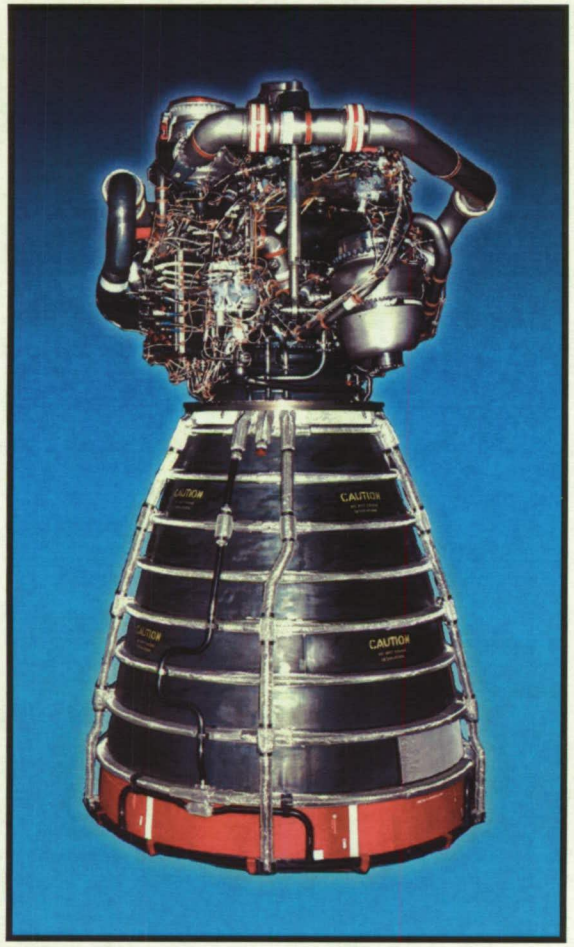
Dynamic Online SSME Schematics



Ra'Sean Hoheb
NASA M.U.S.T. Intern
Univ. of Central FL/ KSC
NE-A1 NASA SSME Avionics Engineering
8/3/07

Project creator/ programmer/ mentor:
Chris Moffatt
NE-A1 NASA SSME Avionics Engineering

http://launchops.ksc.nasa.gov/gdsinfo/group-ssmec/index.htm

SOFTWARE

- Microsoft Visio 2003
- Microsoft Visual Studio 2005
- Adobe Photoshop CS2

LANGUAGES

- C#
- HTML
- XML
- VML
- SQL
- JavaScript

SSME Systems Schematic

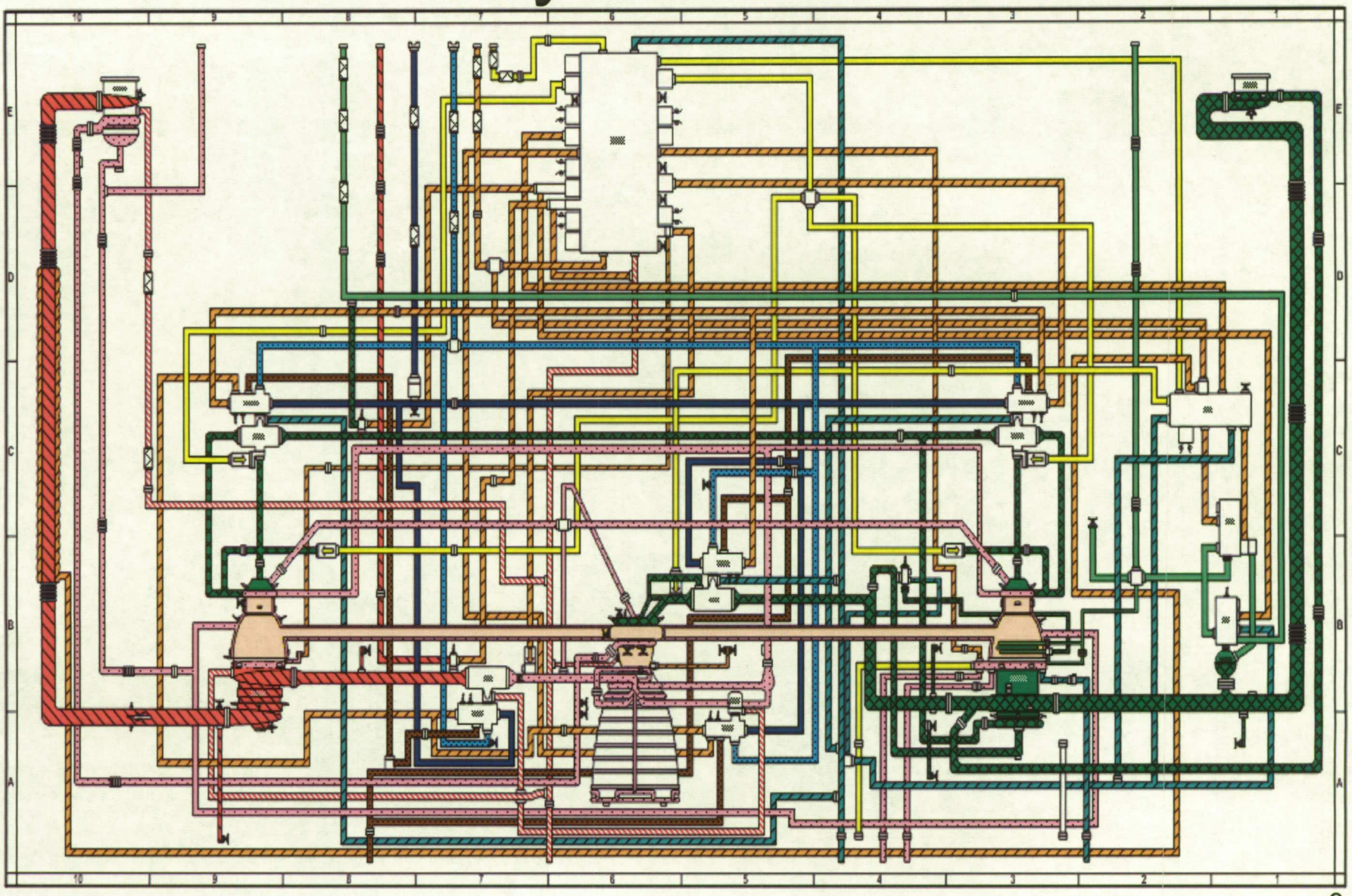


Fig.1

SSME Avionics Schematic

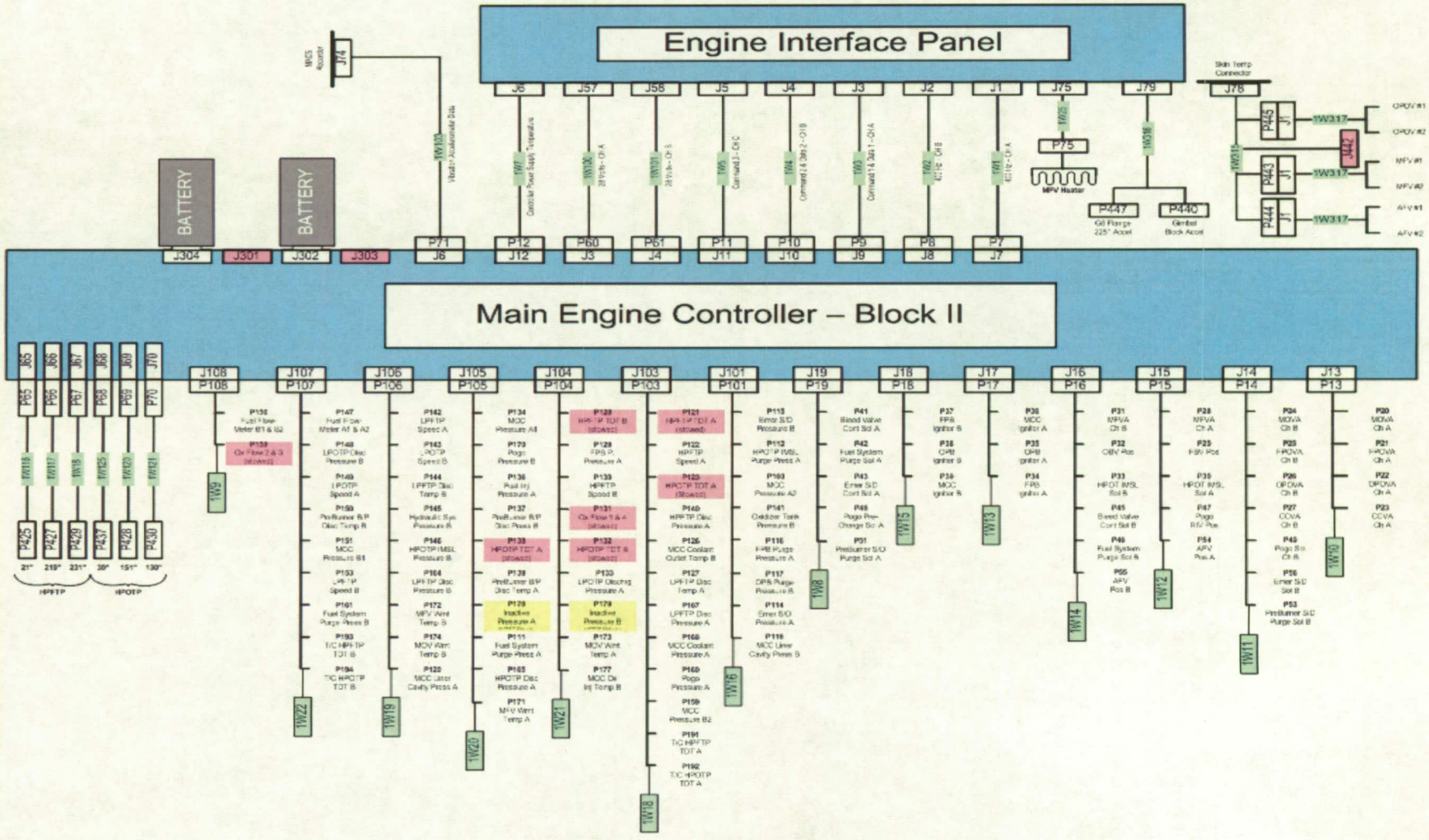


Fig. 2

Objectives

- Make the schematics available and accessible online
- Make them dynamic and interactive with handy, useful, and advantageous features

USES/ADVANTAGES

• Used by technicians, engineers, and many others in the engine shops, firing room, meetings, conferences, launch support, etc.

• Conveniently accessible anywhere

• Ideal training tool, as well as for increasing familiarity, visibility, knowledge and understanding of SSME Systems and Avionics

•Can be used as a model for other systems as well as for future launch vehicles like Constellation

Setup and Access

- **Internet Explorer (IE) is necessary to view the online schematics.**
- **One setting must be changed in IE to enable the schematics to be viewed. That is binary and script behaviors option must be enabled.**
  - **Open IE and click Tools/Internets Options**
  - **Click the Security tab, then Local Intranet**

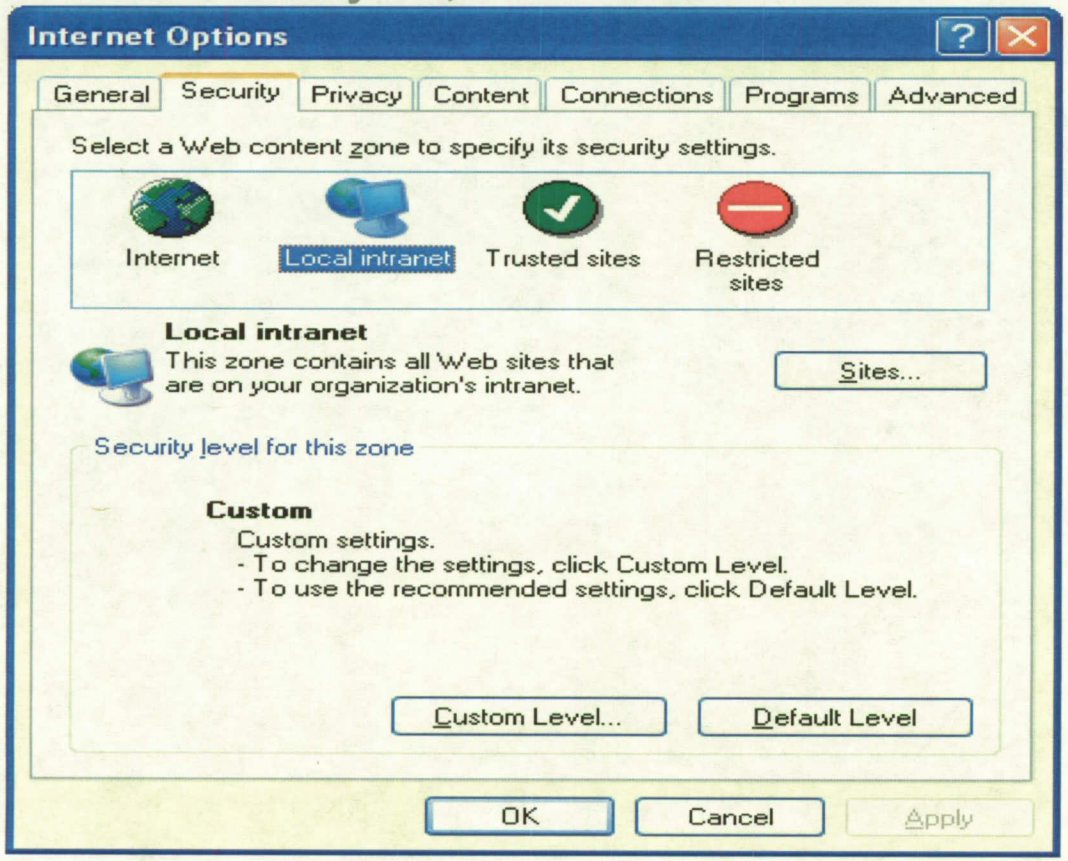


Fig. 3

Setup and Access cont'd.

- Click the Sites button, which opens the Local intranet window
- Click the Advanced button

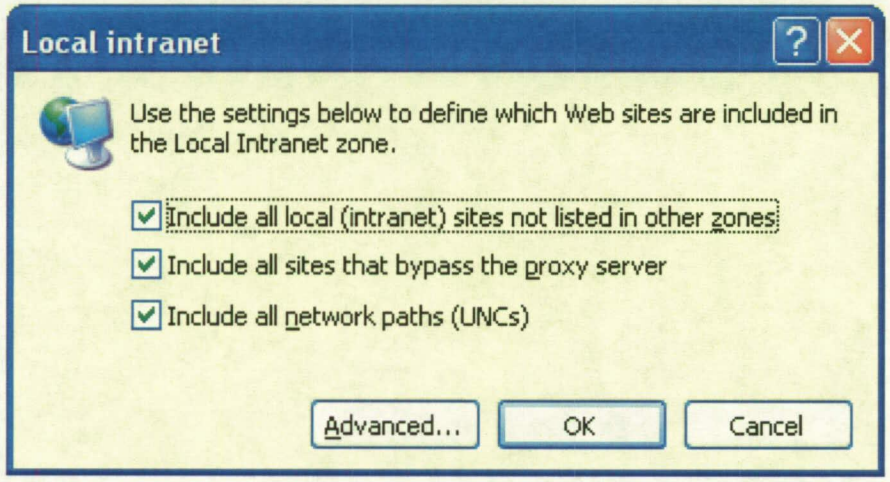


Fig. 4

• This opens the other Local intranet window shown on the next slide.

Setup and Access cont'd.

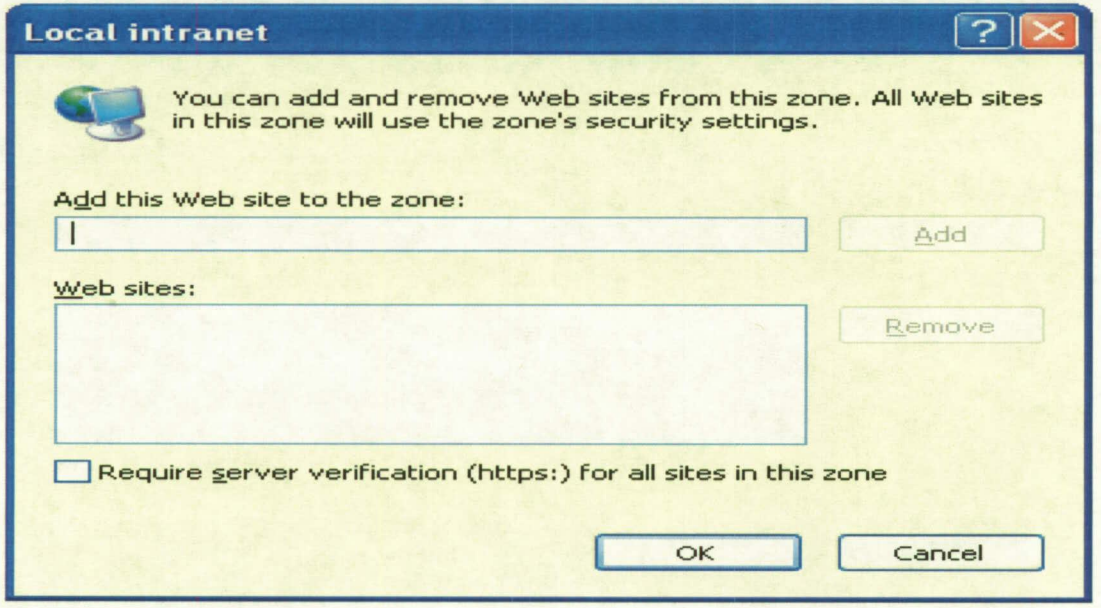


Fig. 5

- Add http://www-launchops.ksc.nasa.gov/ to the "Add this Web site to the zone" field.
- Click OK, then OK again on the first Local Intranet window.

Setup and Access cont'd.

– Click the Custom Level button on the Internet Options window. This will open the Security Settings window.

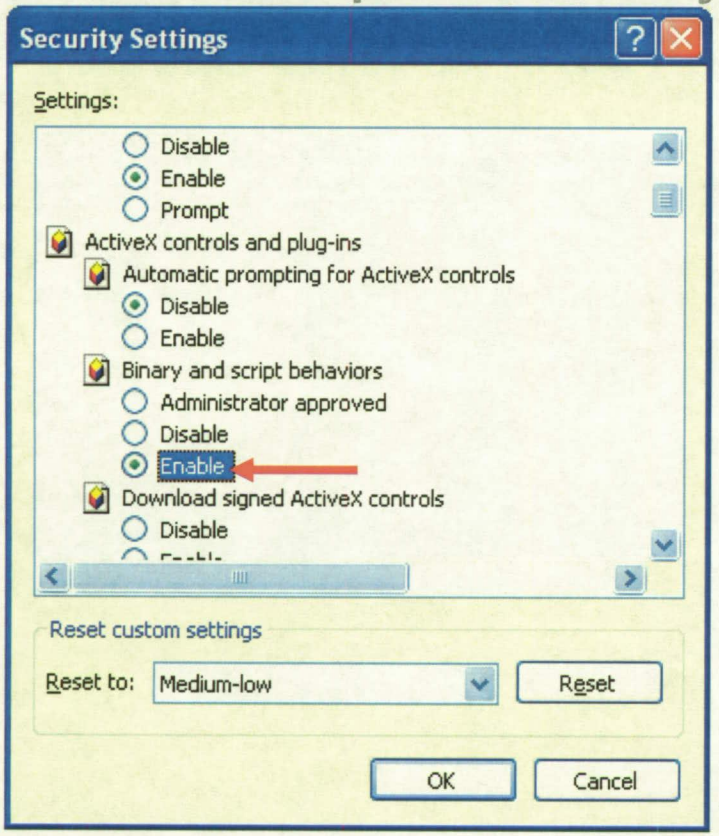


Fig. 6

- Enable Binary and script behaviors under ActiveX controls and plug-ins.
- Click OK.
- Close IE and reopen. The browser should now be able to view the Dynamic Online SSME Schematics.

Setup and Access cont'd.

- **To access the schematics go to the NASA SSME Avionics home page located at http://launchops.ksc.nasa.gov/gdsinfo/group-ssmec/index.htm**

- **The links are in the blue left hand pane, as indicated on the next slide SSME Avionics Schematic and SSME Systems Schematic.**

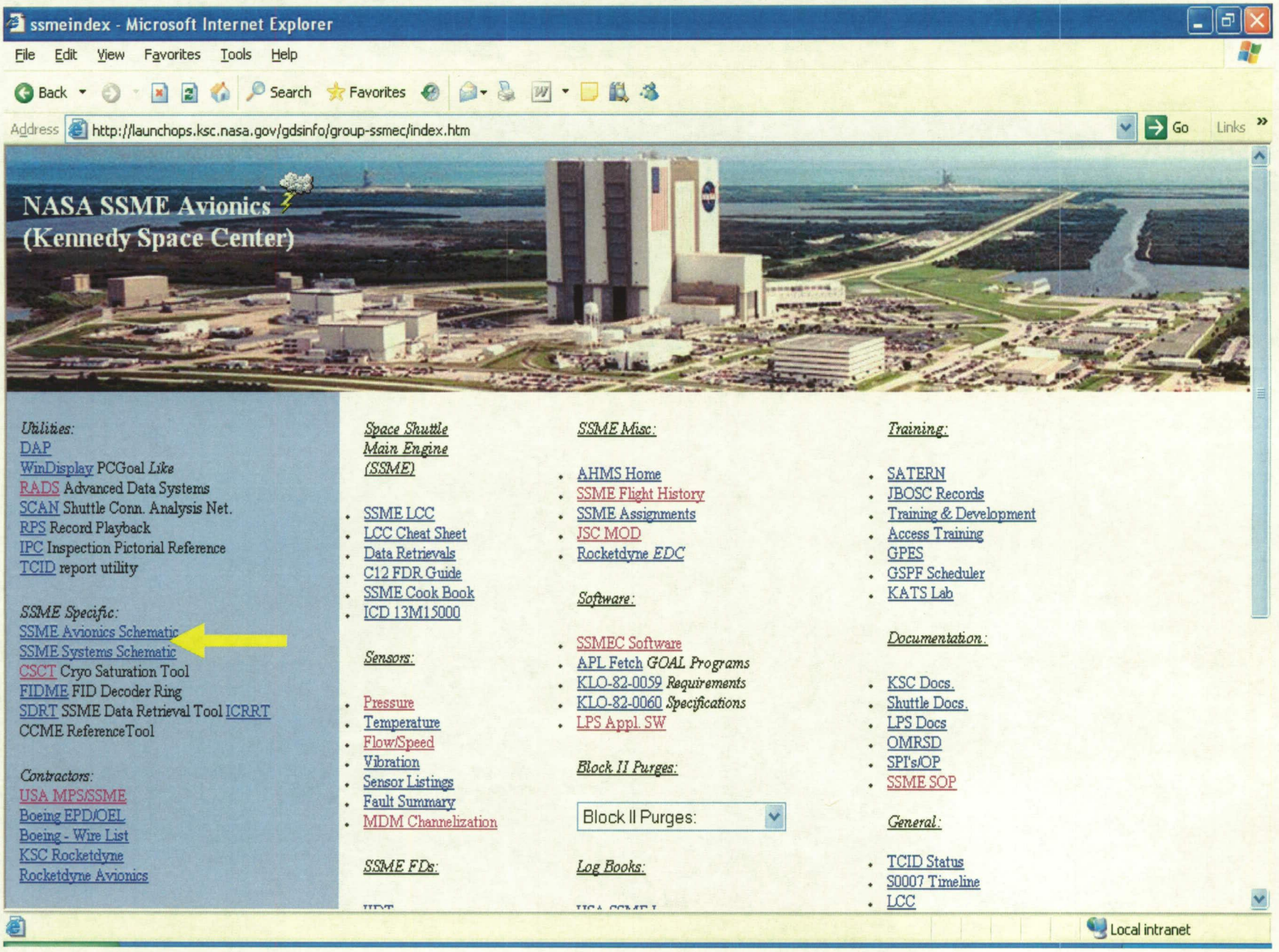

ssmeindex - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites
Address http://launchops.ksc.nasa.gov/gdsinfo/group-ssmec/index.htm
Go Links
NASA SSME Avionics
(Kennedy Space Center)
Utilities:
DAP
WinDisplay PCGoal Like
RADS Advanced Data Systems
SCAN Shuttle Conn. Analysis Net.
RPS Record Playback
IPC Inspection Pictorial Reference
TCID report utility
SSME Specific:
SSME Avionics Schematic
SSME Systems Schematic
CSCT Cryo Saturation Tool
FIDME FID Decoder Ring
SDRT SSME Data Retrieval Tool ICRRT
CCME ReferenceTool
Contractors:
USA MPS/SSME
Boeing EPD/OEL
Boeing - Wire List
KSC Rocketdyne
Rocketdyne Avionics
Space Shuttle Main Engine (SSME)
SSME LCC
LCC Cheat Sheet
Data Retrievals
C12 FDR Guide
SSME Cook Book
ICD 13M15000
Sensors:
Pressure
Temperature
Flow/Speed
Vibration
Sensor Listings
Fault Summary
MDM Channelization
SSME FDs:
SSME Misc:
AHMS Home
SSME Flight History
SSME Assignments
JSC MOD
Rocketdyne EDC
Software:
SSMEC Software
APL Fetch GOAL Programs
KLO-82-0059 Requirements
KLO-82-0060 Specifications
LPS Appl. SW
Block II Purges:
Block II Purges:
Log Books:
Training:
SATERN
JBOSC Records
Training & Development
Access Training
GPES
GSPF Scheduler
KATS Lab
Documentation:
KSC Docs.
Shuttle Docs.
LPS Docs
OMRSD
SPI's/OP
SSME SOP
General:
TCID Status
S0007 Timeline
LCC
Local intranet

Fig. 7

Features

- **Left-hand pane shows different functions of schematic and can be opened and closed as needed**
  - **Pan and zoom**

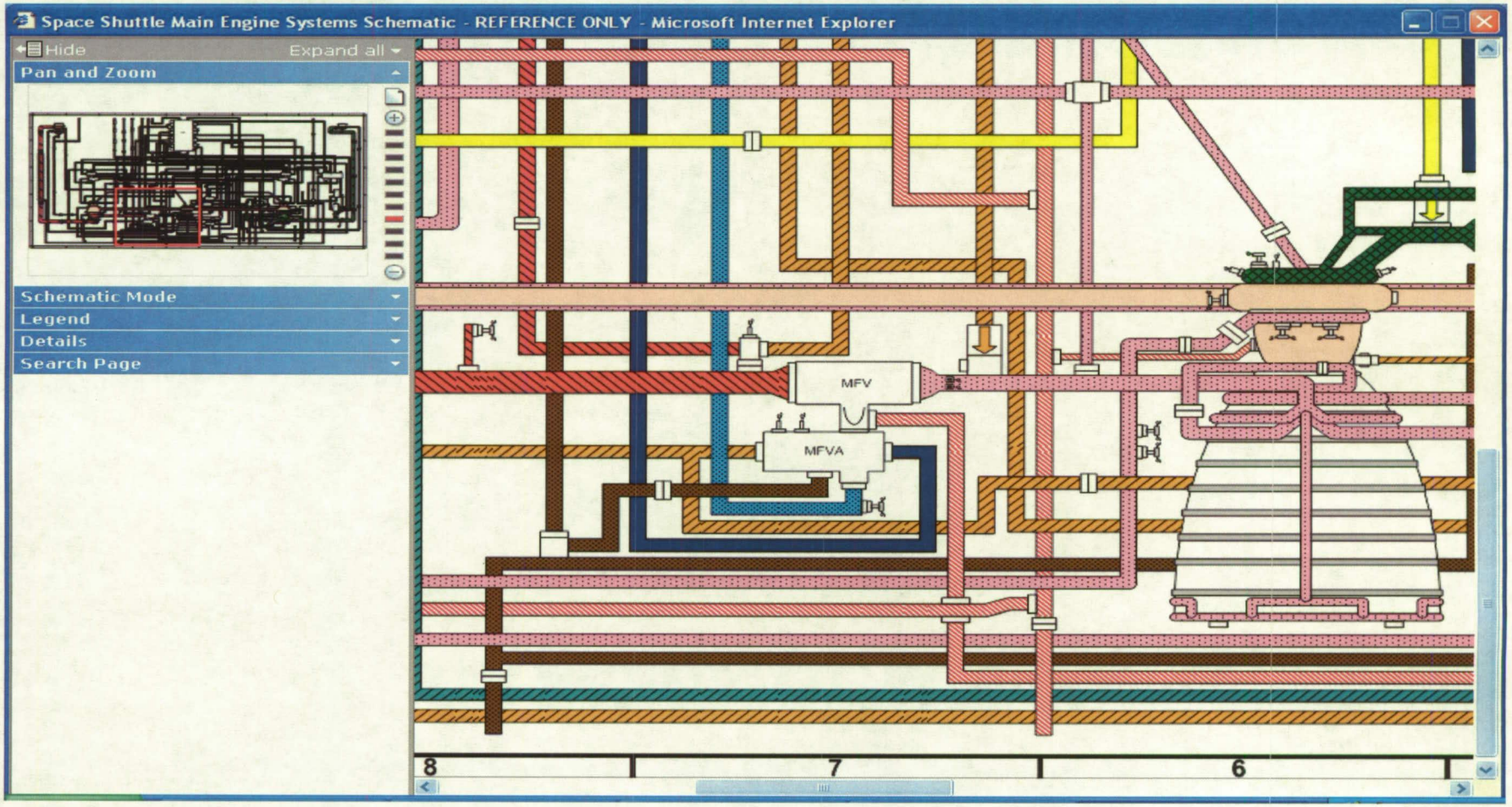


Fig. 8

Features cont'd.

- **Schematic Mode**
  - **Shows the different configurations the schematic can be viewed in**
    - **Flight, External Leak Check, Purge Sequences 1-4, also w/ or w/o the PCA (Pneumatic Control Assembly) internals**

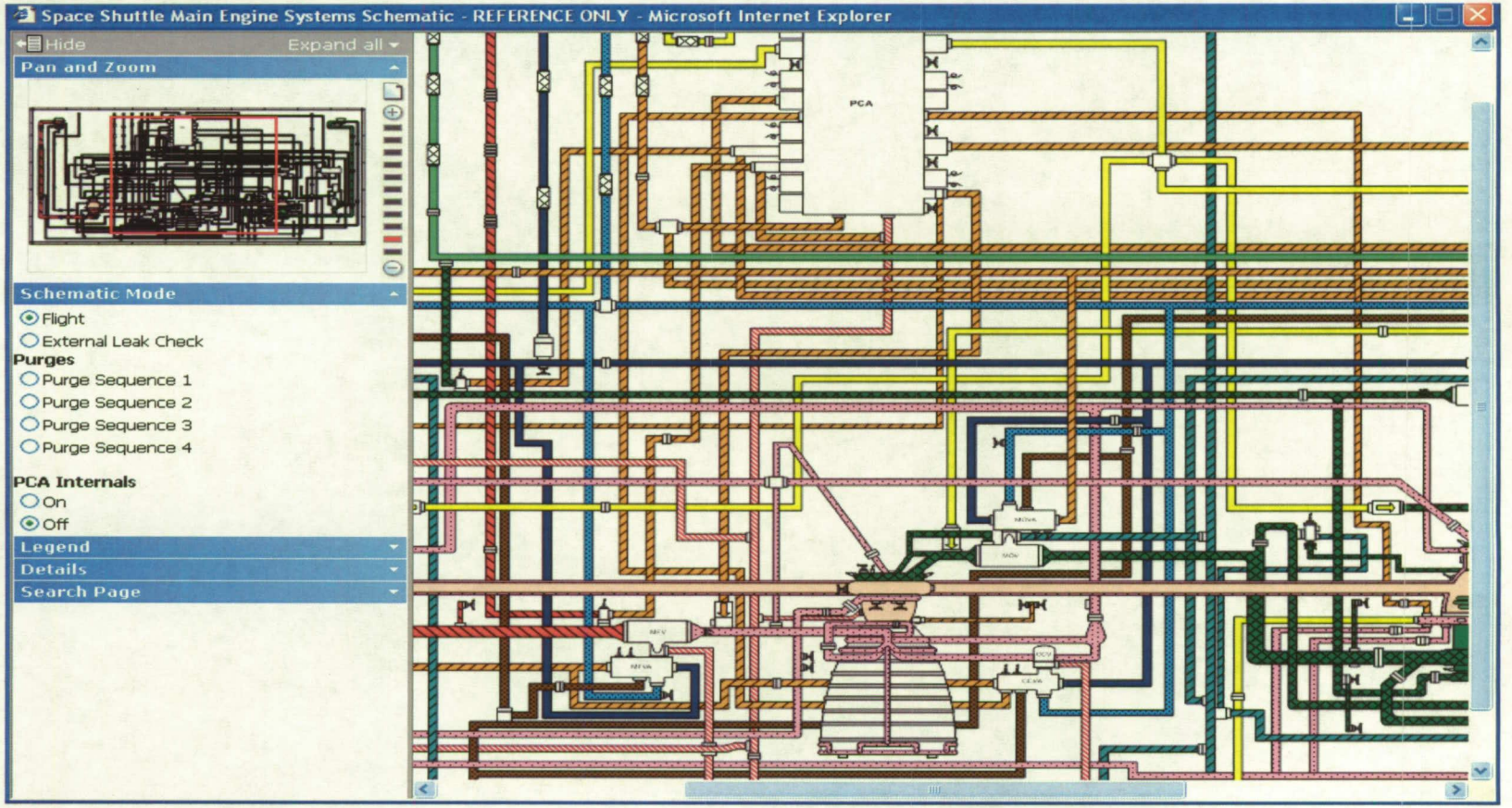


Fig. 9 "In flight mode"

Features cont'd.

- **View Legend**
  - **Shows the how the different ducts and lines are used by color coding and listing what is inside(LO2,He,etc.) depending on what mode the schematic is in**

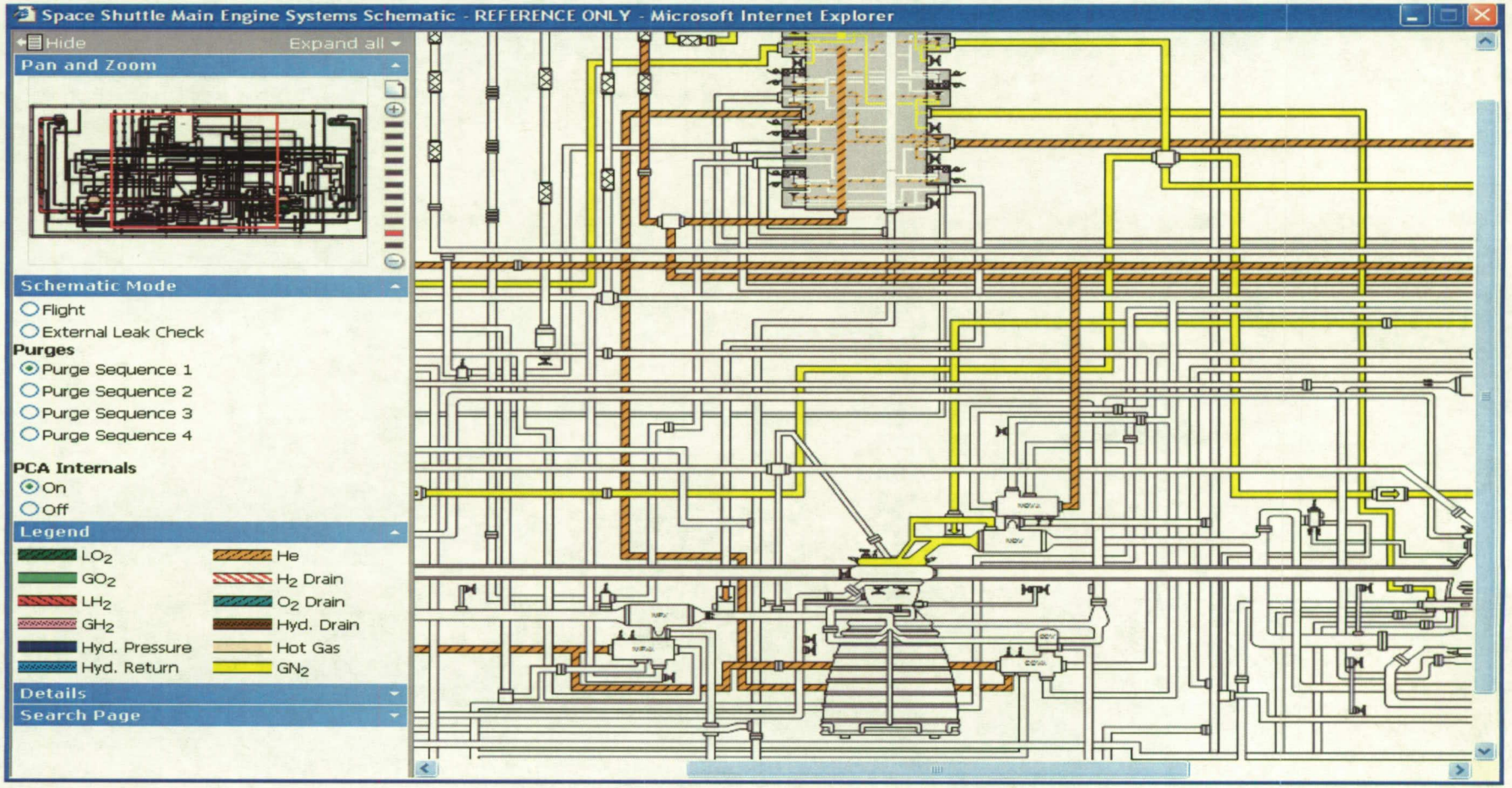


Fig. 10

Features cont'd.

- **Details**
  - **If the mouse is hovered over a component, a brief description is displayed as shown below.**

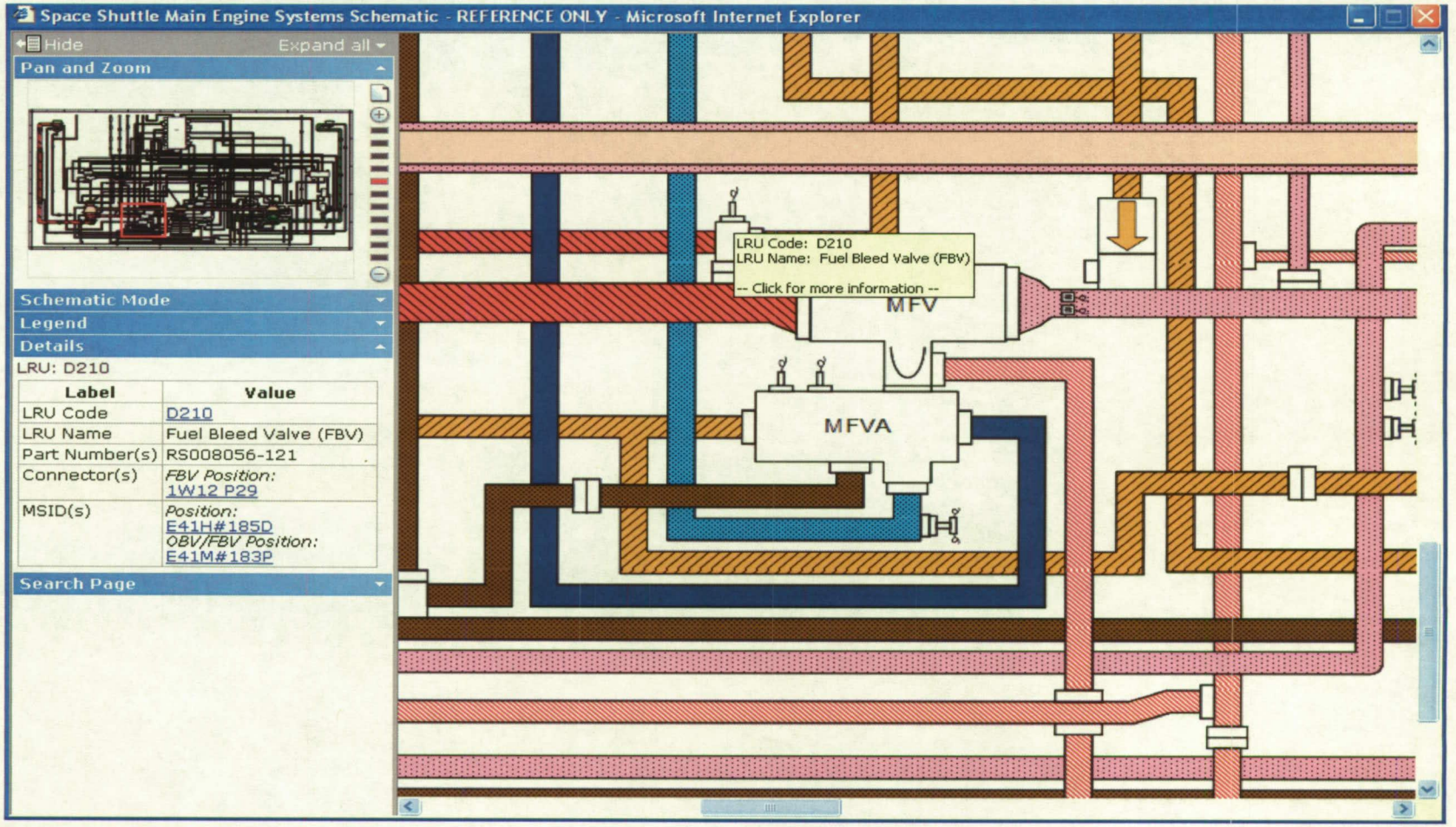


Fig. 11

Features cont'd.

- **If the component is clicked on, the details and information are displayed in the left hand pane.**
  - **Including the LRU Code, connector numbers, MSIDs, etc. shown below**

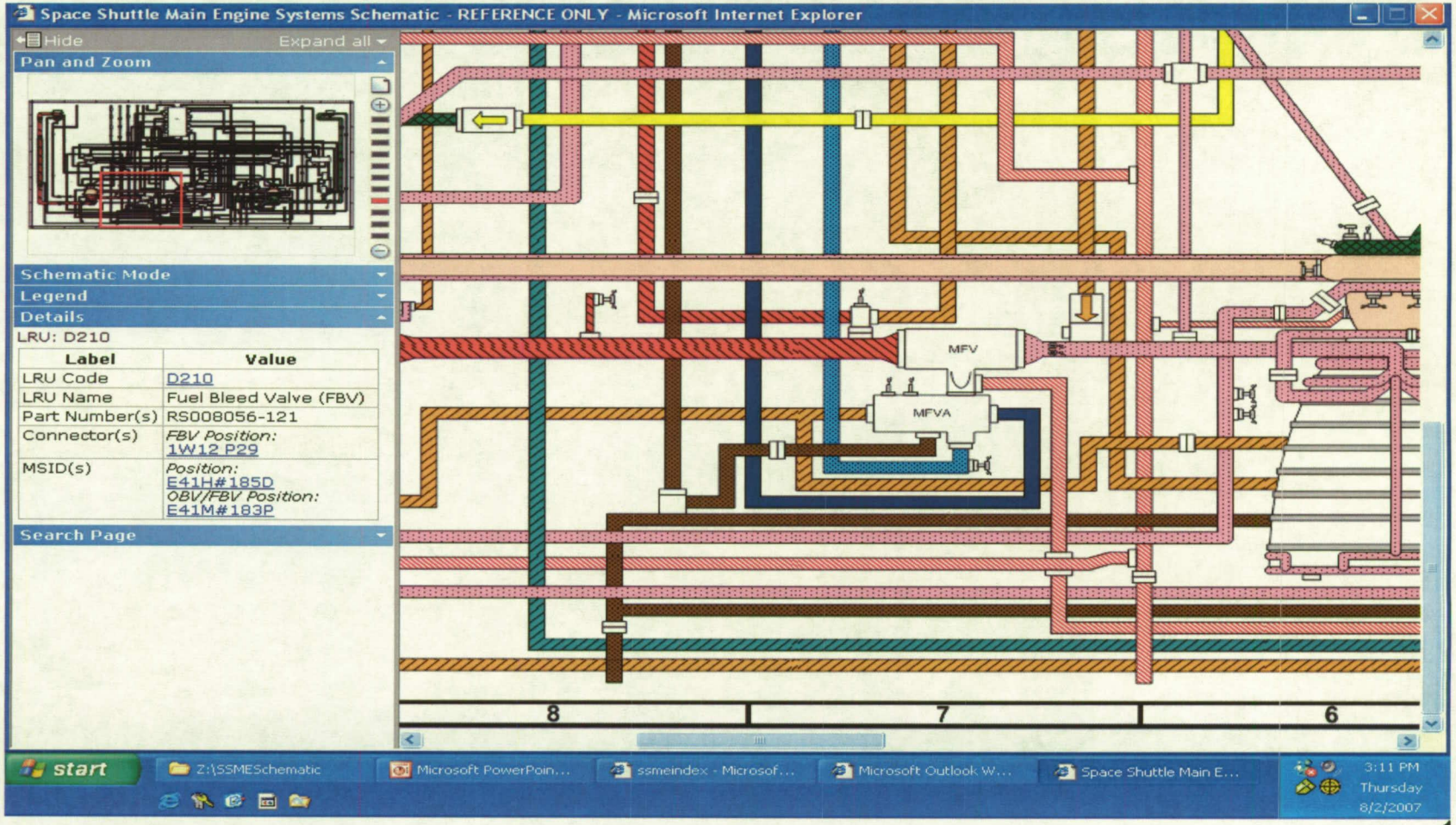


Fig. 12 "Details"

Features cont'd.

- **Much of the details are hyperlinks.**
- **LRU Code Hyperlinks**
  - **Clicking opens a new window showing Rocketdyne's RCS Serialization System "Search-Installed Parts" screen.**

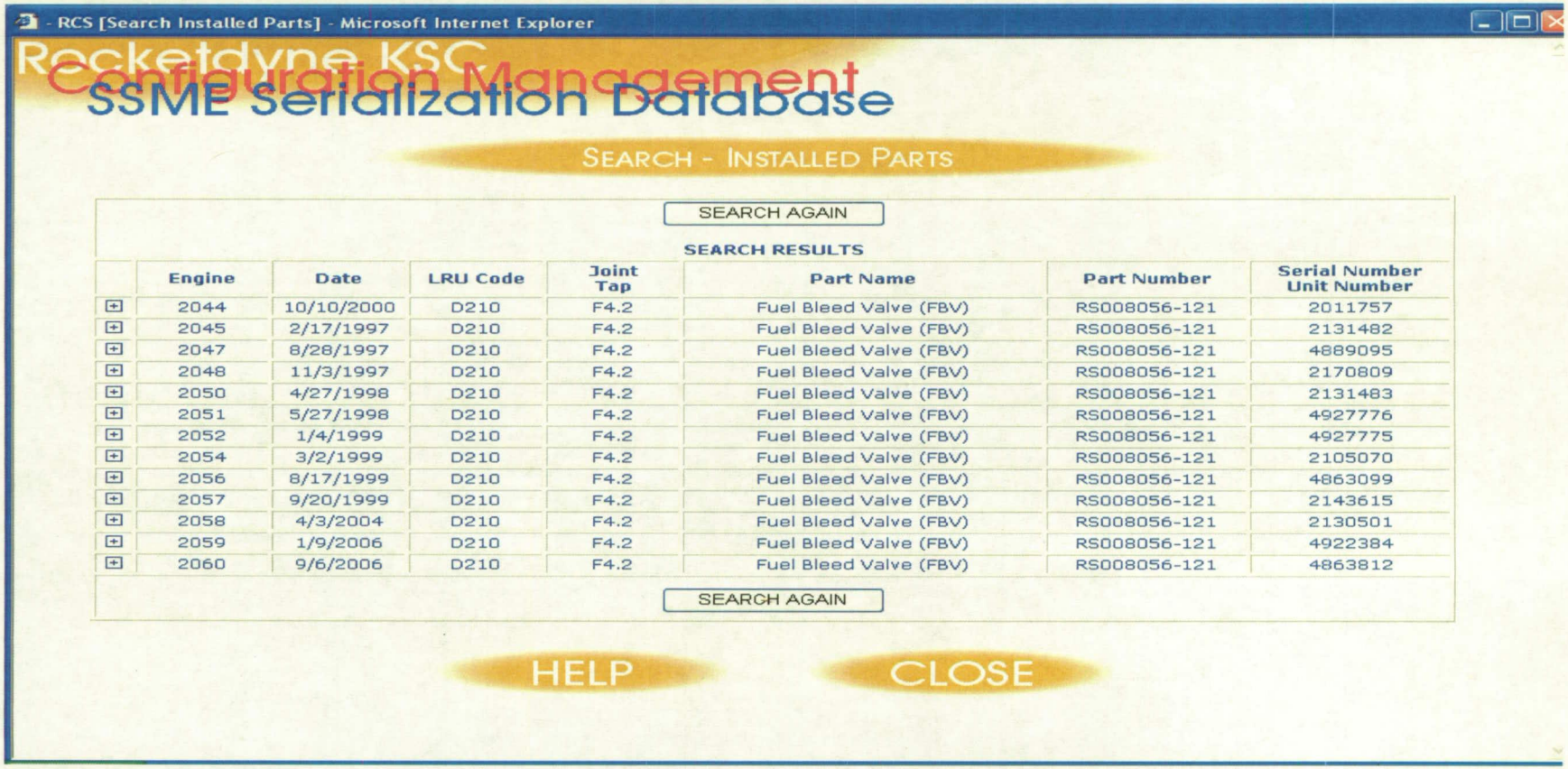


Fig. 13 "Currently installed parts for LRU code installed on all engines at KSC"

Features cont'd.

- **Connectors Hyperlinks**
  - **Clicking opens the SSME Avionics Schematic, which will automatically find the connector that was clicked and zoom in on it as shown below.; similar details as Systems Schematic**

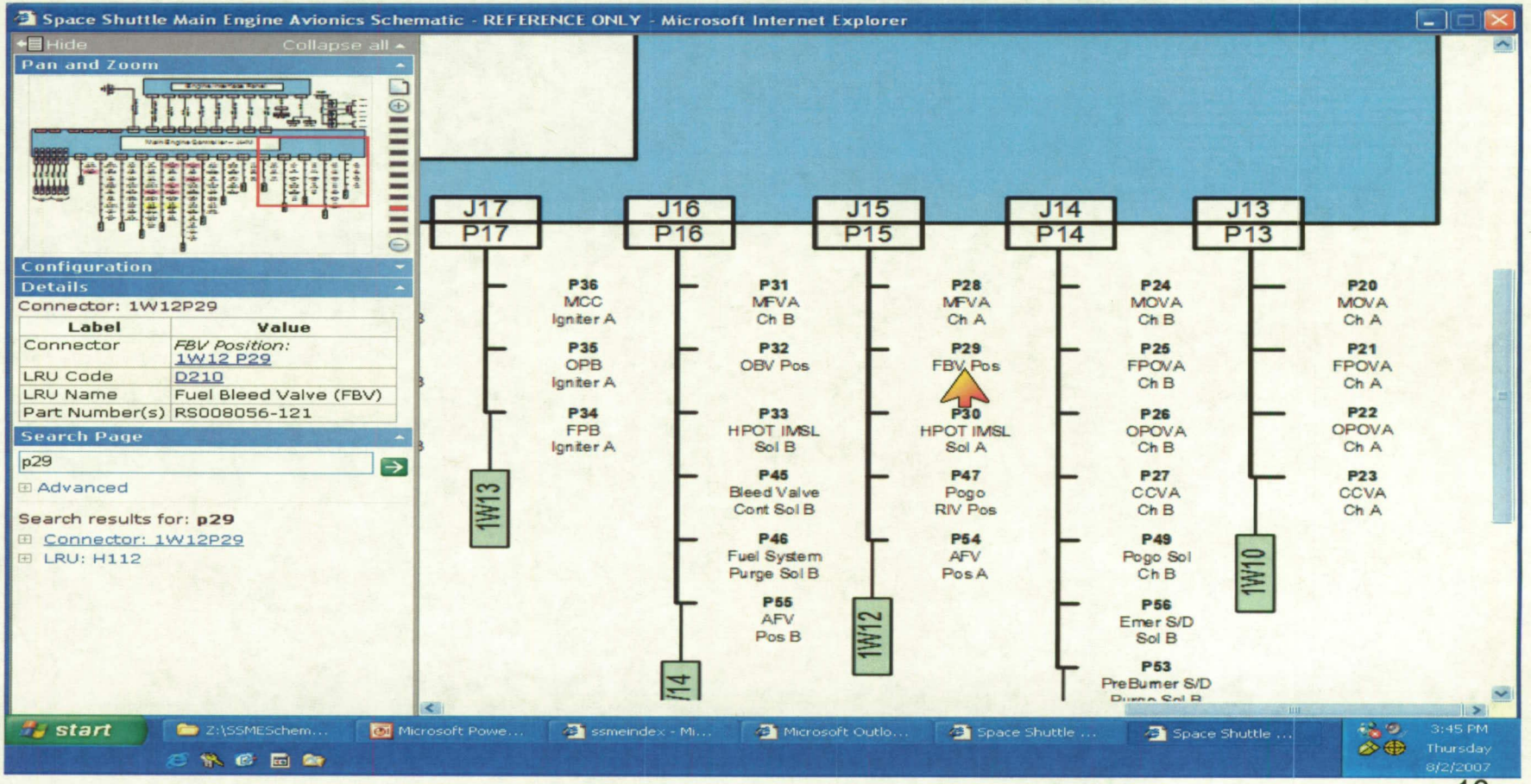


Fig. 14

Features cont'd.

- **Joints Hyperlinks**
  - **Clicking a joint hyperlink opens up Rocketdyne's Joint Data List (JDL) to the selected joint.**

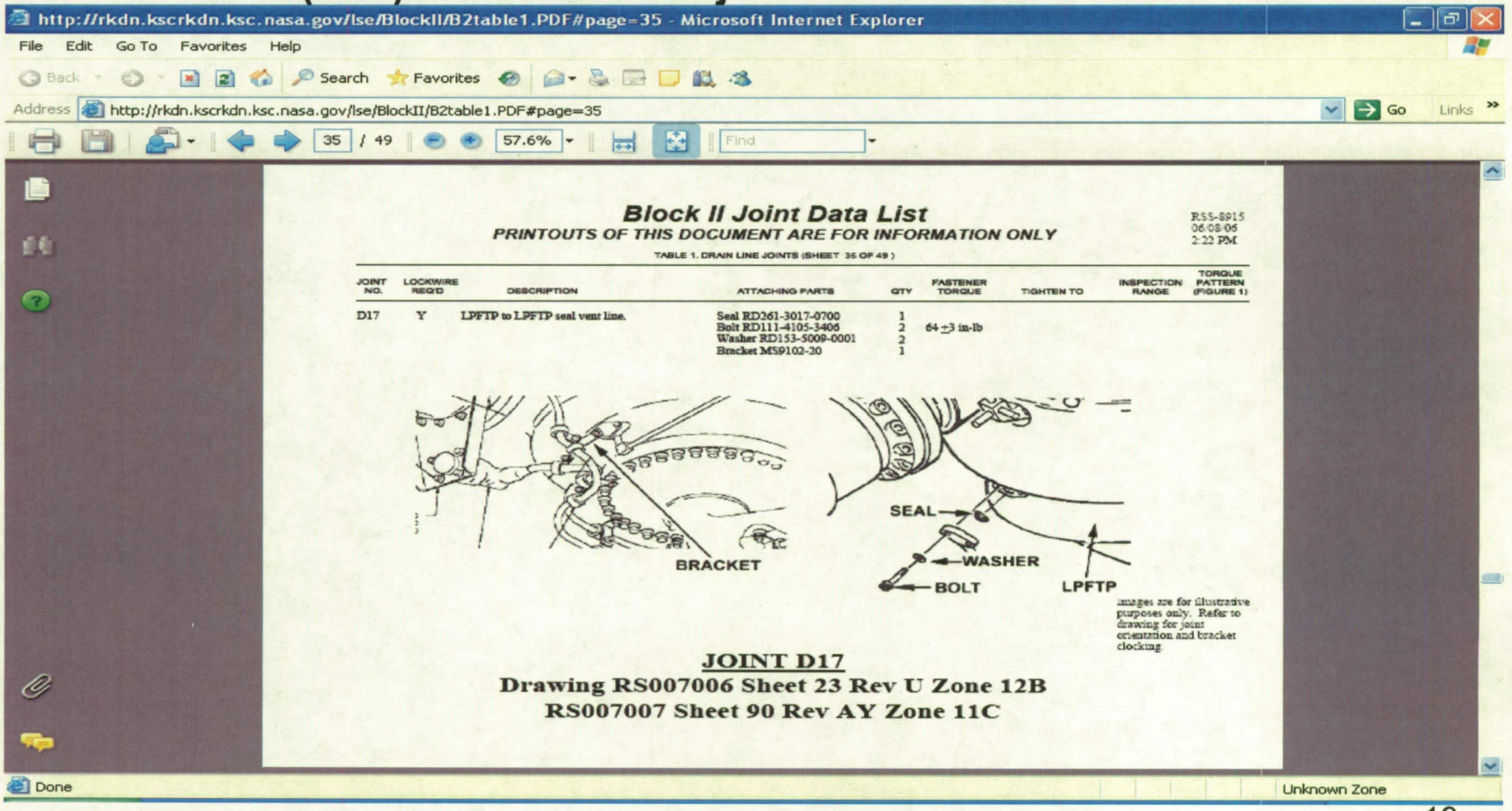


Fig. 15 "Joint assembly"

Features cont'd.

- **Search**
  - **Any component or part of the schematic can be searched and found also. The information can also be filtered by LRU Code, LRU Name, Part Number, Joint Number, Joint Name, Connectors, and/or MSID.**

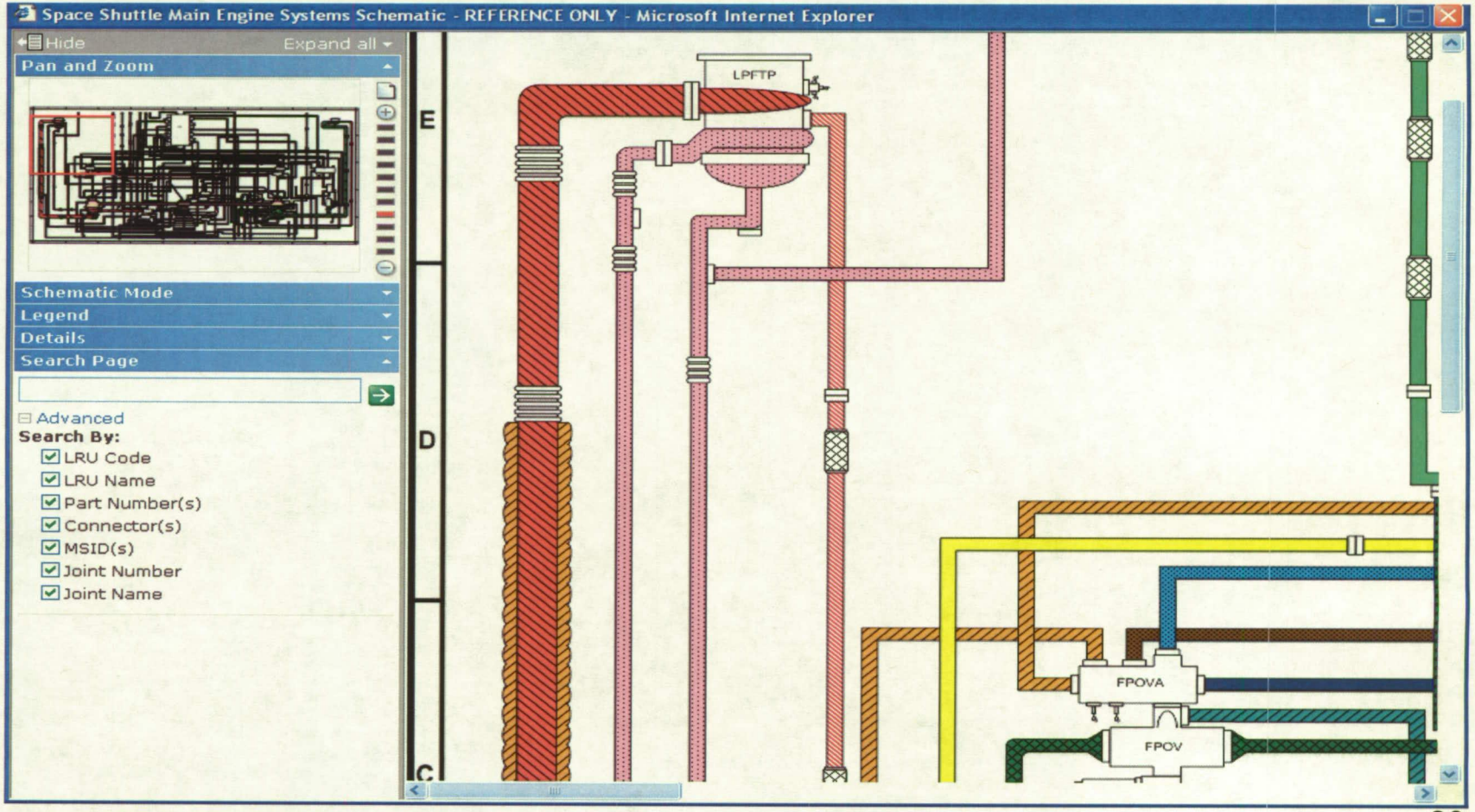


Fig. 16 "Search page feature"

Current Stage and Future Features

- **Photos**
  - **Photos of the entire engine and all its components are currently being incorporated into the schematics to provide real-life pictures as an added feature when hyperlinks for those elements are clicked on. (Overviews, Wide angles, and Close-ups)**
  - **For example: clicking the wide angle (afar) hyperlink for photos of Joint F9 reveals the photo on the next slide.**

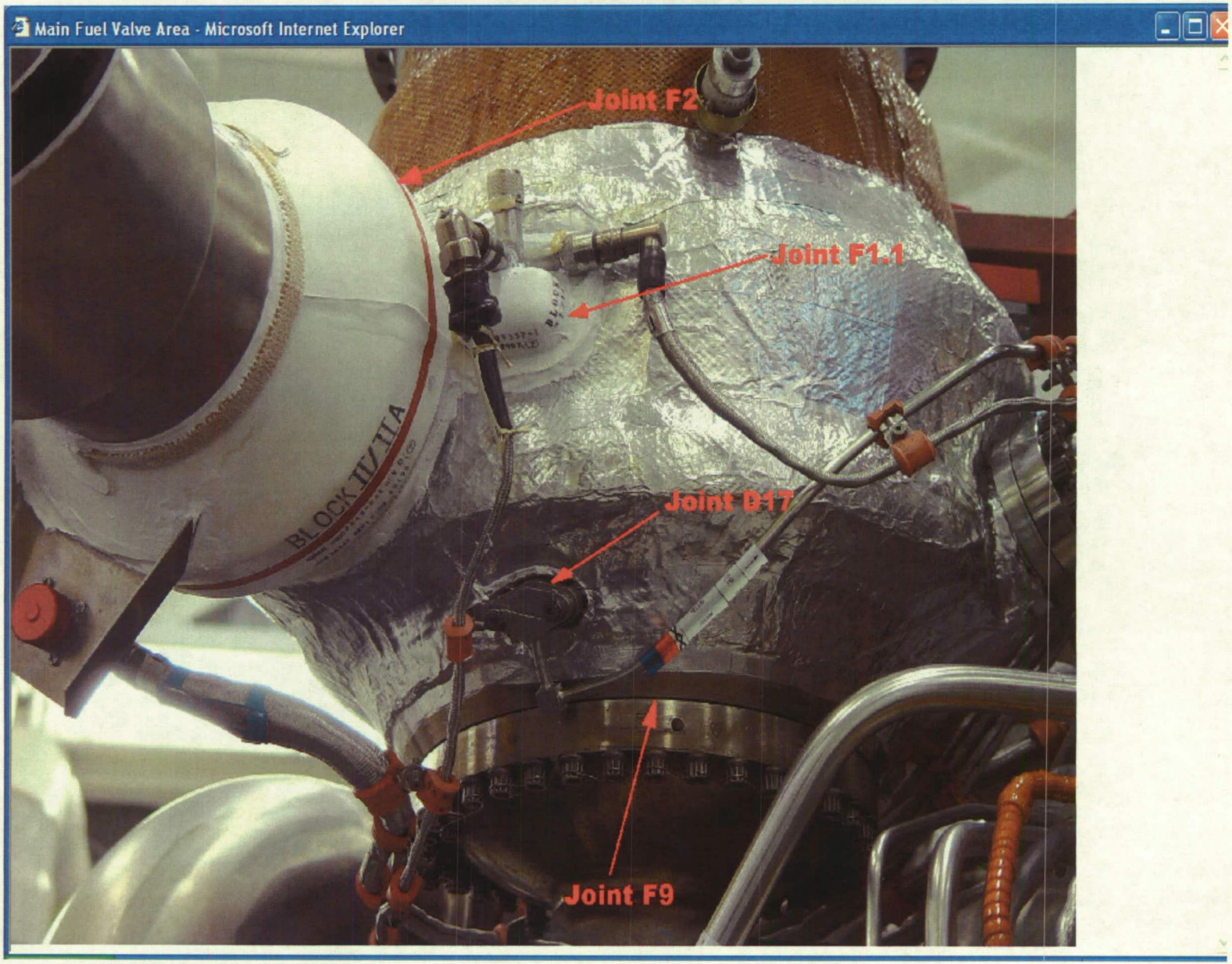


Fig. 17 Wide angle view of Joint F9

Current Stage and Future Features cont'd.

- **MSID (Measurement Stimulation I.D.) hyperlink currently inactive**
  - **In future will open a WinPlot session or get data from SDC (Shuttle Data Center) after valid a TCID (Test Configuration Identifier Document) and start/stop times are provided by user**

- **LCC info and data plots of typical chill and main stage operation for all sensors will also be added in the future.**

- **Endless possibilities**
  - **For future systems and vehicles**
  - **Training**
  - **Launch Support, etc.**

References

- Moffatt, Chris. ***Dynamic Online SSME Schematics User Guide.*** Pg 1-13. 2007

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