



DYNAMIC WIRING DIAGRAMS
HELP ENSURE EFFICIENT,
HIGH-QUALITY REPAIRS BY
PROVIDING MAINTENANCE
DATA ON A LAPTOP.

Dynamic Wiring Diagrams: Maintenance Efficiency on the 787

A special tool for the new Boeing 787 Dreamliner allows airline maintenance teams to access customizable wiring diagrams quickly and easily. This new approach is designed to help airlines increase safety, improve maintenance efficiency, and decrease maintenance costs.

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For several years, Boeing has been working to develop a way to better communicate the configuration of the electrical systems on its airplanes. Wiring diagrams drawn by the electrical engineer responsible for the design of a specific airplane electrical system have traditionally been used to represent the system's configuration. While they provide an accurate view of the system, their usefulness is limited by their static nature.

Part of Boeing's objective in developing the 787 was to optimize revenue-generating flying time by increasing the efficiency of the airplane's maintenance. The primary interface for 787 support data is the Maintenance Performance Toolbox, which enables maintenance personnel to access maintenance procedures, fault isolation procedures, parts information, and other maintenance data in an electronic format on a laptop. (See "Maintenance Performance Toolbox," *AERO* first-quarter 2007.) The 787's new dynamic

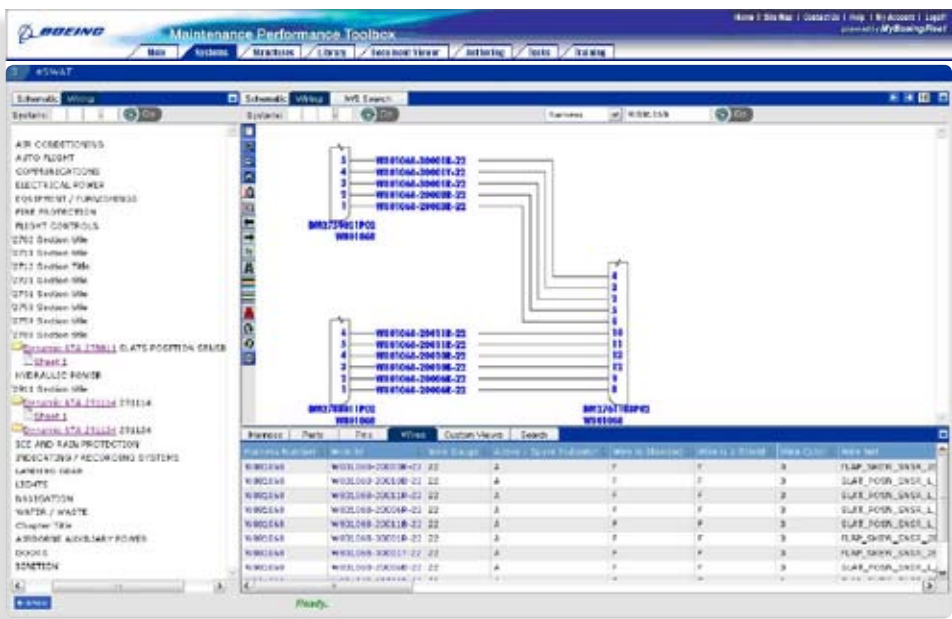
wiring diagrams are a complement to this e-enabled solution on the MyBoeingFleet.com online toolset.

LIMITATIONS WITH PRINTED DIAGRAMS

Traditional printed wiring diagrams were contained in a Wiring Diagram Manual (WDM) that provided airline maintenance teams with a precise representation of an airplane's wiring system. However, the process of locating the exact wiring harness, junction, wire, or other electrical component takes time away from the mechanic's real job: fixing a problem so the airplane can return to service. The data presented in the WDM was static and was not capable of data sorting or data linking.

It can also be a very time-consuming process — an electrical wiring manual may have 75 pages between a line replaceable unit and its associated

Table of Contents predefined view of a wiring harness

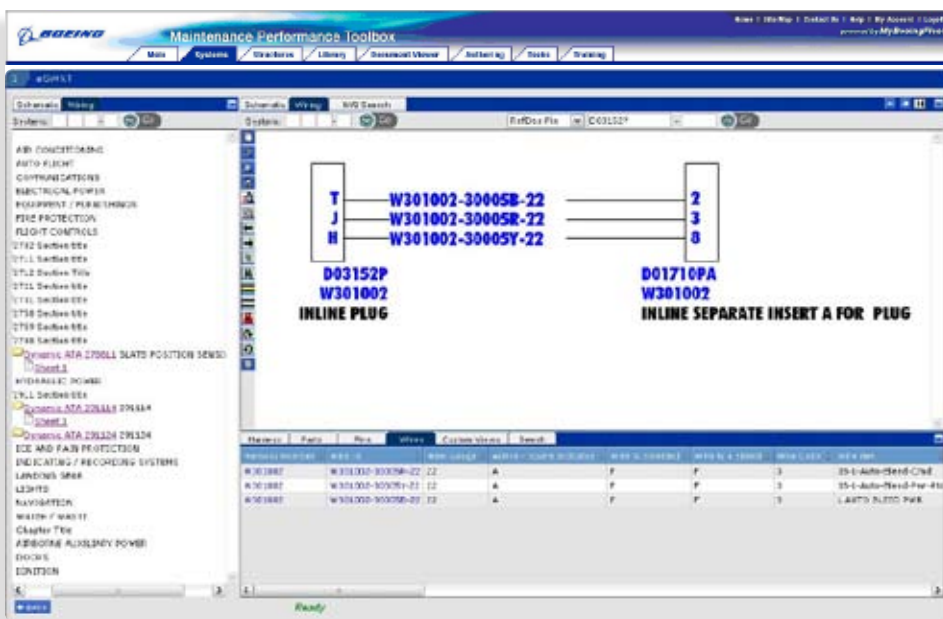


DYNAMIC DRAWINGS ENABLE USERS TO SELECT DESIRED DETAIL

Figure 1

This dynamic drawing of a subset of slat position sensor wiring creates a view of the harness W8001068. In a traditional wiring diagram manual, this small harness would have been part of a much larger engineering drawing. Reducing the scope of the drawing allows airline maintenance teams to quickly focus on the specific area they are interested in.

User-defined custom view of a wire path



MAKING THE COMPLEX ACCESSIBLE SAVES TIME

Figure 2

Airline maintenance teams can use eSWAT to view a very small subset of a much larger drawing. This drawing displays only the connectivity between an inline plug and the three wires leading to an insert for a plug. This very basic view of a very small subset of a complex electrical system can dramatically reduce the team's research time while maintaining accuracy.

The new electronic Schematic and Wiring Analysis Tool/Integrated Wiring Suite eliminates the production of a printed manual and enables airline maintenance teams to spend less time doing analysis and more time doing maintenance by providing flexible, dynamic wiring diagrams with customizable views.

connector. When assessing an electrical fault, the airline maintenance team must look through each of those pages to identify the WDM diagram pages that are applicable to the airplane tail number.

Additionally, when an airplane's electrical system has been modified, updated diagrams must be printed and distributed.

MAKING WIRING DIAGRAMS DYNAMIC

The new electronic Schematic and Wiring Analysis Tool/Integrated Wiring Suite (eSWAT/IWS) that Boeing has developed for the 787 eliminates the production of a printed manual and enables airline maintenance teams to spend less time doing analysis and more time doing maintenance by providing flexible, dynamic wiring diagrams with customizable views. That, in turn, helps ensure efficient, high-quality repairs.

Users can adjust the view of the wiring diagram to see the entire airplane wiring system or a single wire path from power to ground (see fig. 1). Users can also adjust the view to better understand and orient the diagrams of the airplane's configuration and highlight any wire or harness in a specific color to make it easier to follow the wiring from source to termination. Other functionality includes links to other information as well as ties between visual wiring diagrams and wiring data reports. The application also allows for the linking of operator-specific supplemental data to the Boeing data structure. These features enable maintenance personnel to quickly understand and work with the electrical configurations in the 787.

WORKING WITH ESWAT/IWS

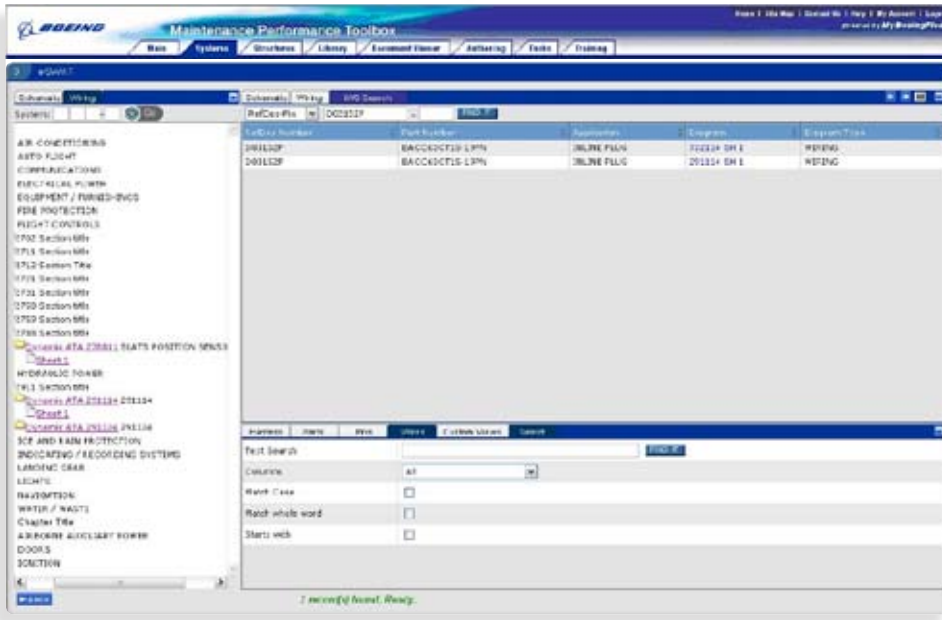
eSWAT/IWS dynamically displays system wiring information to the airline maintenance team.

Wiring information is stored in a database which can be accessed through MyBoeingFleet.com. The information can be retrieved as requested by the user and filtered to apply specifically to the airplane being serviced. The data is then formatted and displayed in any combination of wiring diagram, pin listing (within a connector), and/or wire listing (see fig. 2).

eSWAT/IWS eliminates the need to sort through multipage foldouts and interpret system configuration information. Locator graphics, connector pin arrangement graphics, parts listings, and drawing notes are always readily available.

To access the tool, the user enters the airline's airplane tail number and specifies through the table of contents which wiring system to display. The tool draws a wiring diagram and provides detailed report data. Graphical icons enable users to quickly locate key functions. While researching the wiring, harness, or electrical component to be studied, the user can zoom in or out, compare one

Customizable views

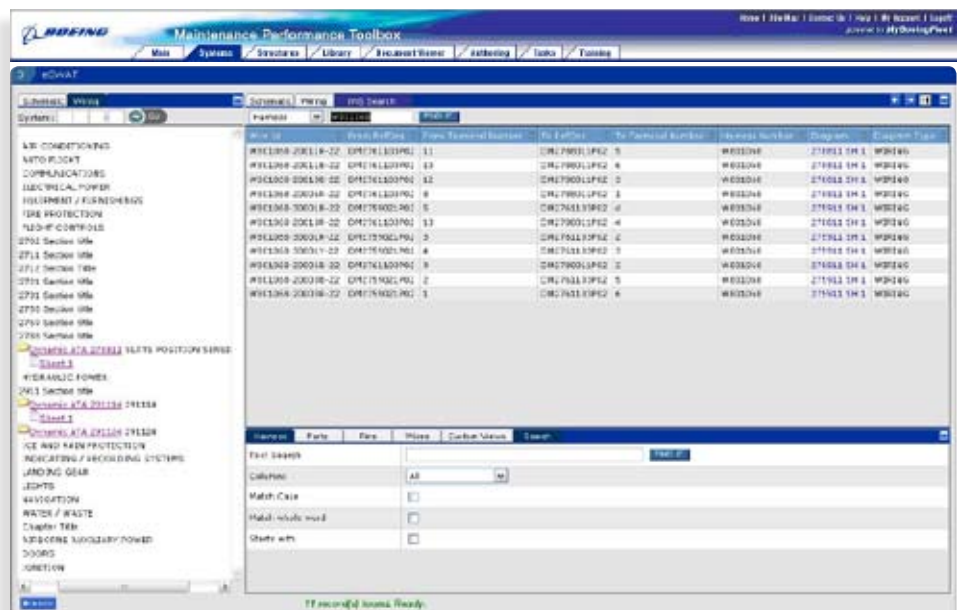


CUSTOMIZABLE VIEWS AND SEARCH CAPABILITY ENHANCE EFFICIENCY

Figure 3

Users can customize the tabular view of the data and search on a specific item. In this example, the tabular view gives the airline maintenance team detailed information about a specific part and allows the user to draw a dynamic view of that data, or search repair practices or fault information based on this tabular data. This capability reduces the very large amount of data that would have been present in a traditional wiring data and wiring report to a very small amount of data, enabling the airline maintenance team to quickly isolate the area where work needs to be done and reducing the time required to service the airplane.

Customizable tabular data columns

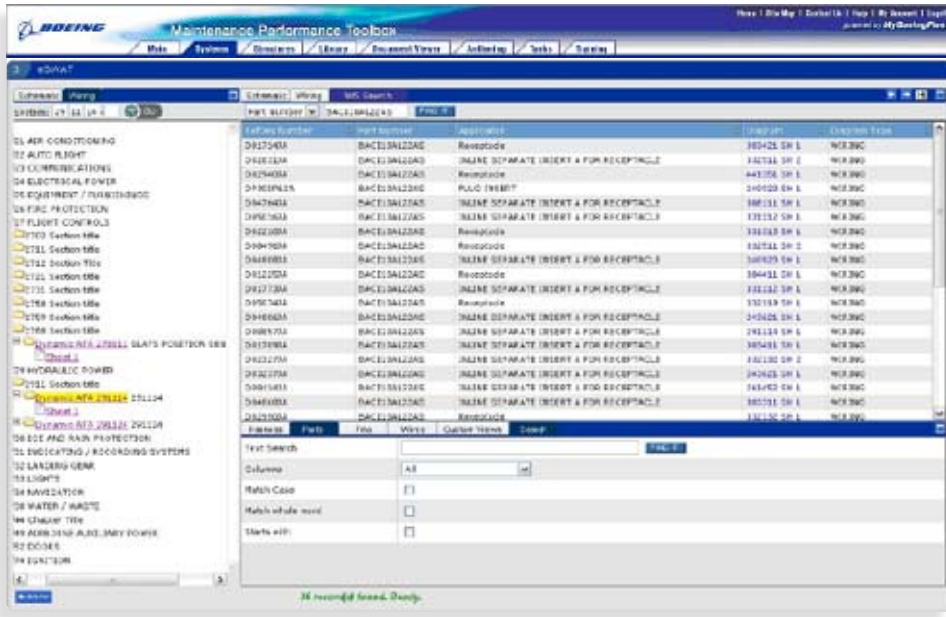


SIMPLIFIED COLUMN VIEWS ELIMINATE UNNECESSARY DATA

Figure 4

Tabular data columns can be customized to match the set of data that is relevant to the type of work the user is doing. That allows the engineer or mechanic to eliminate unnecessary data and simplify the analysis needed to understand the airplane configuration. In this example, the columns have been set to "all," but they can be set to any subset of columns the user would like to focus on.

Comprehensive tabular search feature



LOCATE INFORMATION EASILY

Figure 5

eSWAT's tabular search can be used to locate all the instances of a specific part. This would be useful if, for example, a part had reached its end of life and needed to be replaced throughout the airplane. The tabular view provides the harness, wiring, part, and location information for each instance, allowing the engineering and repair teams to quickly assess the time and materials needed for the repair.

airplane configuration to another, and print any part, display, or information for use in troubleshooting or repairs. eSWAT/IWS is integrated into the rest of the 787 maintenance information.

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ADVANTAGES OF DIGITAL WIRING DIAGRAMS

This new system provides an integrated view of flexible wiring diagrams and the data contained in

traditional wiring reports. Data is provided in a format that is specific to a single airplane and can be updated more frequently than paper-based diagrams.

The wiring data is linked electronically to the 787 Fault Isolation Manual and 787 Airplane Maintenance Manual. Additional links to the Standard Wiring Practices Manual are planned.

eSWAT/IWS can also enhance productivity by providing users with customizable views of information. For example, airline maintenance teams can view a wiring diagram in one window and a list of parts associated with that view of the diagram in another window (see fig. 3). That enables the team to quickly locate required parts, facilitating faster maintenance turnarounds.

By streamlining access to a vast array of wiring information, this new tool has the potential to dramatically increase knowledge transfer while decreasing the possibility of maintenance errors.

SUMMARY

The new Boeing eSWAT/IWS is designed to improve the flow time and quality of electrical system maintenance by enabling maintenance personnel to focus their efforts on making repairs, not searching for information. The system provides virtually instant access through MyBoeingFleet.com to detailed information about any copper or fiber-optic wiring on the 787, all in context to the specific airplane being repaired. This new approach to wiring diagrams is designed to increase the efficiency of maintenance and decrease maintenance costs for 787 operators.

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