

## APPENDIX

### IETM AUTHORIZING REQUIREMENTS

#### 1. IETM AUTHORIZING REQUIREMENTS (see Figure A-1)

Current weapon systems being fielded for operation are supported by Interactive Electronic Technical Manuals (IETMs). The information presently contained in paper documents is displayed electronically to technicians on Portable Maintenance Aids (PMAs). The combination of the data to support the weapon system and the presentation system running on the PMA enables the technician to interact with the computer. The system presents only the data required to complete a task and displays only that data applicable to a given weapon system. In order to deliver this type of information, data must be authored in a different manner than that used to produce paper documents.

IETM authoring is driven by totally different considerations than the authoring of paper manuals. No longer is page appearance primary. What drives the software and hardware is the content of the data. In IETM authoring, each piece of data is inserted into a "slot" in a database. A maintenance procedure is not stored as a flat file; rather, a procedure's elements are arranged by database schema, and at display time the pieces needed are pulled from the database and assembled in the proper order. The IETM Authoring System database is compatible with MIL-D-87269 (Data Base, Revisable: Interactive Electronic Technical Manuals, For the Support of). The content of the database is accessible by selecting the desired system, subsystem, and sub-subsystem, and provides the following types of data:

- Descriptive
- Procedural (Tasks)
- Fault
- Part

Additionally, when data is used in more than one place, it is created and stored once (the second, third, and fourth occurrences simply point to the first one), thus permitting common data to be reused. For instance, warnings, cautions, and notes are used throughout procedural data. Many of these are repeated many times.

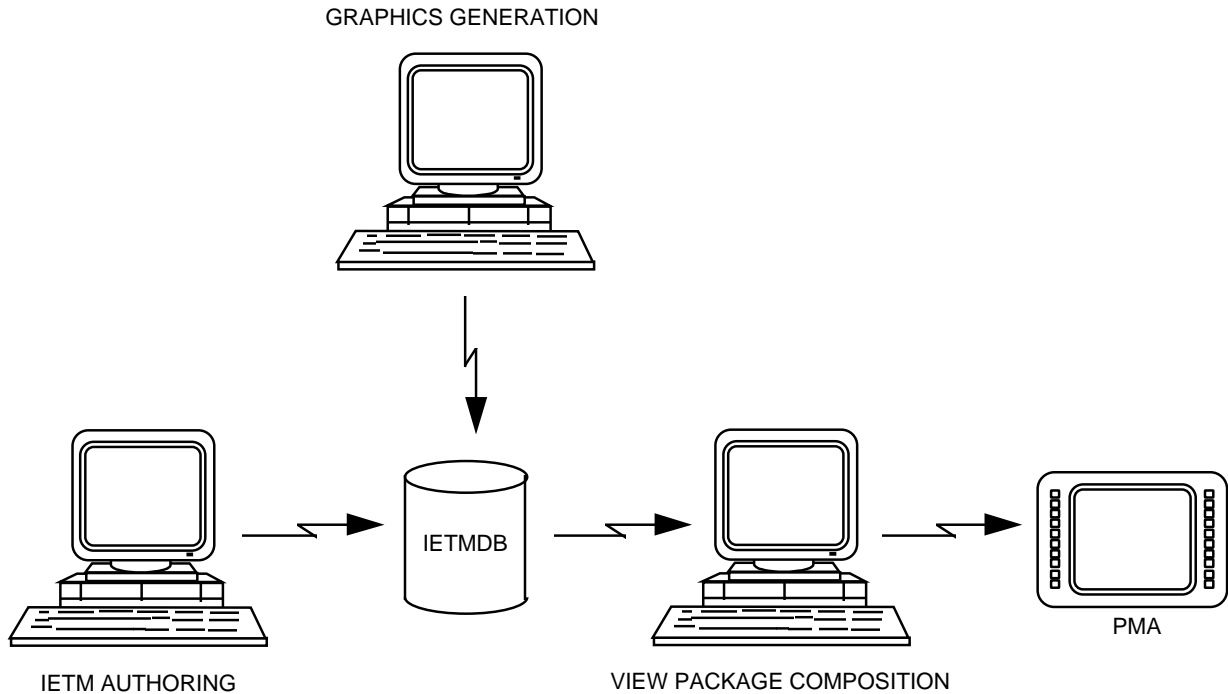


Figure A-1. Interactive Electronic Technical Manual Authoring.

Another consideration is the electronic linking of data. If one procedure references another task, it is not necessary to name the referenced procedure by manual name and number. The system automatically links and permits the user (at display time) to select an option to initiate the link.

The system also allows cross-links to be built between text and graphics. The authoring system displays graphics and permits the writer to insert a pointer or a callout to a specific spot (coordinate) on a graphic. The graphics developed by this effort comply with MIL-D-28003, the CALS Computer Graphics Metafile (CGM) standard.

## 2. RESEARCH

An author spends much time doing research. Research cannot be fit into a practical time slot. It is a continuous process during the contract period for a technical manual. Through research, the author collects and evaluates information to gain thorough knowledge of the product, including its operating principles, use, materials, and maintenance.

The amount of data available depends on the development stage of the equipment. During the early stages of development, the author may be limited to information sources such as the following:

- Detail specifications
- Design data books
- Engineering design sketches
- Models
- Mockups
- Personal working relation with design engineer.

As development progresses through production, delivery, and use of the equipment, research for the manual expands into areas such as the following:

- Engineering drawings
- Engineering orders
- Engineering change proposals
- Time compliance technical orders
- Publication change requests
- Field service reports

### **3. DATA SOURCES** (See Figure A-2)

The data sources listed in Table A-1 are used in the development of IETM data. The data are broken down by the major data types provided in an IETM (descriptive, procedural, fault, part). Procedural (tasks) data contains all the information required to do maintenance on the aircraft. Each task provides complete, step-by-step, start-to-finish maintenance instructions. A list of typical tasks is provided below:

- Removal
- Installation
- Inspection
- Cleaning
- Operational Checkout
- Adjustment
- Calibration
- Ground Handling
- Servicing

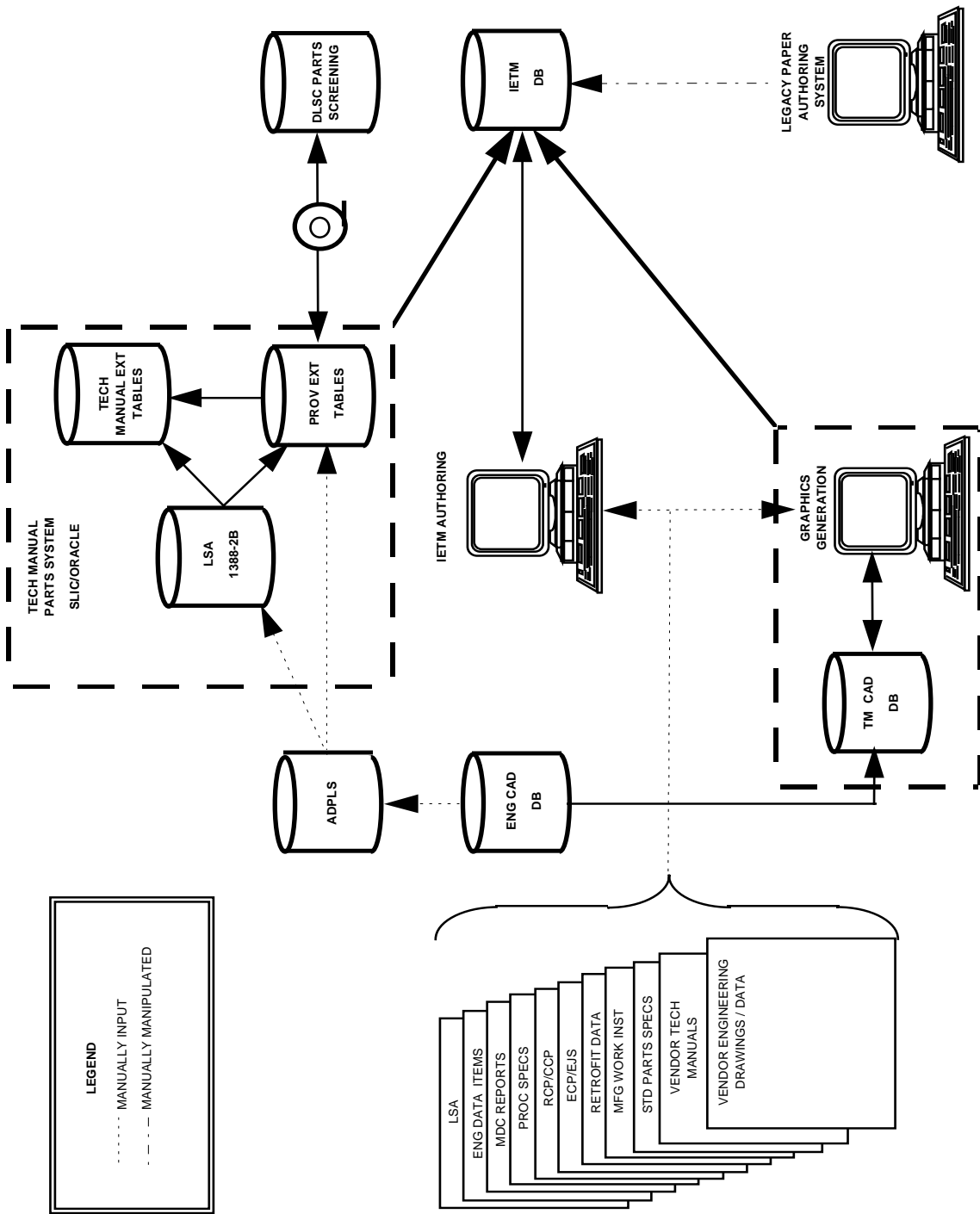


Figure A-2. As-Is Data Sources.

Table A-1. Data Sources Used in IETM Authoring

<p><b>LSA</b>                  LSAR-024 Report - Maintenance Plan Part III: Identifies support equipment requirements by task                  LSAR 019 Report – Task Analysis Summary: Provides sequential task narrative</p>
<p><b>Engineering Data</b> (random reports/presentations)                  Data Item E-12.13E - Human Engineering Design Approach Document - Maintainer                  Data Item E-35.07E - Booklet of Maintenance and Operating Instructions</p>
<p><b>Engineering/Vendor Drawings</b> (including drawing notes)</p>
<p><b>Retrofit Data</b> - modifies aircraft configuration in the field</p>
<p><b>Requirements Change Proposal (RCP) / Configuration Change Proposal (CCP)</b> - used by vendor to submit recommended component changes to contractor</p>
<p><b>Engineering Change Proposal (ECP) / Engineering Job Sheet (EJS)</b> - used by engineering to submit recommended changes to aircraft to the customer</p>
<p><b>Factory Visits/Actual Hands On</b></p>
<p><b>Provisioning Data</b> - Part ordering data / SM&amp;R codes</p>
<p><b>Process Specifications</b> - Provides process instructions for tubing inst., elec. bonding, and grounding, etc.</p>
<p><b>Standard Parts Specifications</b></p>
<p><b>Engineering Coordination and Review of Data</b></p>
<p><b>Validation/Verification</b> - actual performance of the procedures (validation is performed by contractor / verification is performed by customer)</p>
<p><b>Manufacturing Work Instructions (installation)/Visual Aids</b> - Provides instruction for installing parts in factory</p>
<p><b>Engineering Reports</b>                  94B0128A - Maintainability Equipment Access Matrix: Provides location of components (door/access information).</p>

## 6. IETM AUTHORING PROCESS WITH RESPECT TO DATA SOURCES

STEPS	DATA SOURCES USED
<b>Identify System Components</b>	LSA /System Functional Schematics
<b>Determine Level of Maintenance Requirements</b>	<ul style="list-style-type: none"> <li>• LSA</li> <li>• Provisioning data</li> </ul>
<b>Select LRU/WRA</b>	
<b>Research Task Requirements</b>	
1. Should hydraulic and electrical power be off during maintenance?	<ul style="list-style-type: none"> <li>• LSA/system functional schematics</li> <li>• Human Engineering Design Approach Document – Maintainer</li> <li>• Booklet of Maintenance and Operating Instructions</li> </ul>
2. With external power off, is line still pressurized?	<ul style="list-style-type: none"> <li>• LSA/system functional schematics</li> <li>• Human Engineering Design Approach Document – Maintainer</li> <li>• Booklet of Maintenance and Operating Instructions</li> </ul>
3. <i>How is line pressure relieved?</i>	<ul style="list-style-type: none"> <li>• LSA/system functional schematics</li> <li>• Human Engineering Design Approach Document – Maintainer</li> <li>• Booklet of Maintenance and Operating Instructions</li> </ul>
4. When a fluid line is to be disconnected, will fluid continue to drain?	<ul style="list-style-type: none"> <li>• LSA/system functional schematics</li> <li>• Human Engineering Design Approach Document – Maintainer</li> <li>• Booklet of Maintenance and Operating Instructions</li> </ul>
5. Are safety devices required to be installed during maintenance?	<ul style="list-style-type: none"> <li>• LSA/system functional schematics</li> <li>• Human Engineering Design Approach Document – Maintainer</li> <li>• Booklet of Maintenance and Operating Instructions</li> </ul>

STEPS	DATA SOURCES USED
<p>6. If maintenance is to be performed on an electrical or electromechanical component which is hard wired –</p> <p>a. Should wires be removed from an existing splice or cut as close to component being replaced as possible?</p> <p>b. Is hookup schematic required when splicing or reconnecting wires?</p> <p>c. Is wire bundle positioning and clamping critical?</p>	<ul style="list-style-type: none"> <li>• Engineering/vendor drawings (including drawing notes)</li> <li>• Process specifications</li> <li>• LSA /system functional schematics</li> </ul>
<p>7. Should aircraft be on jacks during component maintenance?</p>	<ul style="list-style-type: none"> <li>• Engineering/vendor drawings (including drawing notes)</li> <li>• LSA /system functional schematics</li> </ul>
<p>8. If aircraft is on jacks with power applied, should circuit breakers be pulled or ground power switches off to de-energize other systems?</p>	<p>LSA/system functional schematics</p>
<p>9. Will other components have to be removed for access?</p>	<ul style="list-style-type: none"> <li>• Engineering/vendor drawings (including drawing notes)</li> <li>• LSA /system functional schematics</li> </ul>
<p>10. Are fasteners securing component all the same type, size and length?</p>	<ul style="list-style-type: none"> <li>• Engineering/vendor drawings (including drawing notes)</li> <li>• LSA /system functional schematics</li> <li>• Standard parts specifications</li> </ul>
<p>11. Are the component fasteners one-time-usage only?</p>	<ul style="list-style-type: none"> <li>• Engineering/vendor drawings (including drawing notes)</li> <li>• Standard parts specifications</li> </ul>
<p>12. Are special torque instructions required?</p>	<ul style="list-style-type: none"> <li>• Engineering/vendor drawings (including drawing notes)</li> <li>• Human Engineering Design Approach Document – Maintainer</li> <li>• Booklet of Maintenance and Operating Instructions</li> <li>• Process specifications</li> <li>• LSA /system functional schematics</li> </ul>

STEPS	DATA SOURCES USED
13. Are the fasteners safe-tied?	<ul style="list-style-type: none"> <li>• Engineering/vendor drawings (including drawing notes)</li> <li>• Human Engineering Design Approach Document – Maintainer</li> <li>• Booklet of Maintenance and Operating Instructions</li> <li>• Process specifications</li> <li>• LSA/system functional schematics</li> </ul>
14. Should an old sealant be removed before component removal?	<ul style="list-style-type: none"> <li>• Engineering/vendor drawings (including drawing notes)</li> <li>• Process specifications</li> <li>• LSA /system functional schematics</li> </ul>
15. Prior to removal, are special alignment marks required to eliminate unnecessary rigging?	<ul style="list-style-type: none"> <li>• Engineering/vendor drawings (including drawing notes)</li> <li>• Human Engineering Design Approach Document – Maintainer</li> <li>• Booklet of Maintenance and Operating Instructions</li> <li>• Process specifications</li> <li>• LSA/system functional schematics</li> </ul>
16. Is component removal procedure the same for access as for replacement?	Engineering/vendor drawings (including drawing notes)
17. Are special electrical bonding and sealing instructions required?	<ul style="list-style-type: none"> <li>• Engineering/vendor drawings (including drawing notes)</li> <li>• Human Engineering Design Approach Document – Maintainer</li> <li>• Booklet of Maintenance and Operating Instructions</li> <li>• Process specifications</li> <li>• LSA/system functional schematics</li> </ul>
18. Will sealant cure time affect assembly sequence?	<ul style="list-style-type: none"> <li>• Engineering/Vendor Drawings (including drawing notes)</li> <li>• Process Specifications</li> </ul>

STEPS	DATA SOURCES USED
19. Are warnings or cautions required?	<ul style="list-style-type: none"> <li>• Engineering/vendor drawings (including drawing notes)</li> <li>• Human Engineering Design Approach Document – Maintainer</li> <li>• Booklet of Maintenance and Operating Instructions</li> <li>• LSA/system functional schematics</li> </ul>
20. Are critical installation dimensions required?	<ul style="list-style-type: none"> <li>• Engineering/vendor drawings (including drawing notes)</li> <li>• Human Engineering Design Approach Document – Maintainer</li> <li>• Booklet of Maintenance and Operating Instructions</li> <li>• LSA/system functional schematics</li> </ul>
21. Are special parts assembly sequence required?	<ul style="list-style-type: none"> <li>• Engineering/vendor drawings (including drawing notes)</li> <li>• Human Engineering Design Approach Document – Maintainer</li> <li>• Booklet of Maintenance and Operating Instructions</li> <li>• Process specifications</li> <li>• LSA/system functional schematics</li> </ul>
22. What materials will be required to do procedure: Tape                      Shims Hydraulic Fluid        Lockwire Cotter Pins              Grease Washers                  Fasteners	<ul style="list-style-type: none"> <li>• Engineering/vendor drawings (including drawing notes)</li> <li>• Human Engineering Design Approach Document – Maintainer</li> <li>• Booklet of Maintenance and Operating Instructions</li> <li>• Process specifications</li> <li>• LSA/system functional schematics</li> </ul>
23. Which way should lubrication fittings and bolt heads be facing when installed?	<ul style="list-style-type: none"> <li>• Engineering/vendor drawings (including drawing notes)</li> <li>• Human Engineering Design Approach Document – Maintainer</li> <li>• Booklet of Maintenance and Operating Instructions</li> </ul>

STEPS	DATA SOURCES USED
24. Is the assembly being removed “procurable at o-level” or is it coded “assemble at o-level” which means that the parts which make up the assembly are procurable separately and assembly instructions will be required?	<ul style="list-style-type: none"> <li>• Provisioning data</li> <li>• Engineering/vendor drawings (including drawing notes)</li> <li>• Human Engineering Design Approach Document – Maintainer</li> <li>• Booklet of Maintenance and Operating Instructions</li> <li>• LSA/system functional schematics</li> </ul>
25. Does the part have to be trimmed and drilled on installation?	<ul style="list-style-type: none"> <li>• Engineering/vendor drawings (including drawing notes)</li> <li>• LSA/system functional schematics</li> </ul>
26. Does new replacement component come complete and ready to install, or is it necessary to remove parts from old component for installation on new component?	<ul style="list-style-type: none"> <li>• Engineering/vendor drawings (including drawing notes)</li> <li>• LSA/system functional schematics</li> </ul>
27. Should parts be inspected (QA)?	
28. Is lubrication, servicing, air bleeding, or rigging required?	<ul style="list-style-type: none"> <li>• Engineering/vendor drawings (including drawing notes)</li> <li>• Human Engineering Design Approach Document – Maintainer</li> <li>• Booklet of Maintenance and Operating Instructions</li> <li>• Process specifications</li> </ul>
29. What checkout is required after installation?	<ul style="list-style-type: none"> <li>• Human Engineering Design Approach Document – Maintainer</li> <li>• Booklet of Maintenance and Operating Instructions</li> </ul>
30. Are test hookup and use instructions required?	<ul style="list-style-type: none"> <li>• LSA</li> <li>• Human Engineering Design Approach Document – Maintainer</li> <li>• Booklet of Maintenance and Operating Instructions</li> </ul>
31. Is required GSE authorized and is it available?	<ul style="list-style-type: none"> <li>• LSA</li> <li>• Human Engineering Design Approach Document – Maintainer</li> <li>• Booklet of Maintenance and Operating Instructions</li> </ul>

