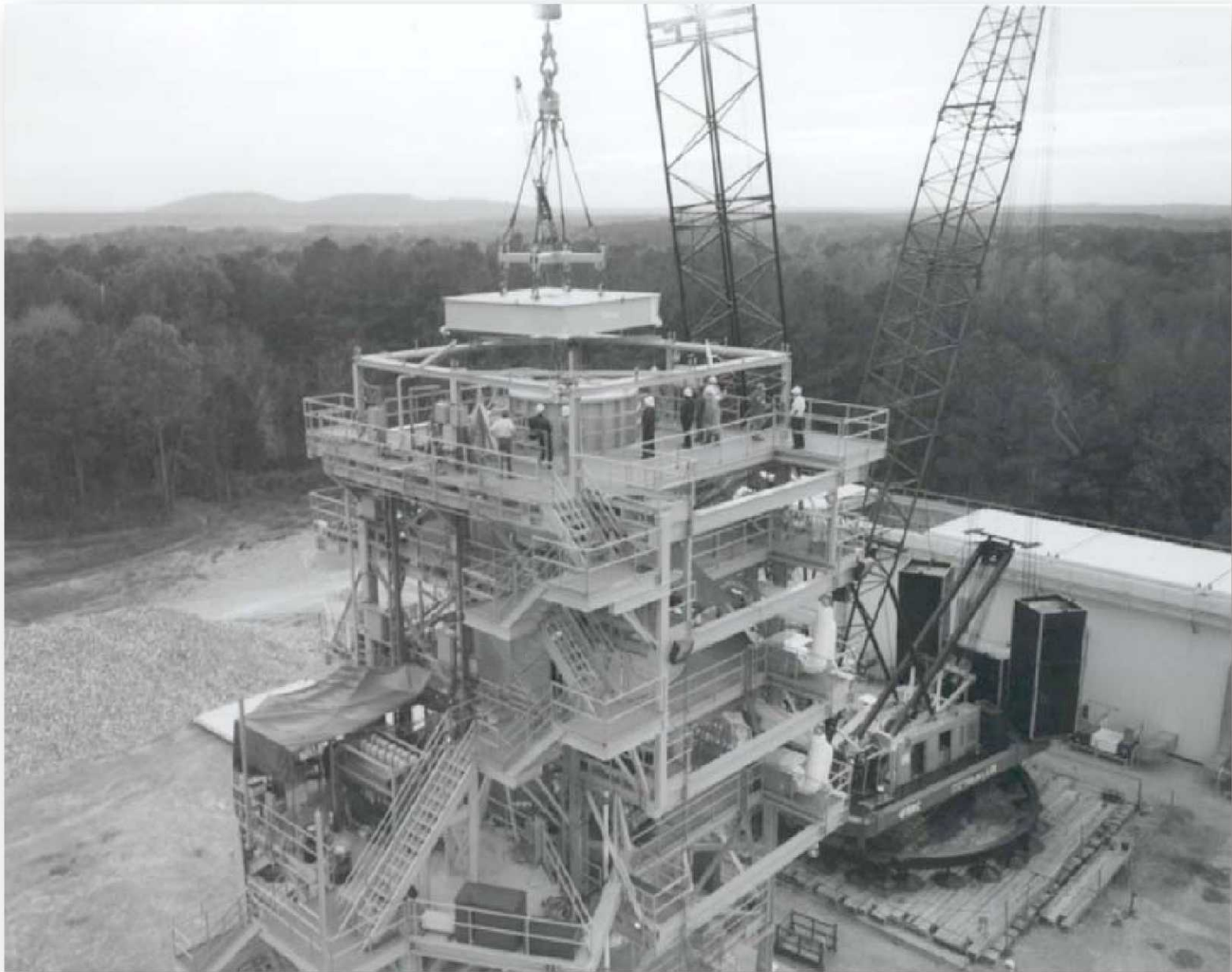
- Scope:
 - The Main Propulsion Test Article integrated the main propulsion subsystem with the clustered Space Shuttle Main Engines, the External Tank and associated GSE. The test program consisted of cryogenic tanking tests and short- and long duration static firings including gimbaling and throttling. The test program was conducted on the S1-C test stand (Position B-2) at the National Space Technology Laboratories (NSTL)/Stennis Space Center.
 - 3 tanking tests and 20 hot fire tests conducted between December 21, 1977 and December 17, 1980
- Configuration:
 - The main propulsion test article consisted of the three space shuttle main engines, flightweight external tank, flightweight aft fuselage, interface section and a boilerplate mid/fwd fuselage truss structure.

Main Propulsion Test Article (MPTA)

MAIN PROPULSION TEST ARTICLE



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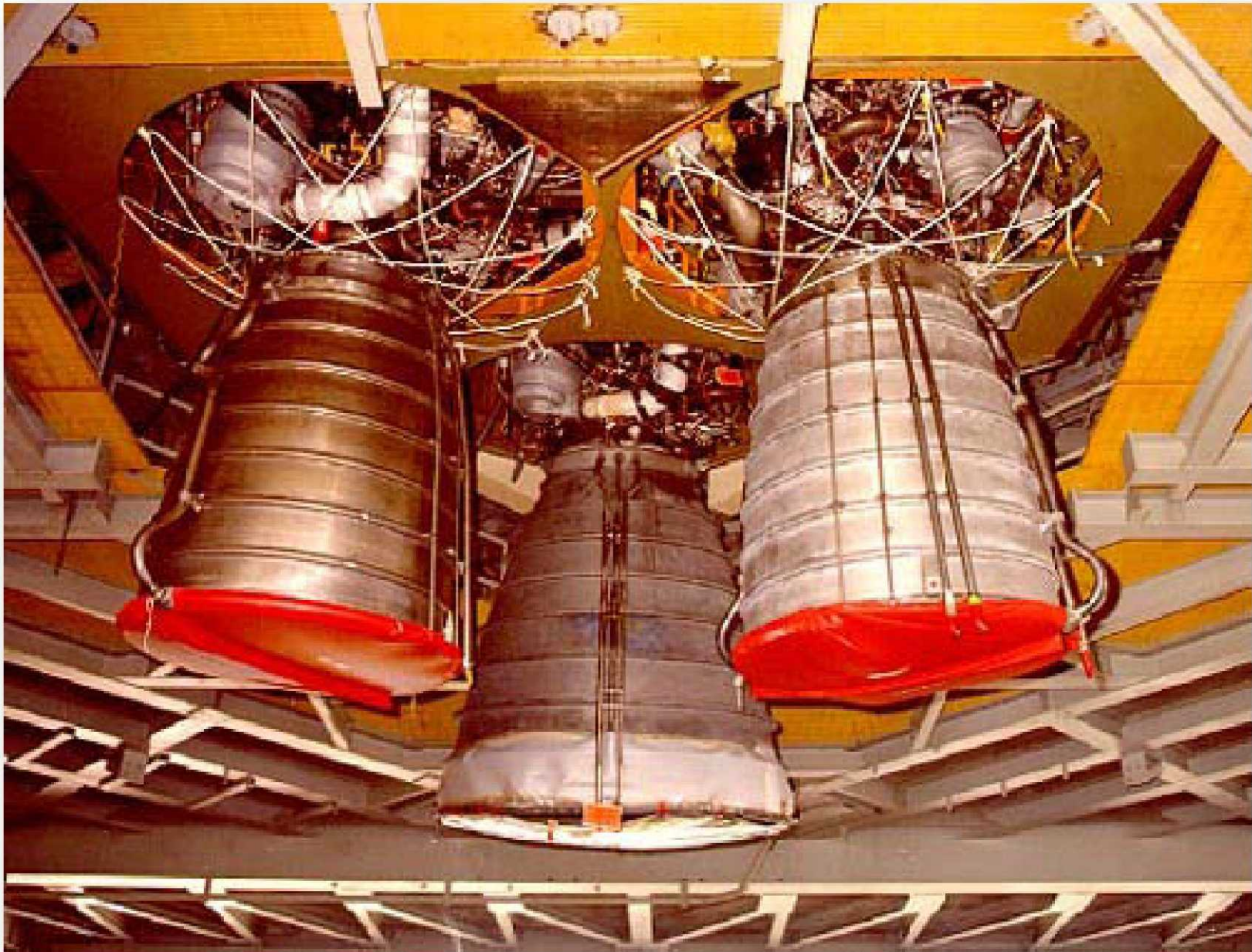
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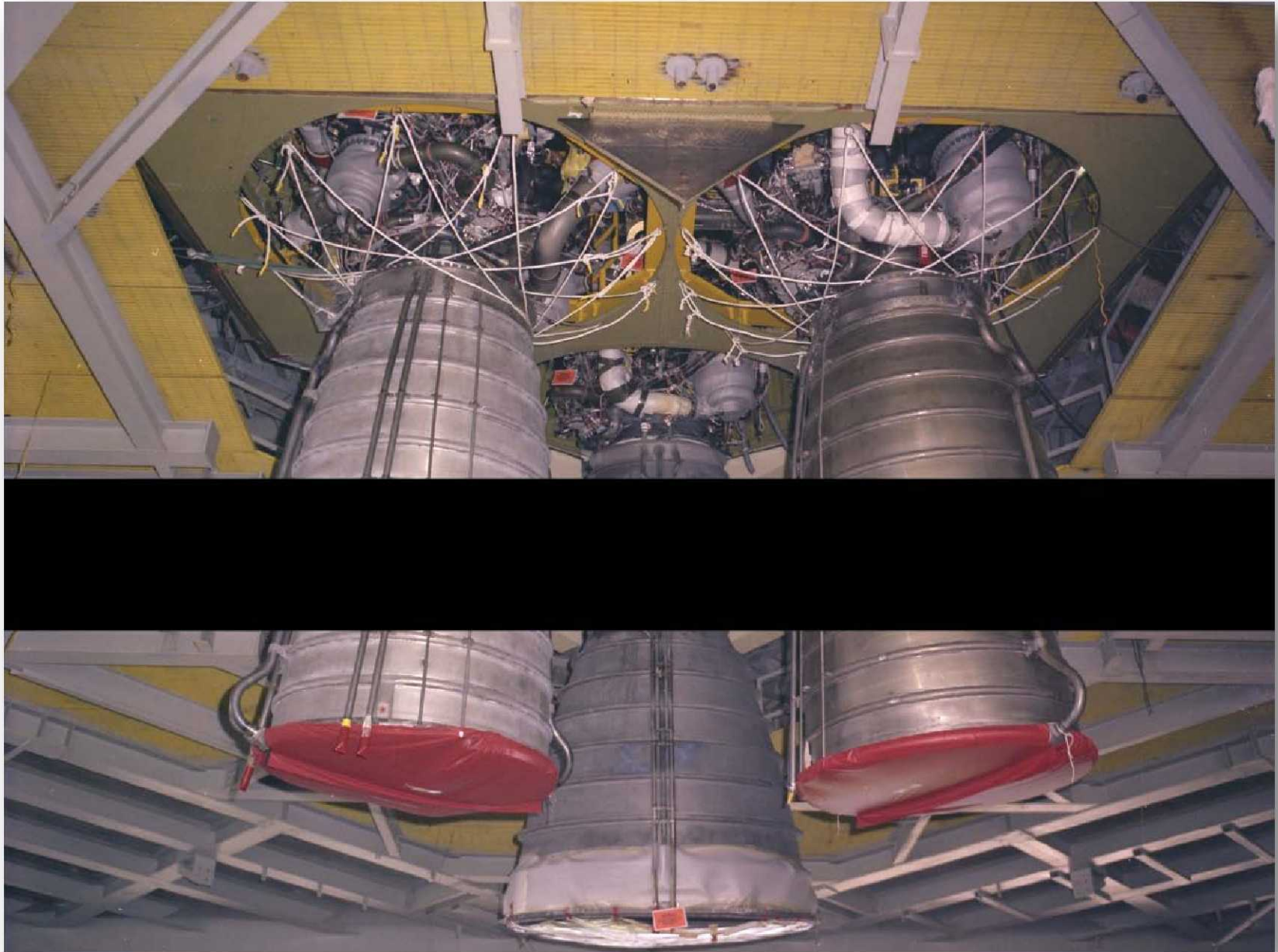
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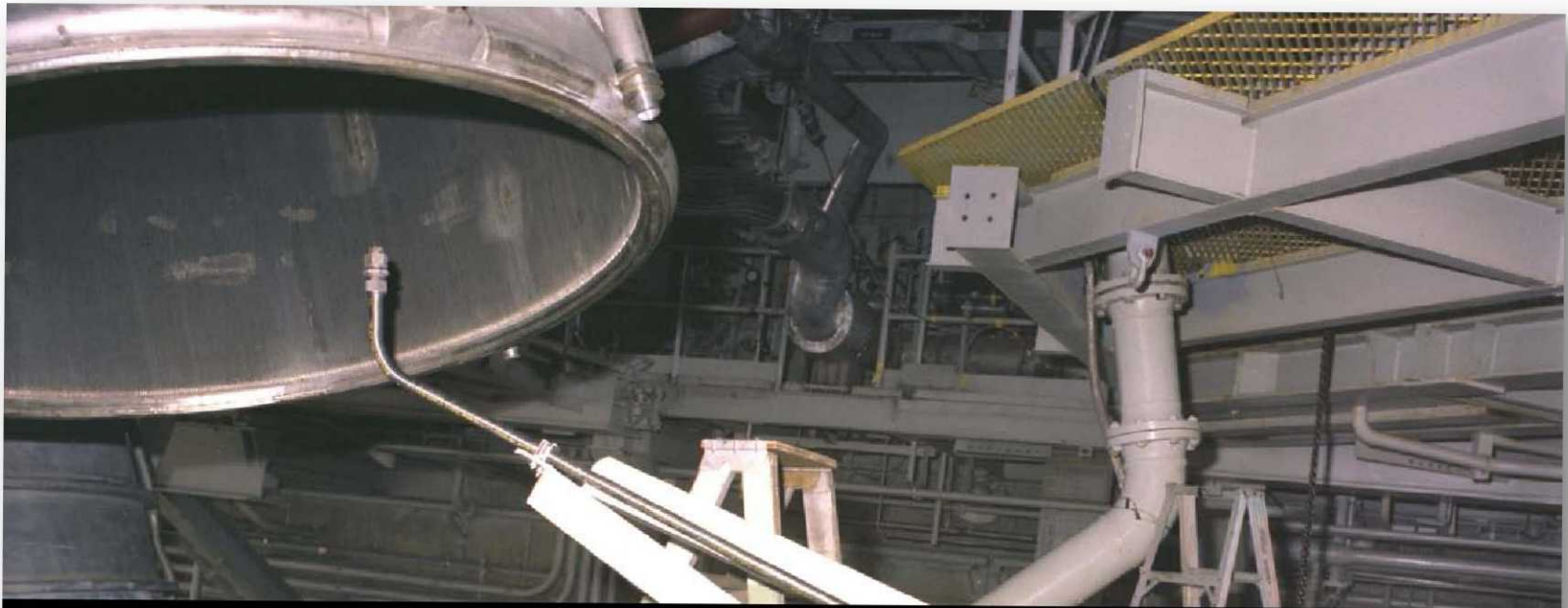
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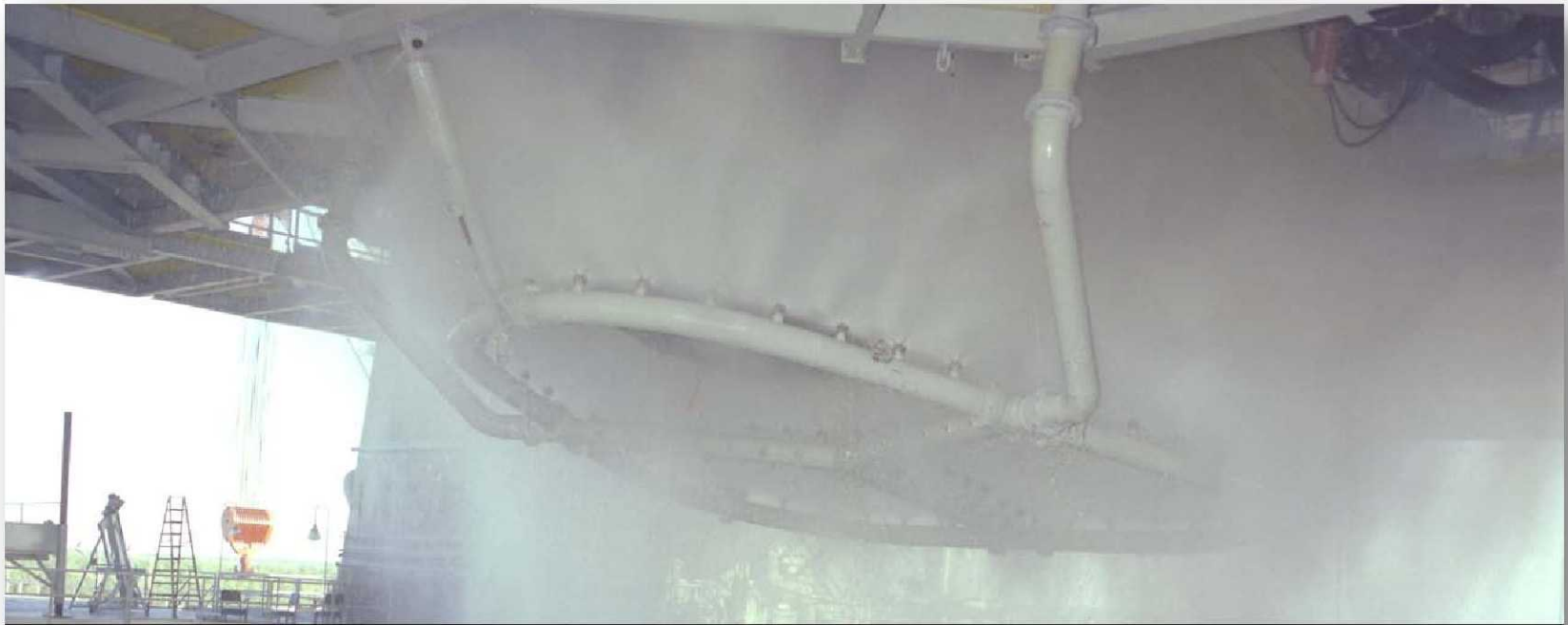
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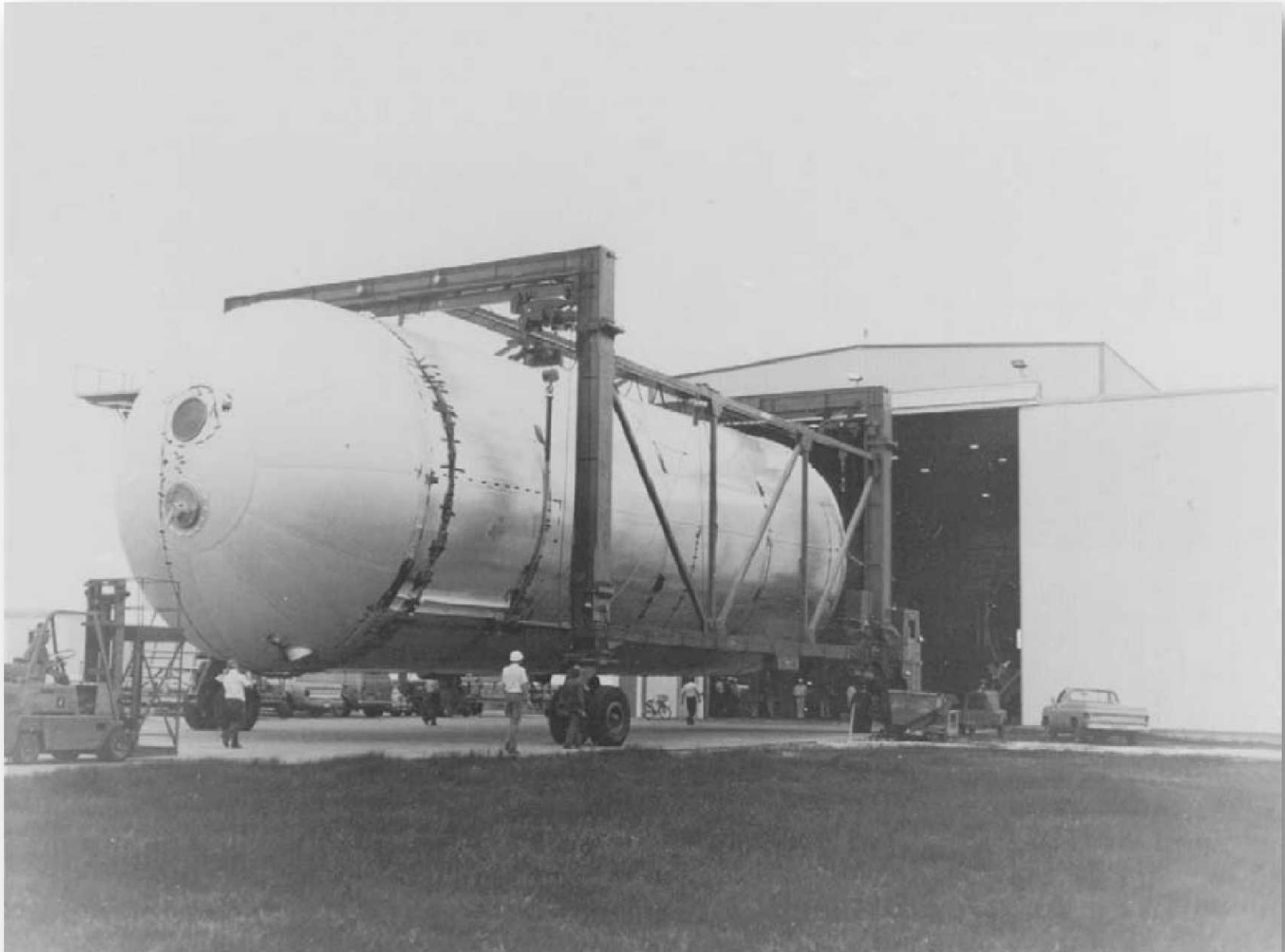
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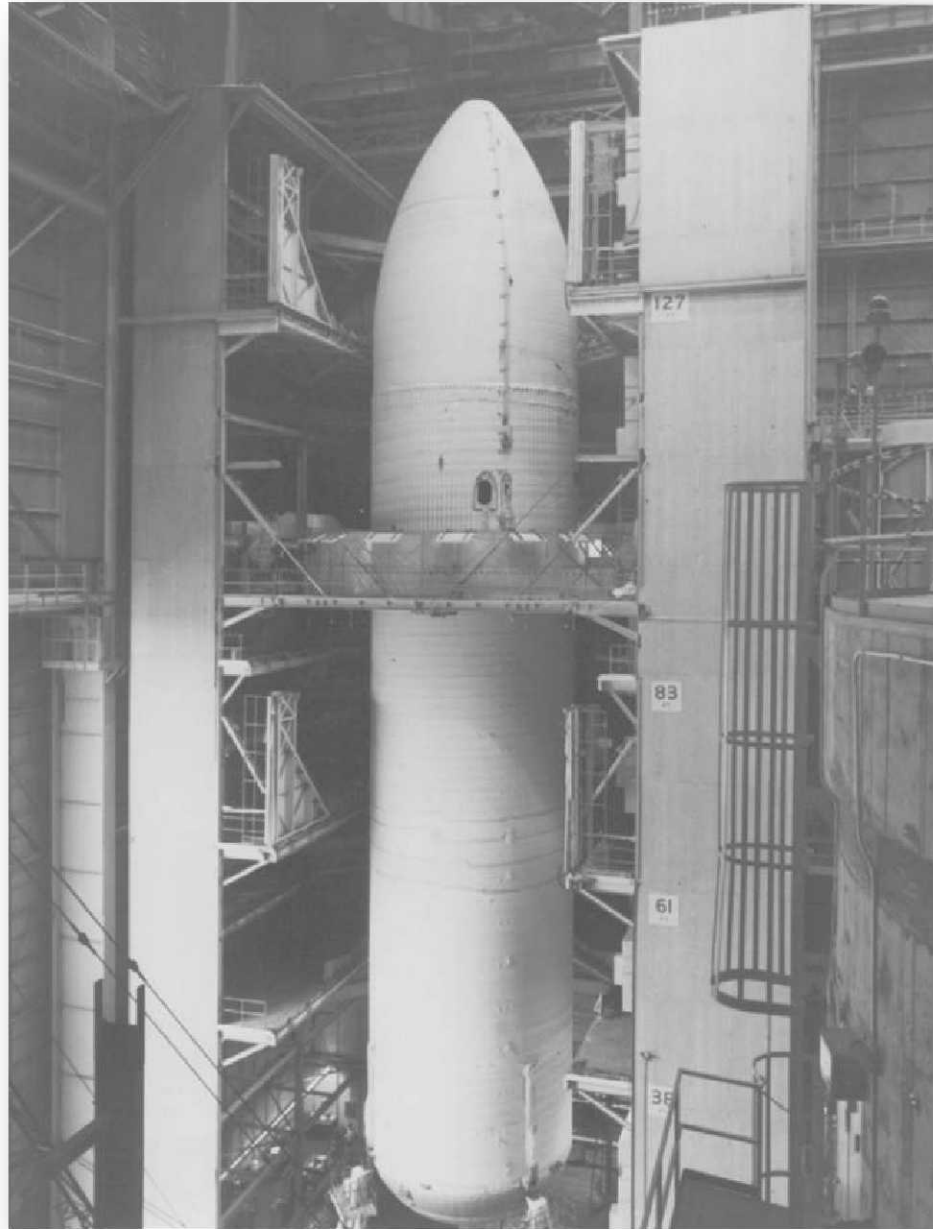
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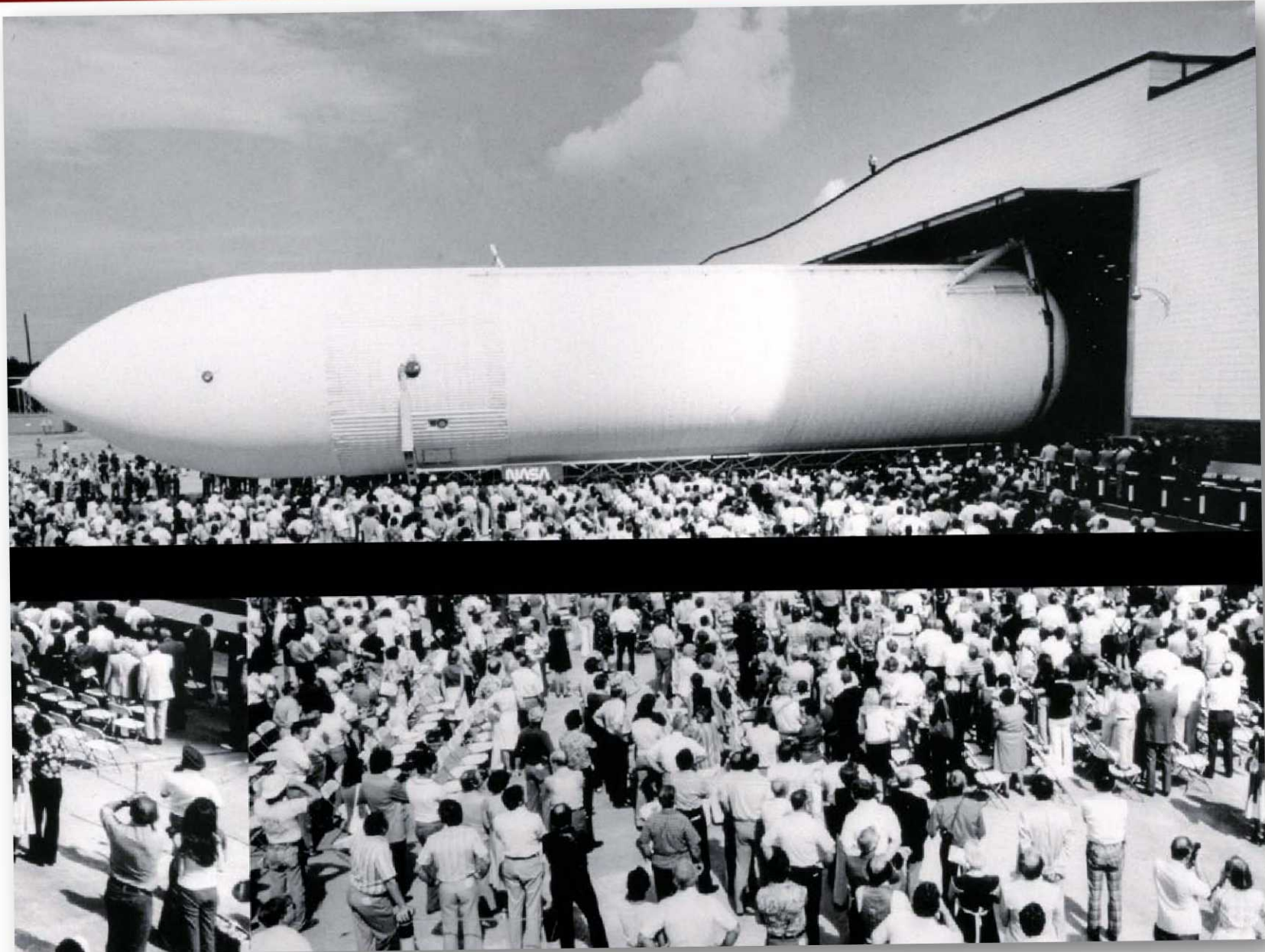
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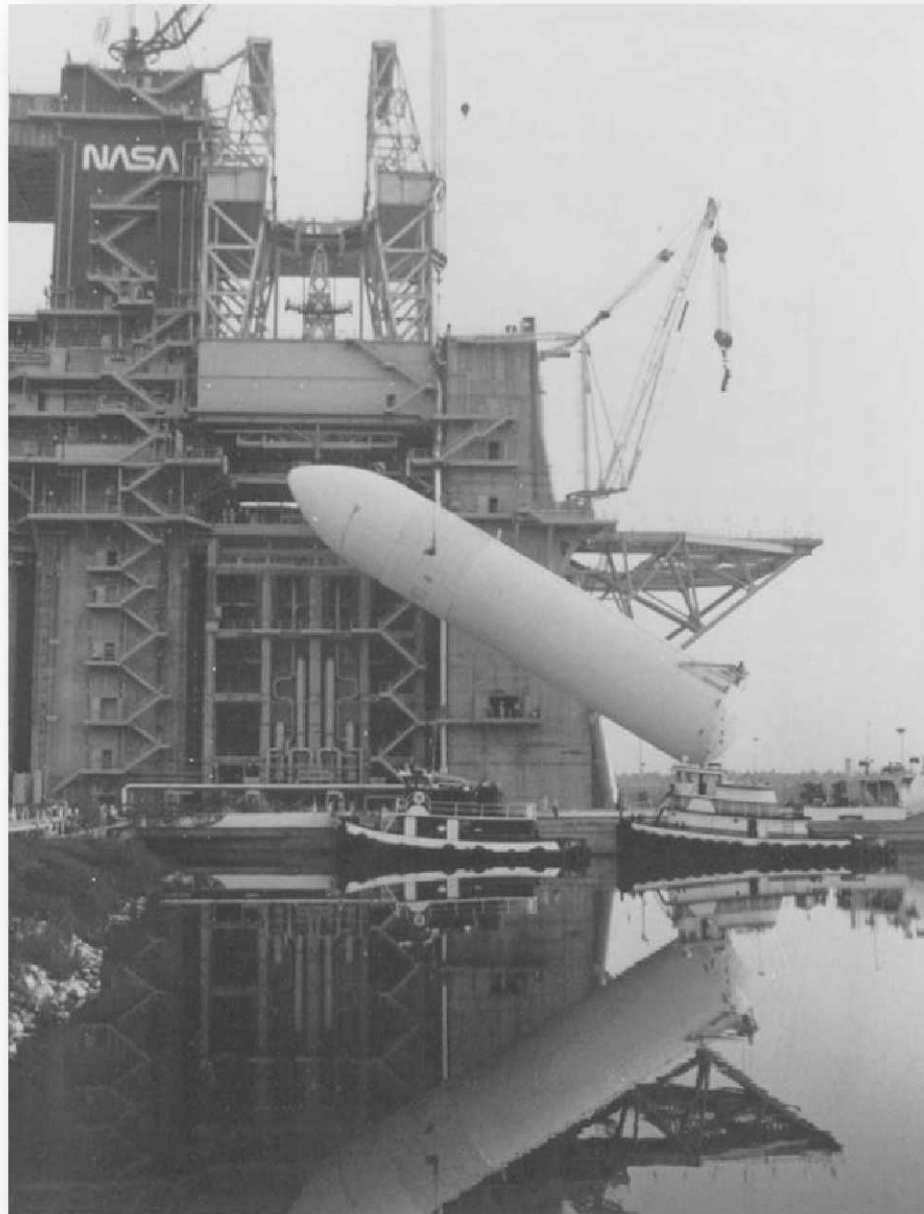


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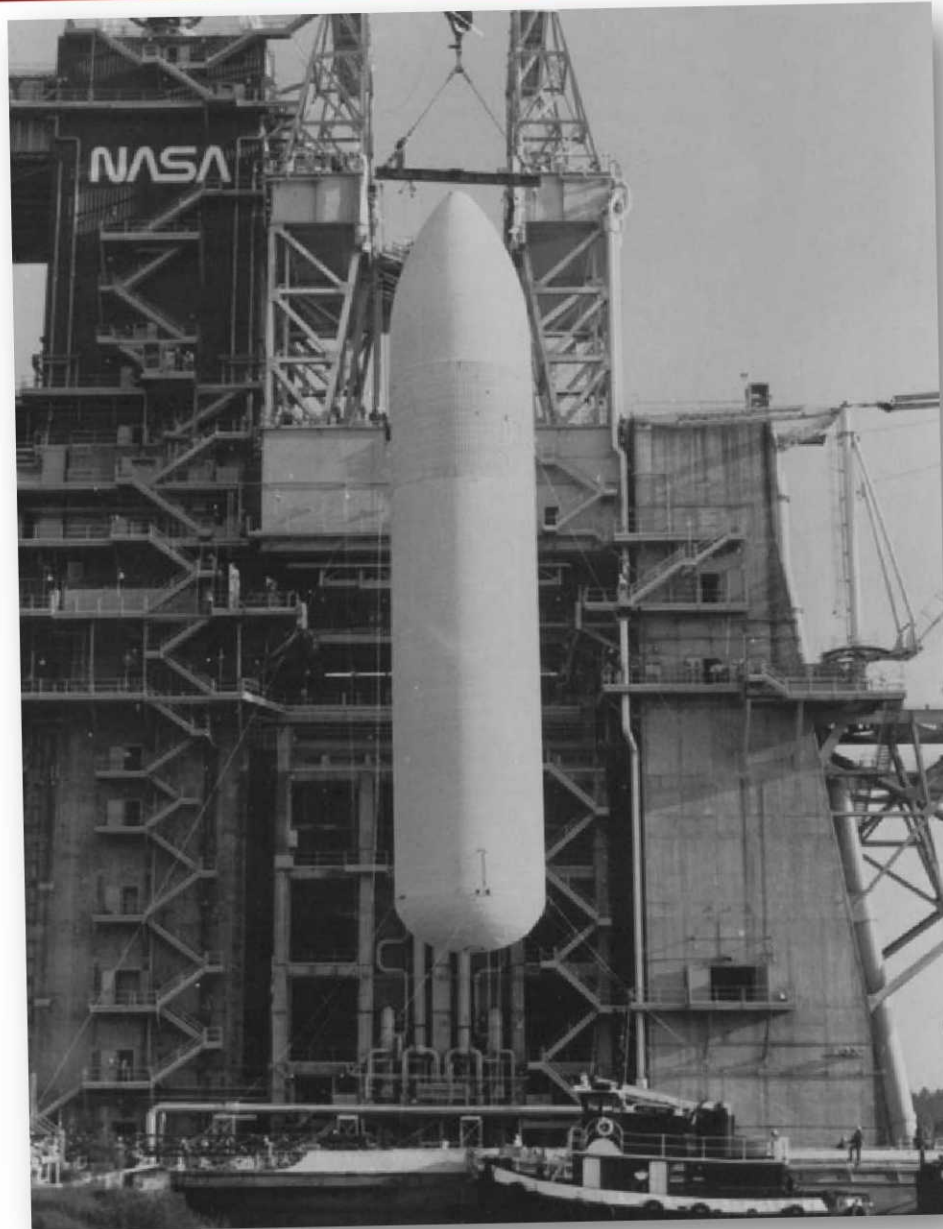




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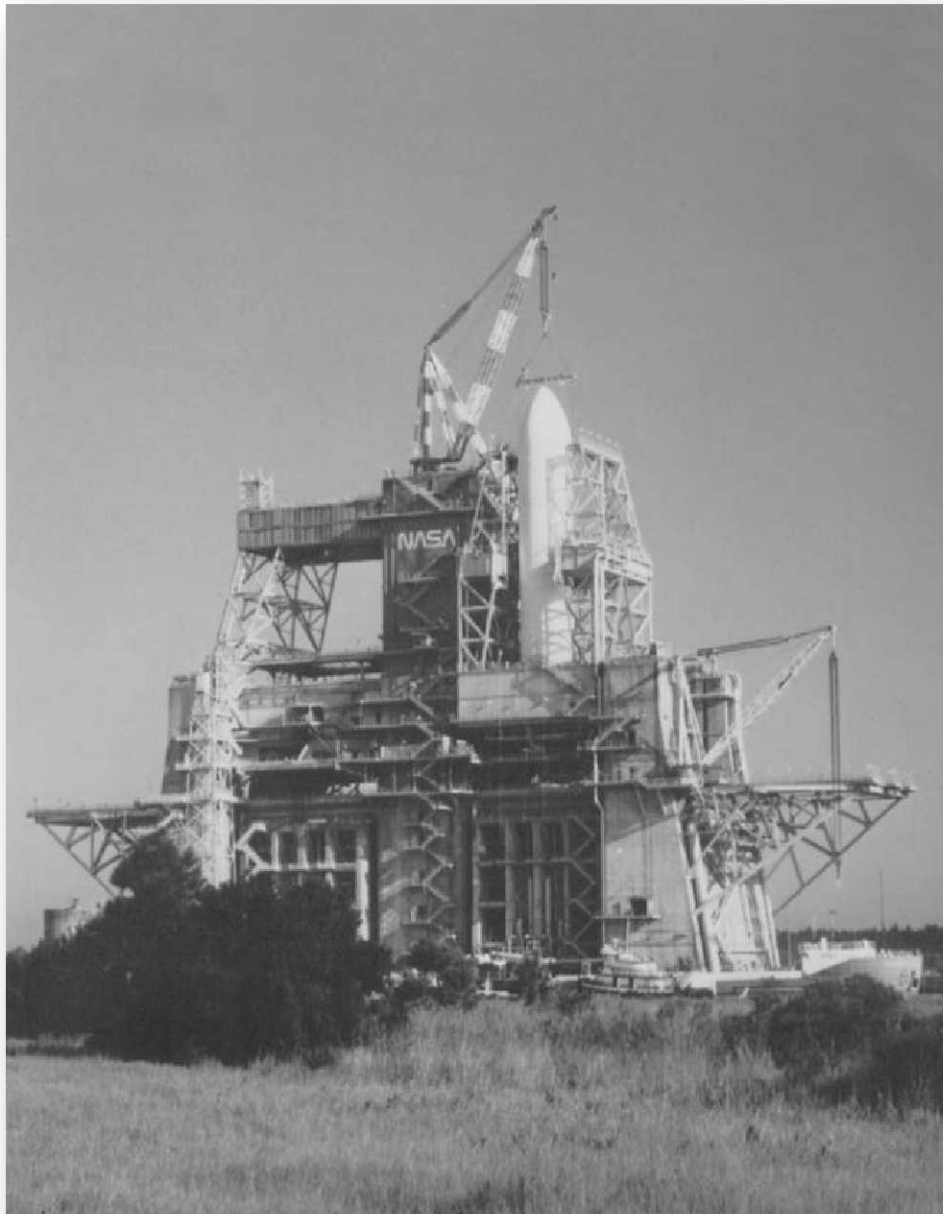
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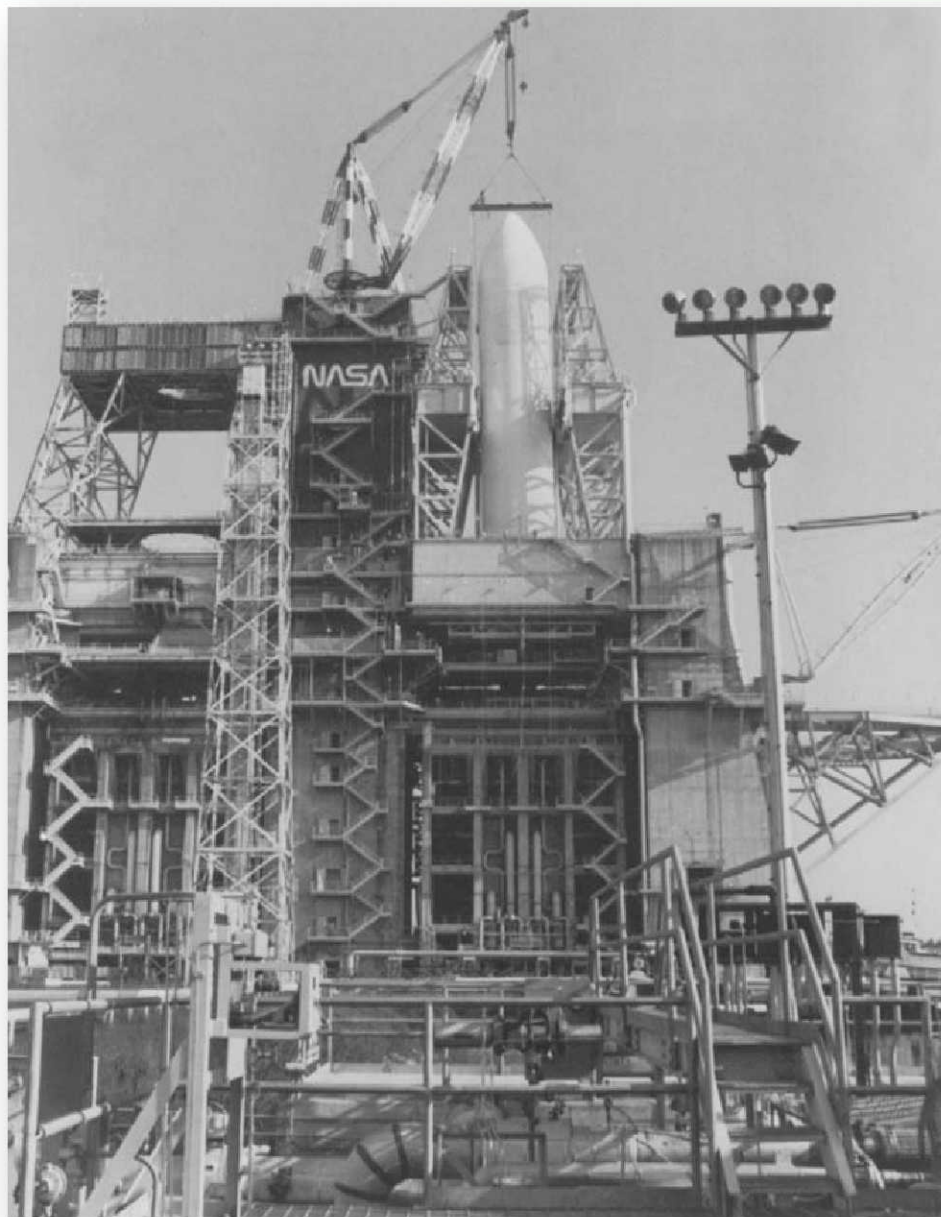


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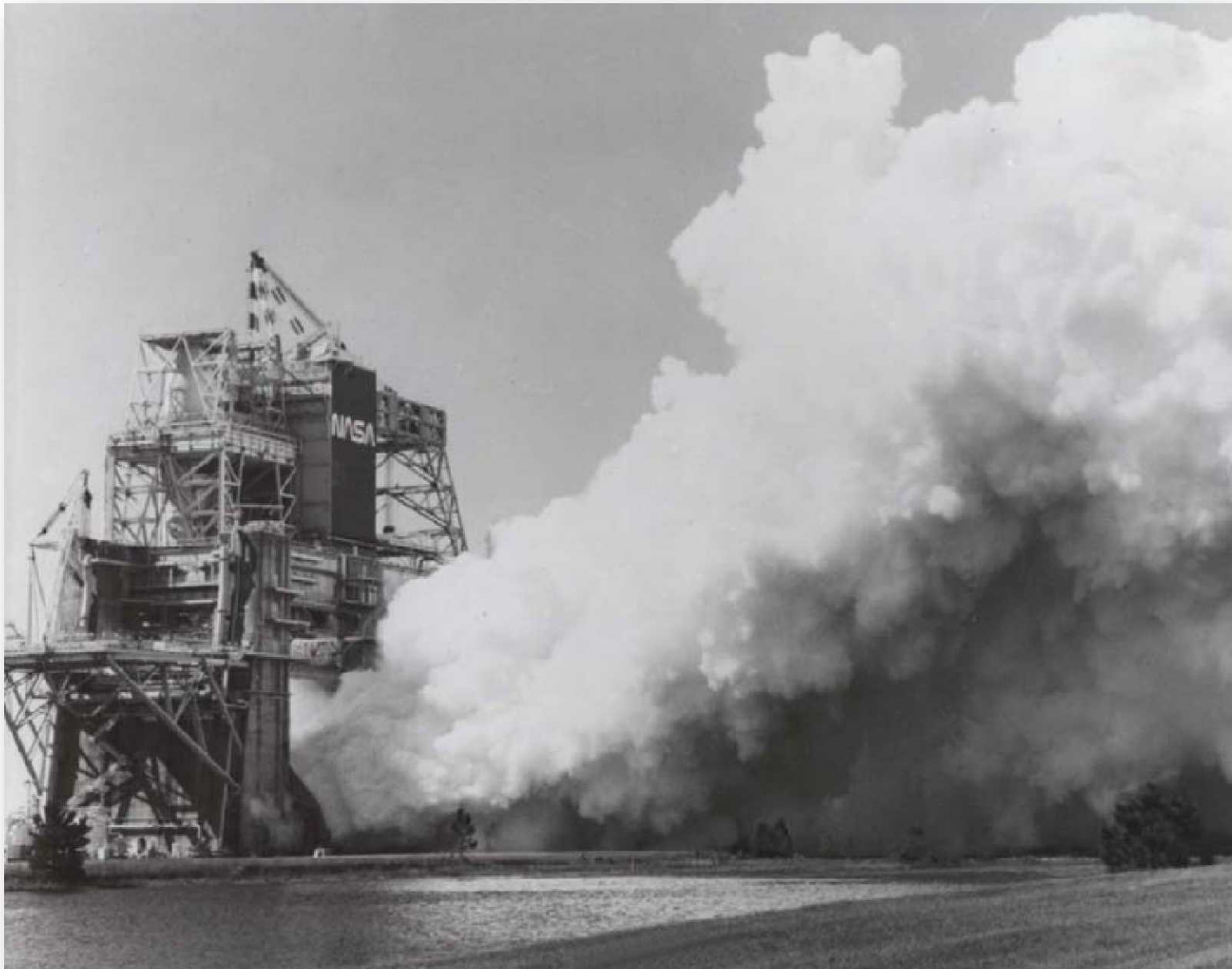
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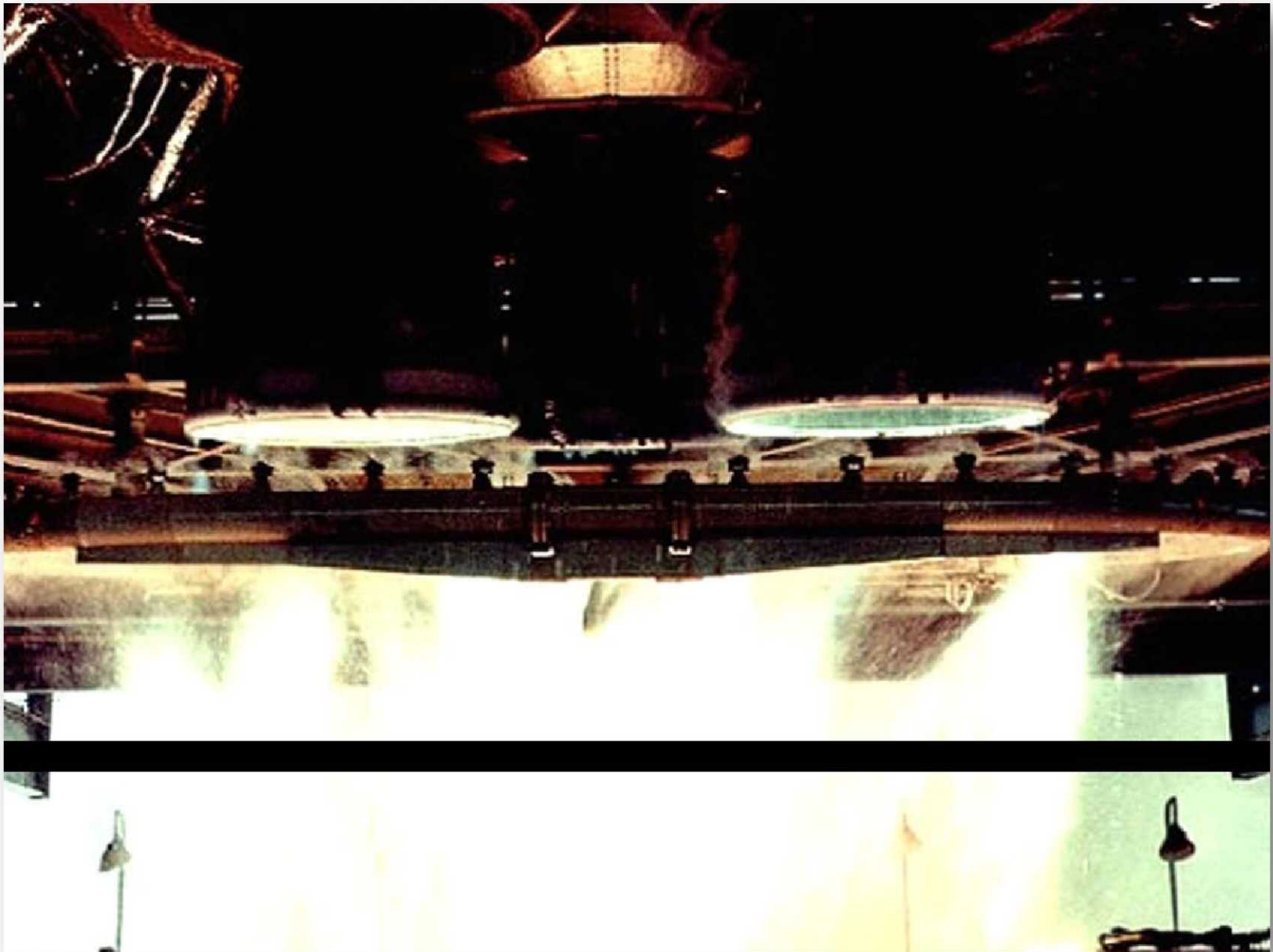
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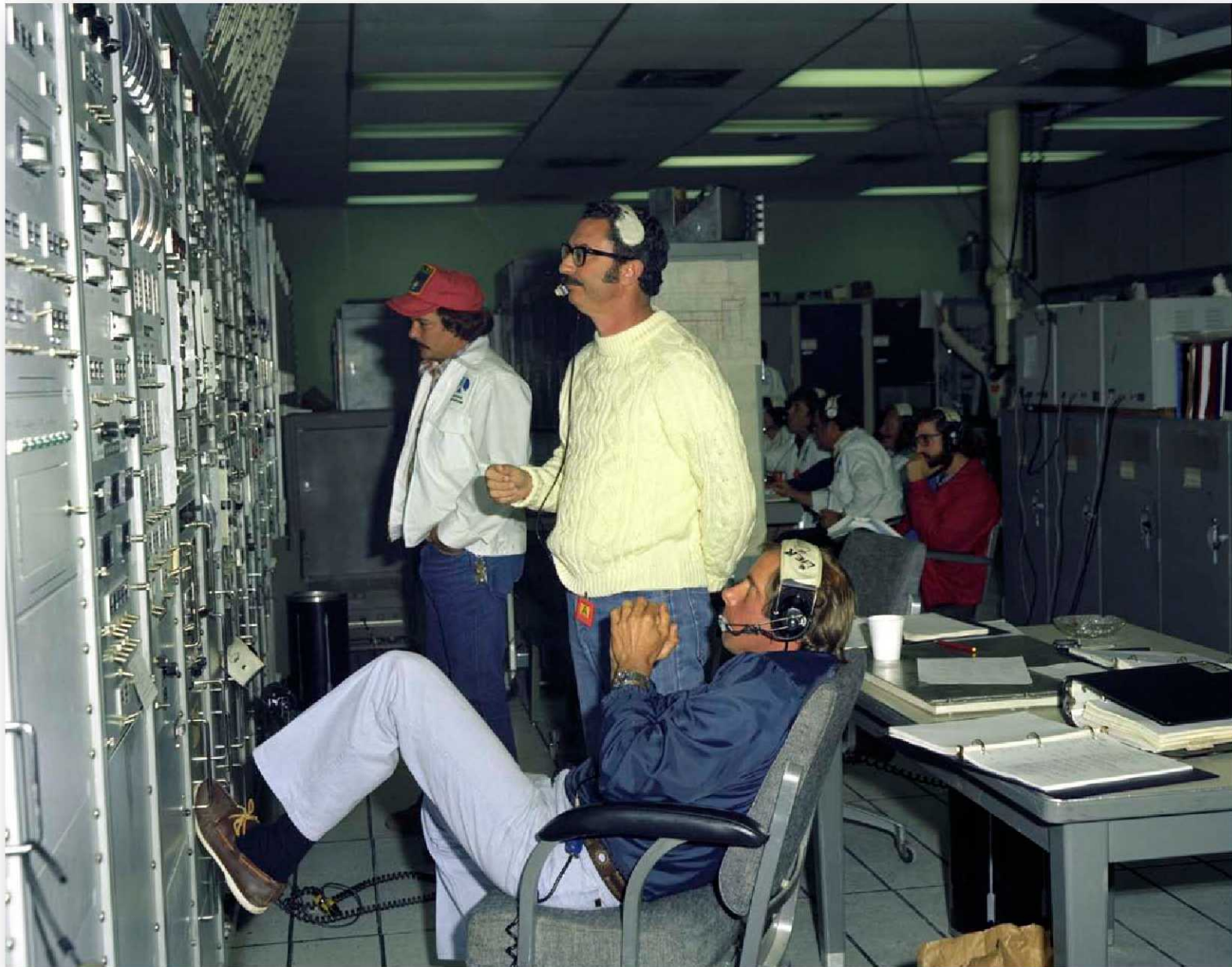
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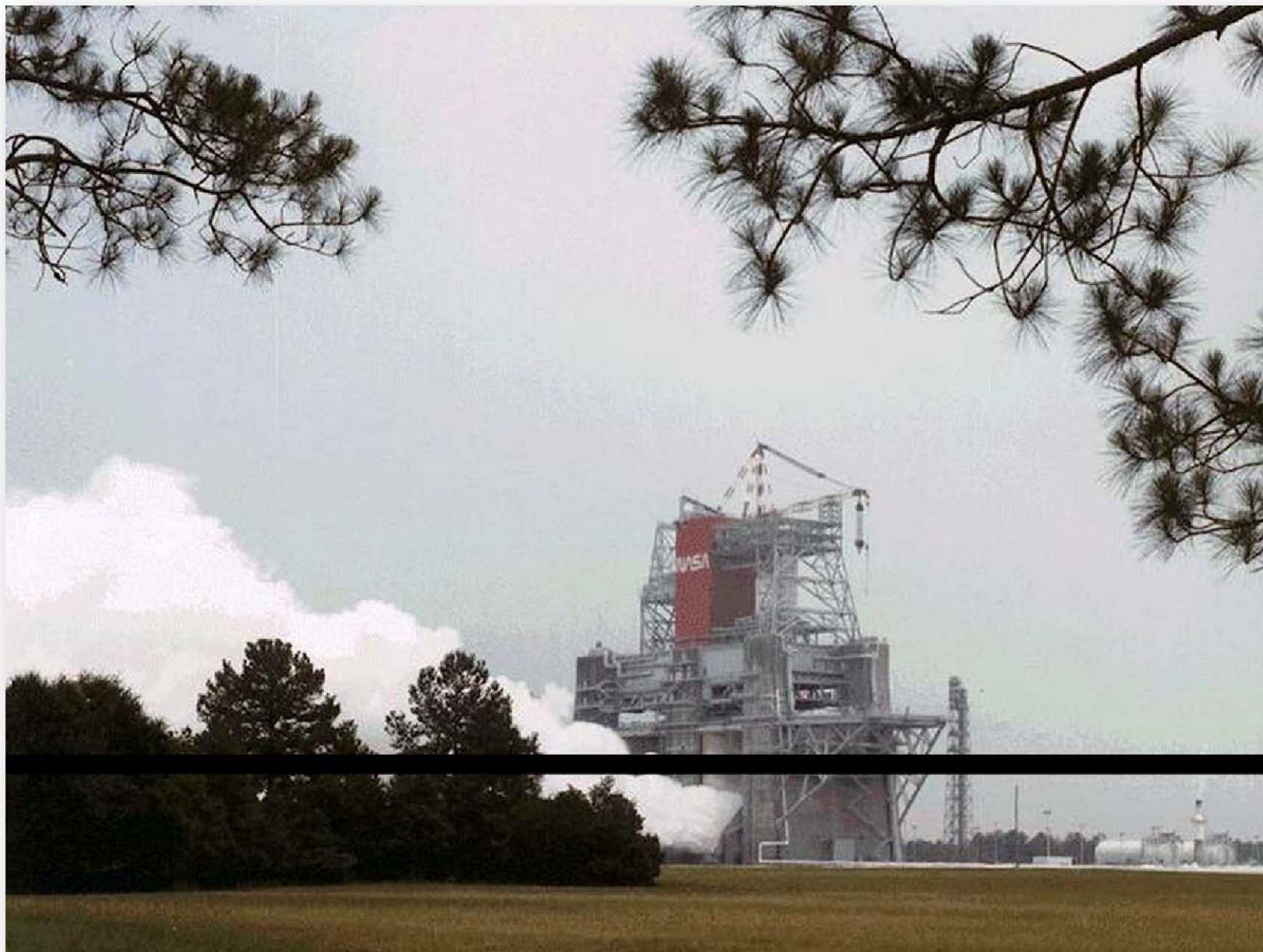
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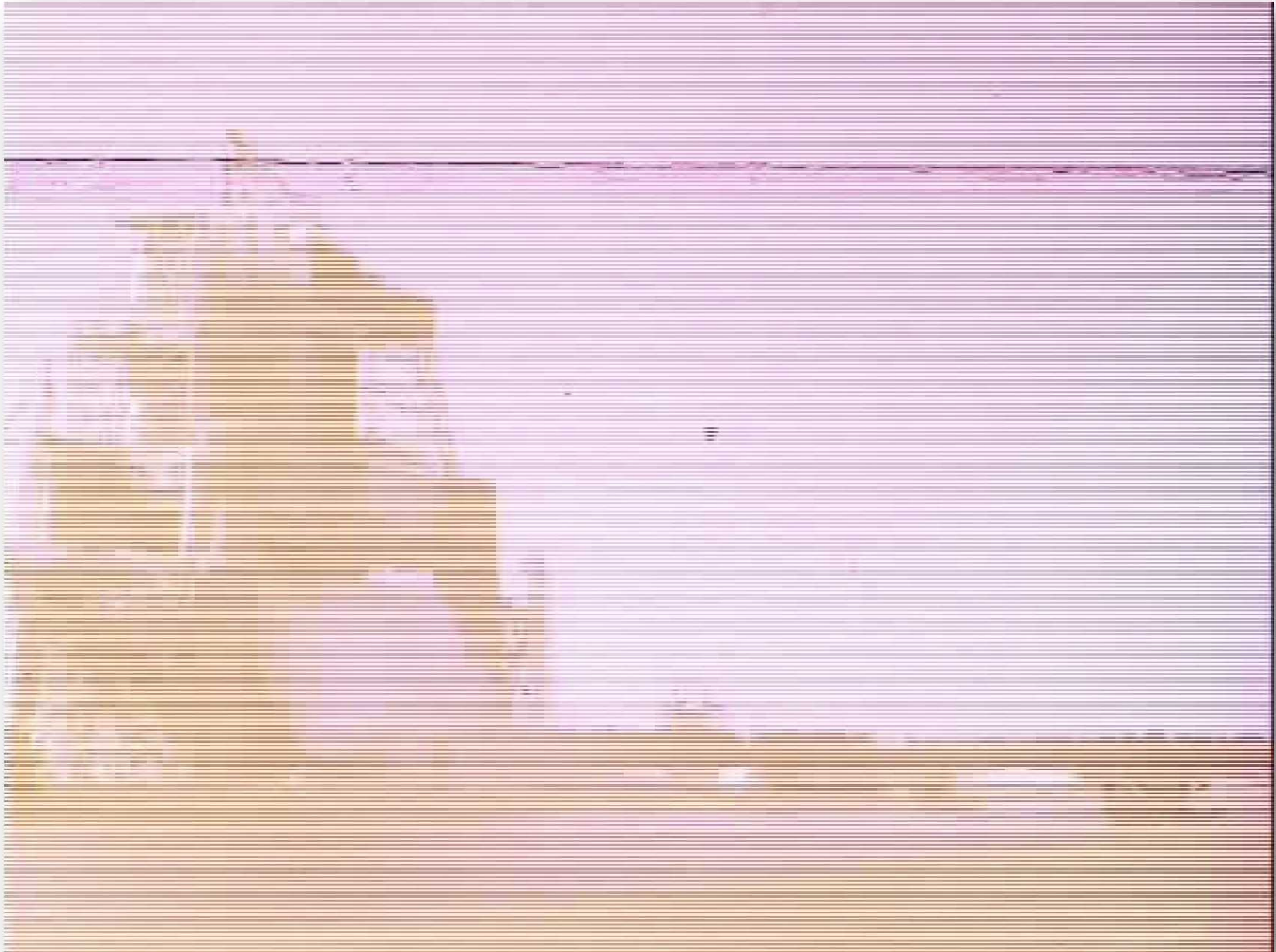
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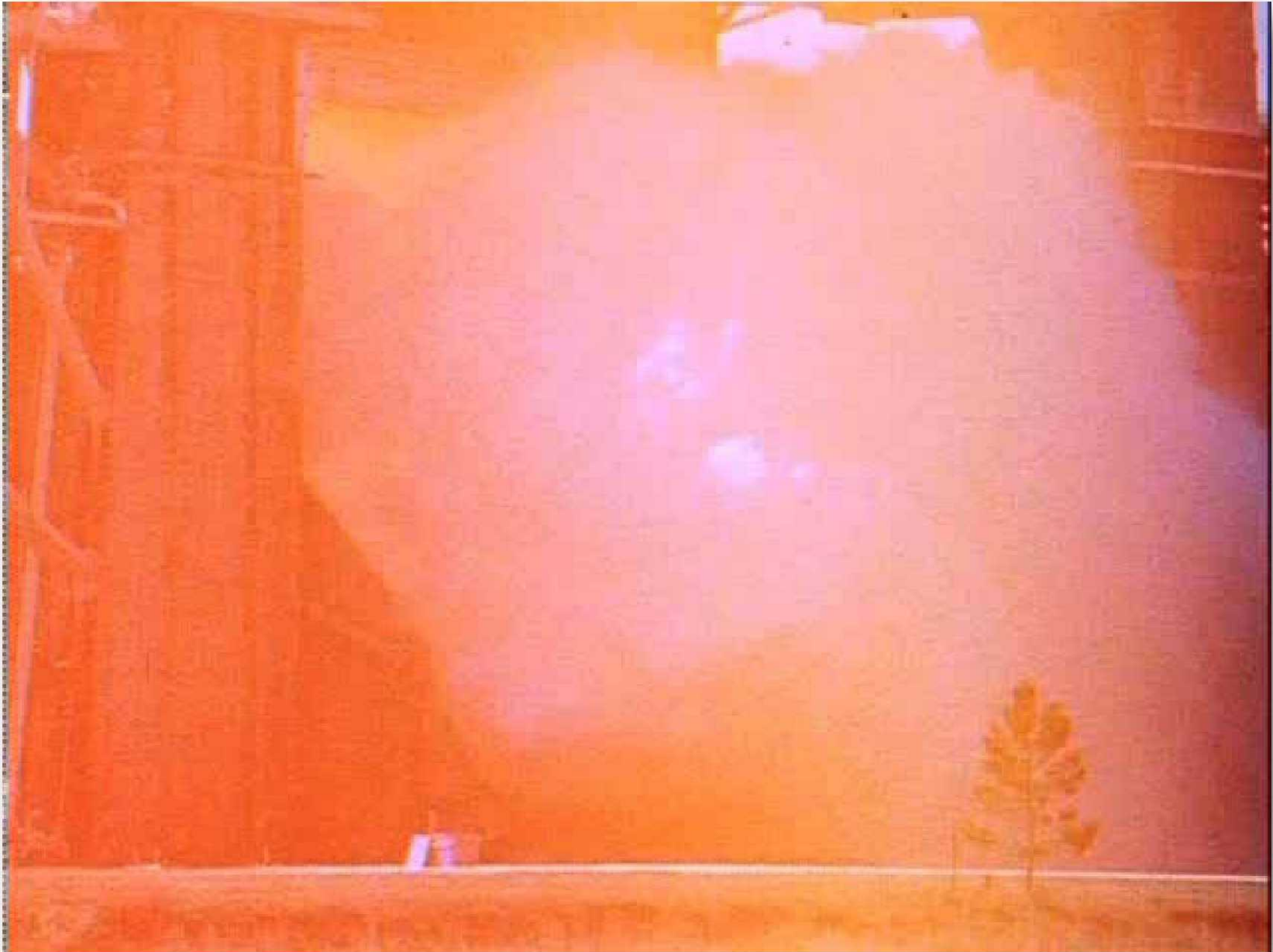
- Organizations:
 - Rockwell International, Space Division (Orbiter)
 - Rockwell International, Rocketdyne Division (Main Engine)
 - Martin Marrietta (External Tank)
 - Rockwell International, Space Division (integration and test site operation)
 - National Space Test Laboratory (Stennis Space Center)
 - Marshall Space Flight Center
 - Johnson Space Center
 - Kennedy Space Center

- MPTA Summary
 - 20 attempts to static fire
 - 2 tests failed to get SSME ignition
 - 6 full duration tests accomplished
 - 10 tests planned duration accomplished
 - 12 tests with high percentage of objectives meet
 - 12 tests had hydrogen leakage in the aft compartment
 - 9 tests had fires (4 major external, 1 aft compartment)
 - 10,813 Total Engine Seconds

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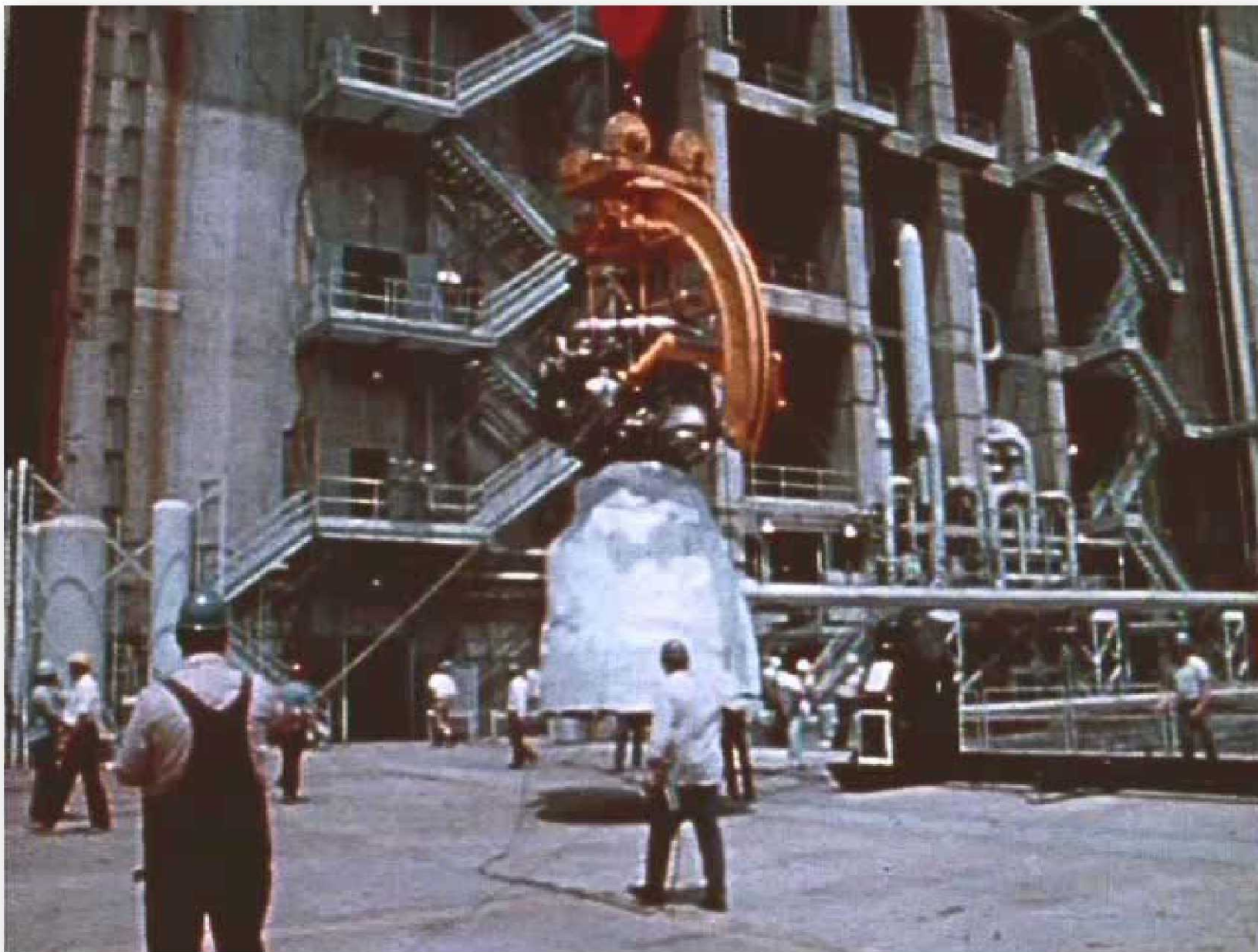


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- MPTA Accomplishments
 - Qualification of the Shuttle cross-feed system
 - (ET along side the Orbiter)
 - Integration of SSME into the Orbiter
 - Qualification of liquid delivery system hardware
 - Qualification of gaseous pressurization system hardware
 - Validation of structural and POGO models
 - Development of loading and draining procedures/software
 - 3 potential flight catastrophic discrepancies mitigated
 - steerhorn failure, solid N2 in engine main fuel valve, LO2 engine cutoff location and shutdown command timing
 - 3 potential pre-flight operation catastrophic discrepancies mitigated
 - high LO2 loading temp, LO2 off loading pressure spikes, ET/ Orbiter LO2 17 inch disconnect unplanned closure

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