

HISTORIC AMERICAN ENGINEERING RECORD

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SPACE TRANSPORTATION SYSTEM, SPACE SHUTTLE

HAER TX-116-I

MAIN ENGINE

Johnson Space Center, 2101 NASA Parkway

Houston

Harris County

Texas

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Jet Lowe, photographer, June 2011

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| TX-116-I-1 | General view in the Horizontal Processing Area of the Space Shuttle Main Engine (SSME) Processing Facility at Kennedy Space Center. This view is looking at SSME number 2048 mounted on an SSME engine Handler. |
| TX-116-I-2 | General view in the Horizontal Processing Area of the Space Shuttle Main Engine (SSME) Processing Facility at Kennedy Space Center. This view is looking at SSME 2052 and 2051 mounted on their SSME Engine Handlers. |

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- TX-116-I-3 Close-up side view of Space Shuttle Main Engine (SSME) 2059 mounted in a SSME Engine Handler near the Drying Area in the High Bay section of the SSME Processing Facility. The prominent features of the SSME in this view are the hot-gas expansion nozzle extending from the approximate image center toward the image right. The main-engine components extend from the approximate image center toward image right until it meets up with the mount for the SSME Engine Handler. The engine is rotated to a position where the major components in the view are the Low-Pressure Fuel Turbopump Discharge Duct with reflective foil insulation on the upper side of the engine, the Low-Pressure Oxidizer Turbopump and its Discharge Duct on the right side of the engine assembly extending itself down and wrapping under the bottom side of the assembly to the High-Pressure Oxidizer Turbopump pump. The High-Pressure Oxidizer Turbopump Discharge Duct exists the turbopump and extends up to the top side of the assembly where it enters the main oxidizer valve. The sphere on the lower side of the engine assembly is an accumulator that is part of the SSMEs POGO suppression system.
- TX-116-I-4 General view in the Vertical Processing Area of the Space Shuttle Main Engine (SSME) Processing Facility at Kennedy Space Center. This view shows a SSME Rotating Sling in the foreground right and SSME 2056 in the foreground and SSMEs 2050, 2062 and 2054 in succession towards the background.
- TX-116-I-5 General view of the shop floor looking north in the Vertical Processing Area of the Space Shuttle Main Engine (SSME) Processing Facility at Kennedy Space Center. SSME number 2061 is in the foreground.
- TX-116-I-6 General view of the shop floor looking north in the Vertical Processing Area of the Space Shuttle Main Engine (SSME) Processing Facility at Kennedy Space Center. SSME number 2061's nozzle is being inspected by an SSME technician in the foreground.

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- TX-116-I-7 Close-up view looking into the nozzle of the Space Shuttle Main Engine number 2061 looking at the cooling tubes along the nozzle wall and up towards the Main Combustion Chamber and Injector Plate
- TX-116-I-8 General view of the High Bay area of the Space Shuttle Main Engine (SSME) Processing Facility at Kennedy Space Center. This view shows the specially modified fork lift used for horizontal installation and removal of the SSMEs into and out of the Orbiters. SSME number 2059 is in the background and is in the process of being scanned with a high-definition laser scanner to acquire field documentation for the production of historic documentatin.
- TX-116-I-9 Close-up view of the top of Space Shuttle Main Engine (SSME) 2057 mounted in a SSME Engine Handler in the Vertical Processing area of the SSME Processing Facility at Kennedy Space Center. The most prominent components in this view is the large Low-Pressure Oxidizer Turbopump (LPOTP) Discharge Duct wrapping itself around the right side of the engine assembly. The smaller tube to the left of LPOTP Discharge Duct is the High-Pressure Oxidizer Duct used to supply the turbine of the LPOTP. The other major feature in this view is the Low-Pressure Fuel Turbopump at the top of the engine assembly.

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- TX-116-I-10 Close-up view of the bottom area of Space Shuttle Main Engine (SSME) 2052 engine assembly mounted in a SSME Engine Handler in the Horizontal Processing area of the SSME Processing Facility at Kennedy Space Center. The most prominent features in this view are the Low-Pressure Oxidizer Discharge Duct toward the bottom of the assembly, the SSME Engine Controller and the Main Fuel Valve Hydraulic Actuator are in the approximate center of the assembly in this view, the Low-Pressure Fuel Turbopump (LPFTP), the LPFTP Discharge Duct are to the left on the assembly in this view and the High-Pressure Fuel Turbopump is located toward the top of the engine assembly in this view. The ring of tabs in the right side of the image, at the approximate location of the Nozzle and the Coolant Outlet Manifold interface is the Heat Shield Support Ring.
- TX-116-I-11 Close-up View of the Space Shuttle Main Engine (SSME) 2044 mounted in a SSME Engine Handler in the SSME processing Facility at Kennedy Space Center. This view shows SSME 2044 with its expansion nozzle removed and an Engine Leak-Test Plug is set in the throat of the Main Combustion Chamber in the approximate center of the image, the insulated, High-Pressure Fuel Turbopump sits below that and the Low Pressure Oxidizer Turbopump Discharge Duct sits towards the top of the engine assembly in this view.

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NASA - Photo Operations Group - JSC, photographer, June 2011

- TX-116-I-12 General view of a Space Shuttle Main Engine (SSME) mounted on an SSME engine handler, taken in the SSME Processing Facility at Kennedy Space Center. The most prominent features of the engine assembly in this view are the Low-Pressure Fuel Turbopump Discharge Duct looping around the right side and underneath the assembly, the High-Pressure Fuel Turbopump located on the lower left portion of the assembly, the Engine Controller and Main Fuel Valve Hydraulic Actuator located on the upper portion of the assembly and the Low-Pressure Oxidizer Turbopump Discharge Duct at the top of the engine assembly in this view.
- TX-116-I-13 General view of a Space Shuttle Main Engine (SSME) mounted on an SSME engine handler, taken in the SSME Processing Facility at Kennedy Space Center. The most prominent features of the engine assembly in this view are the Low-Pressure Oxidizer Turbopump Discharge Duct looping around the right side of the engine assembly then turning in and connecting to the High-Pressure Oxidizer Turbopump. The sphere in the approximate center of the assembly is the POGO System Accumulator, the Engine Controller is located on the bottom and slightly left of the center of the Engine Assembly in this view.

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- TX-116-I-14 General view of a Space Shuttle Main Engine (SSME) mounted on an SSME engine handler, taken in the SSME Processing Facility at Kennedy Space Center. The most prominent features of the engine assembly in this view are the Low-Pressure Fuel Turbopump Discharge Duct looping diagonally across the top of the assembly and connecting to the High-Pressure Fuel Turbopump, the Low-Pressure Oxidizer Turbopump (LPOTP) located center right of the assembly and the LPOTP Discharge Duct looping around from the pump to the underside of the engine assembly in this view.
- TX-116-I-15 General view of the Space Shuttle Main Engine (SSME) assembly with the expansion nozzle removed and resting on a cushioned mat on the floor of the SSME Processing Facility. The most prominent features in this view are the Low-Pressure Fuel Turbopump (LPFTP) on the upper left of the engine assembly, the LPFTP Discharge Duct looping around the assembly, the Gimbal Bearing on the top center of the assembly, the Electrical Interface Panel sits just below the Gimbal Bearing and the Low-Pressure Oxidizer Turbopump is mounted on the top right of the engine assembly in this view.
- TX-116-I-16 General view looking down the approximate centerline of the expansion nozzle of a Space Shuttle Main Engine (SSME) mounted on a SSME Engine Handler in the SSME Processing Facility at Kennedy Space Center. This view shows the 1080 cooling tubes used to regeneratively cool the Nozzle and Combustion Chamber by circulating relatively low temperature fuel through the tubes and manifolds before being ignited in the Main Combustion Chamber.

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General view of the Space Shuttle Main Engine (SSME) assembly with the expansion nozzle removed and resting on a cushioned mat on the floor of the SSME Processing Facility. The most prominent features in this view are the Low-pressure oxidizer Turbopump discharge Duct looping from the upper left side of the engine assembly to the lower left side of the assembly, the Low-Pressure Fuel Turbopump (LPFTP) is on the upper left of the assembly in this view and the LPFTP Discharge Duct loops from the upper left to upper right then turns back and down the assembly to the High-Pressure Fuel Turbopump on the lower right of the assembly. The Engine Controller and the Main fuel Valve Hydraulic Actuator are on the lower left portion of the assembly. The vertical rod that is in the approximate center of the engine assembly is a piece of ground support equipment call a Gimbal Actuator Replacement Strut which are used on the SSMEs when they are not installed in an orbiter.

TX-116-I-18

General view of the Space Shuttle Main Engine (SSME) assembly with the expansion nozzle removed and resting on a cushioned mat on the floor of the SSME Processing Facility. The most prominent features in this view are the Low-pressure Fuel Turbopump discharge Duct looping from the upper left side of the engine assembly to the lower left side of the assembly, the Low-Pressure Oxidizer Turbopump (LPOTP) is on the upper left of the assembly in this view and the LPOTP Discharge Duct loops from the upper left to upper right. The sphere in the middle right side of the assembly in this view is the POGO System Accumulator , the partial sphere to its left and slightly more toward the center of the assembly is the Heat Exchanger on the Oxidizer Preburner side of the Hot Gas Manifold, beneath that is the High-Pressure Oxidizer Turbopump (HPOTP) and the HPOTP Discharge duct loops from the pump around to the lower left of the assembly. The Pneumatic Control Assembly is in the approximate center of the engine assembly in this view.

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TX-116-I-19 General view of a Space Shuttle Main Engine (SSME) mounted on an SSME engine handler, taken in the SSME Processing Facility at Kennedy Space Center. The most prominent feature in this view is the Expansion Nozzle . The rings that loop around the nozzle, vertically in this view, add structural stability to the nozzle walls and are referred to Hatbands. The ring on the left most edge of the nozzle is the Coolant Inlet Manifold. The tubes that branch off and connect to the manifold are Coolant Transfer Ducts and the tubes that terminate with a visible opening at the manifold are Drain Lines.

TX-116-I-20 Close-up view of a Space Shuttle Main Engine (SSME) mounted on an SSME engine handler, taken in the SSME Processing Facility at Kennedy Space Center. The most prominent feature in this view is the Expansion Nozzle . The rings that loop around the nozzle, vertically in this view, add structural stability to the nozzle walls and are referred to Hatbands. The ring on the left most edge of the nozzle is the Coolant Inlet Manifold. The tubes that branch off and connect to the manifold are Coolant Transfer Ducts and the tubes that terminate with a visible opening at the manifold are Drain Lines.