

# **Kernel 8.0 & Kernel Toolkit 7.3 Systems Management Guide**



**March 2018**

**Department of Veterans Affairs (VA)  
Office of Information and Technology (OIT)  
Enterprise Program Management Office (EPMO)**

## Revision History

Date	Version	Description	Author
03/01/2018	7.3	<p>Tech Edits:</p> <ul style="list-style-type: none"> <li>• Updated Section <a href="#">2</a>, “<a href="#">Signon/Security: User Interface</a>” and Section <a href="#">3.4.2</a>, “<a href="#">Automatically Deactivating Users</a>,” with regard to “smart cad (aka PIV card) signons.</li> <li>• Updated Section <a href="#">2.1.1</a>, “<a href="#">Defining a Strong Verify Code</a>,” to include references to other section regarding Verify code expiration and option to reset.</li> <li>• Updated Section <a href="#">3.1</a>, “<a href="#">Signon Process</a>.”</li> <li>• Updated <a href="#">Figure 31</a> and added <a href="#">Table 6</a> in Section <a href="#">3.5.4</a>, “<a href="#">Print Sign-on Log Option</a>,” based on updates made with Kernel Patch XU*8.0*630.</li> <li>• Updated Section <a href="#">1</a>; Kernel (and soon all of VistA) is no longer vendor-independent. Much of the new work being done in Kernel and other namespaces relies on Cache ObjectScript.</li> <li>• Added the “<a href="#">Parameter Tools</a>” section taking content from the <i>Parameter Tools Supplement to Patch Description: Patch XT*7.3*26</i> document (ktk7_3p26sp.pdf).</li> <li>• Updated Sections <a href="#">1.1</a>, <a href="#">2</a>, <a href="#">2.1</a>, <a href="#">2.1.1</a>, <a href="#">3.1.2.16</a>, and <a href="#">3.5.8</a> to add or clarify references to 2-Factor Authentication (2FA) vs. use of the Access and Verify codes.</li> <li>• Updated styles and formatting throughout.</li> <li>• Updated all TOCs, lists, cross-references, etc.</li> </ul>	<p>Developer: J.G.            Technical Writer: T.B.</p>
08/10/2016	7.2	<p>Tech Edits:</p> <ul style="list-style-type: none"> <li>• Updated Section <a href="#">15.1.3.2</a> and <a href="#">15.6.4.2</a> for additional HOST file examples and clarifications.</li> <li>• Updated all TOCs, lists, cross-references, etc.</li> </ul>	<p>Developer: H.W.            Technical Writer: T.B.</p>
08/09/2016	7.1	<p>Tech Edits based on Kernel patches XU*8.0*655, 659, and 667:</p> <ul style="list-style-type: none"> <li>• Updated Directive 6402 reference in the “<a href="#">Software Disclaimer</a>” section.</li> <li>• Updated/Added the following sections for 2-Factor Authentication (2FA)-related information: <a href="#">2.1</a>, <a href="#">3.1</a>, <a href="#">3.1.2.16</a> (new), <a href="#">3.5.4</a>,</li> </ul>	<p>Developer: H.W.            Technical Writer: T.B.</p>

Date	Version	Description	Author
		<p><a href="#">4.2.8.1</a>, <a href="#">6.7.1</a>, <a href="#">6.7.2</a>, and <a href="#">6.7.3</a>.</p> <ul style="list-style-type: none"> <li>• Updated Section <a href="#">2.1.1</a> to indicate that the caret (^) is a reserved symbol and added a reference to and VA Directive and Handbook 6500.</li> <li>• Updated Section <a href="#">2.1.1.1</a> for long password future changes pending.</li> <li>• Updated <a href="#">Figure 8</a>.</li> <li>• Added TITLE and ELECTRONIC SIGNATURE COD fields to <a href="#">Table 3</a>.</li> <li>• Updated <a href="#">Figure 13</a> for 2-Aactor Authentication (2FA).</li> <li>• Added the NETWORK USERNAME field to <a href="#">Table 4</a>.</li> <li>• Updated <a href="#">Figure 25</a>.</li> <li>• Added Cautionary note to Section <a href="#">3.4.2.1</a>.</li> <li>• Added references to Broker Security Enhancement (BSE) in Sections <a href="#">3.5.8</a> and <a href="#">3.5.11</a>.</li> <li>• Updated references to CPRS documentation in Section 6.1.</li> <li>• Updated the “<a href="#">XU USER START-UP Option</a>” section; merged from (deleted) Section 6.4.15.</li> </ul> <p><b>Software Versions:</b>  <b>Kernel 8.0</b>  <b>Toolkit 7.3</b></p>	
07/19/2016	7.0	<p>Updates:</p> <ul style="list-style-type: none"> <li>• Moving the “System Management Menus” section and sub-sections from this document into the <i>Kernel 8.0 &amp; Kernel Toolkit 7.3 Technical Manual</i>.</li> <li>• Updated <a href="#">Figure 51</a> and <a href="#">Figure 53</a> to remove extraneous/test-only options from the menu.</li> <li>• Updated the “<a href="#">Prohibited Times</a>” section to include information regarding TaskMan scheduled options.</li> <li>• Added Caution note regarding modification of Kernel routines in the “<a href="#">Software Disclaimer</a>” section.</li> <li>• Converted Word document to .docx format.</li> <li>• Reformatted document to follow latest documentation standards and formatting rules. Also, formatted document for online presentation vs. print presentation (i.e., for double-sided printing). These changes</li> </ul>	Technical Writer: T.B.

Date	Version	Description	Author
		<p>include:</p> <ul style="list-style-type: none"> <li>○ Revised section page setup.</li> <li>○ Removed section headers.</li> <li>○ Revised document footers.</li> <li>○ Removed blank pages between sections.</li> <li>○ Revised all heading style formatting.</li> <li>● Updated organizational references (e.g., “Product Development [PD]” to “Enterprise Program Management Office [EPMO]).</li> <li>● Redacted document for the following information: <ul style="list-style-type: none"> <li>○ Names (replaced with role and initials).</li> <li>○ Production IP addresses and ports.</li> <li>○ VA Intranet websites.</li> <li>○ Server geographic locations and node names.</li> </ul> </li> </ul> <p><b>Software Versions:</b>  <b>Kernel 8.0</b>  <b>Toolkit 7.3</b></p>	
05/31/2013	6.2	<p>Updates:</p> <ul style="list-style-type: none"> <li>● Updates for patch XU*8.0*614 based on feedback from H.W.: <ul style="list-style-type: none"> <li>○ Added the Single User Menu Tree Rebuild option [XQBUILDUSER] to the “Single User Menu Tree Rebuild” It was attached to the Menu Rebuild Menu option [XQBUILDMAIN].</li> <li>○ Added the Menu Rebuild Menu option [XQBUILDMAIN].</li> <li>○ Added the List Unreferenced Menu Options option [XQ LIST UNREFERENCED OPTIONS].</li> <li>○ Added the XQ MENUMANAGER PROMPT parameter to the “<a href="#">Menu Startup Parameter</a>” section.</li> </ul> </li> <li>● Added the “System Management Menus” section. This section lists and briefly describes all Kernel operations, management, user, and developer-related menus and options. It also includes cross-reference links to existing sections that further describe a menu or option elsewhere in this document.</li> <li>● Renamed and updated the “<a href="#">User Management Menu</a>” section.</li> </ul>	<p>Developer: H.W.  Technical Writer: T.B.</p>

Date	Version	Description	Author
		<b>Software Versions:</b> <b>Kernel 8.0</b> <b>Toolkit 7.3</b>	
04/30/2013	6.1	<p>Tech edit updates:</p> <ul style="list-style-type: none"> <li>• XU*8.0*580: Updated document for Kernel patch XU*8.0*580 in support of the Drug Enforcement Agency (DEA) e-Prescribing of Controlled Substances (CS) (ePCS) using Public Key Infrastructure (PKI). <ul style="list-style-type: none"> <li>○ Added the “<a href="#">DEA ePCS Utility</a>” section with the following subsections: <ul style="list-style-type: none"> <li>– <a href="#">Overview</a></li> <li>– <a href="#">Processes</a></li> <li>– <a href="#">Configuring the DEA ePCS Utility</a>, including instructions to: <ul style="list-style-type: none"> <li>▪ <a href="#">Set the XUEPCS REPORT DEVICE Parameter.</a></li> <li>▪ <a href="#">Add DEA ePCS Utility Users.</a></li> </ul> </li> <li>– <a href="#">Using the DEA ePCS Utility</a> (includes description of all Menus/Options).</li> <li>– <a href="#">Prescription Validation and Verification Process—PKIServer.exe Application</a></li> <li>– <a href="#">PIV Card Validation—Revocation Server</a></li> <li>– <a href="#">Windows Authentication and Cryptographic Operations</a></li> </ul> </li> </ul> </li> <li>• Reformatted document to follow current style guide and standards.</li> <li>• Replaced references from “<i>VA FileMan Getting Started Manual</i>” to “<i>VA FileMan User Manual</i>,” since the next VA FileMan 22.n software version will create a new “<i>VA FileMan Getting Started Manual</i>.”</li> <li>• Patches XU*8.0*602: Updated the following sections, as per H.W.: <ul style="list-style-type: none"> <li>○ “<a href="#">Processing Alerts</a>” section.</li> <li>○ “<a href="#">Surrogates and Alerts</a>” section.</li> </ul> </li> <li>• Updated the “<a href="#">Understanding DUZ (User Number)</a>” section to give a more detailed explanation and examples of the <b>DUZ</b> array.</li> <li>• Updated the “<a href="#">KEEP AT TERMINATE</a>” section as per email from C. A., J. I., A. L., and H.W.</li> <li>• Patch XU*8.0*546: Support for Device</li> </ul>	<p>Developers: C.A., J.I., A.L., R.Men., and H.W.  Technical Writer: T.B.</p>

Date	Version	Description	Author
		<p>Hunt Groups was removed. This includes removal of the *HUNT GROUP (#29) and HUNT GROUP DEVICE (#30) fields in the DEVICE (#3.5) file. Sites had to remove any HUNT GROUP devices before installing this patch using VA FileMan to find any existing Hunt Groups. “Hunt Groups” section was deleted from this manual. Also, any references to “Hunt Groups” were removed.</p> <ul style="list-style-type: none"> <li>• Added blue font highlighting and underline to signify internal links to figures, tables, or sections for ease of use, similar to what one sees to hyperlinks on a Web page.</li> <li>• Updated document for Section 508 conformance using word’s built-in Accessibility check: <ul style="list-style-type: none"> <li>○ Added table bookmarks.</li> <li>○ Added screen tips for all URL links.</li> <li>○ Changed all floating callout boxes to in-line, causing reformatting of numerous dialogue screen captures.</li> </ul> </li> </ul> <p><b>Software Versions:</b>  <b>Kernel 8.0</b>  <b>Toolkit 7.3</b></p>	
06/06/2012	6.0	<p>Updates:</p> <ul style="list-style-type: none"> <li>• Added the <a href="#">“XU USER START-UP Option”</a> section. The XU USER START-UP option was added with Kernel patch XU*8.0*593.</li> <li>• Added Section <a href="#">15.6.4 “Verify HFS and NULL Device Setup (required)”</a>, in the <a href="#">“Troubleshooting”</a> section in <a href="#">“Device Handler: System Management.”</a></li> <li>• Updated all VA organizational references.</li> <li>• Revised all version numbers in the “Revision History” section.</li> <li>• Updated the <a href="#">“Orientation”</a> section.</li> <li>• Updated the overall document for current national documentation standards and style guides. For example: <ul style="list-style-type: none"> <li>○ Changed all Heading <i>n</i> styles to use Arial font.</li> <li>○ Changed all Heading <i>n</i> styles to be left justified.</li> </ul> </li> </ul> <p><b>Software Versions:</b>  <b>Kernel 8.0</b>  <b>Toolkit 7.3</b></p>	<p>Office of Information Field Office (OIFO):</p> <ul style="list-style-type: none"> <li>• Maintenance Development Manager—J. Sch.</li> <li>• Developers—G.B., R.D., J.I., R.Men., R.Met., B.T., and H.W.</li> <li>• Technical Writer—T.B.</li> </ul>

Date	Version	Description	Author
03/22/2010	5.3	<p>Updates:</p> <ul style="list-style-type: none"> <li>• Added Section <a href="#">24.3, “Edit Install Status Option”</a> released with Kernel patch XU*8.0*539.</li> <li>• Added <a href="#">Figure 24-4 Edit Install Status option—Sample user dialogue.</a></li> </ul> <p><b>Software Versions:</b>  <b>Kernel 8.0</b>  <b>Toolkit 7.3</b></p>	<p>Office of Information Field Office (OIFO):</p> <ul style="list-style-type: none"> <li>• Maintenance Development Manager—J.Sch.</li> <li>• Developers—G.B., A.C., R.D., W.F., J.G., J.I., R.Men., R.Met., and B.T.</li> <li>• Technical Writers—T.B. and S.S.</li> </ul>
11/16/2009	5.2	<p>Updates:</p> <ul style="list-style-type: none"> <li>• Updated references to the CHCKSUM^XTSUMBLD direct mode utility throughout.</li> <li>• Updated organizational references.</li> <li>• Minor format updates (e.g., reordered document revision history table to display latest to earliest, added outline numbering).</li> <li>• Other minor format updates to correspond with the latest standards and style guides.</li> <li>• Updated the “<a href="#">Automatically Deactivating Users</a>” section in “<a href="#">Signon/Security: System Management</a>” for Kernel patch XU*8.0*514.</li> <li>• Re-ordered and edited all topics in the “<a href="#">Device Handler: System Management</a>” section. Also, added updates to the Device handler based on Kernel patch XU*8.0*440.</li> <li>• Moved the following section content from the <i>Kernel 8.0 &amp; Kernel Toolkit 7.3 Systems Management Guide</i> to the <i>Kernel 8.0 &amp; Kernel Toolkit 7.3 Developer’s Guide</i>, because the functions documented are more developer-related than system management-related: <ul style="list-style-type: none"> <li>○ Miscellaneous Programmer Tools: Programmer Options Menu and %Z Editor; see the “Miscellaneous Developer Tools” section in the <i>Kernel 8.0 &amp; Kernel Toolkit 7.3 Developer’s Guide</i>.</li> <li>○ Routine Tools; see the “Routine Tools” section in the “Toolkit: Developer Tools” section in the <i>Kernel 8.0 &amp; Kernel Toolkit 7.3 Developer’s Guide</i>.</li> <li>○ Verification Tools; see the “Verification Tools” section in the “Toolkit:</li> </ul> </li> </ul>	<p>OIFO:</p> <ul style="list-style-type: none"> <li>• Maintenance Development Manager—J.Sch.</li> <li>• Developers—G. B., A.C., R.D., W.F., J.G., J.I., R.Men., R.Met., and B.T.</li> <li>• Technical Writers—T.B. and S.S.</li> </ul>

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		<p>Developer Tools” section in the <i>Kernel 8.0 &amp; Kernel Toolkit 7.3 Developer’s Guide</i>.</p> <ul style="list-style-type: none"> <li>○ XGF Function Library; see the “XGF Function Library” section in the <i>Kernel 8.0 &amp; Kernel Toolkit 7.3 Developer’s Guide</i>.</li> <li>• Updated Section <a href="#">9.1.3</a> and <a href="#">9.1.6.2</a> for Kernel patch XU*8.0*482.</li> <li>• Reviewed and updated all sections for minor format changes (e.g., bulleted lists and tables), style updates, spelling, and grammar fixes.</li> </ul> <p><b>Software Versions:</b>  <b>Kernel 8.0</b>  <b>Toolkit 7.3</b></p>	
06/10/2008	5.1	<p>Updates:</p> <ul style="list-style-type: none"> <li>• Updated the <a href="#">“Defining a Strong Verify Code”</a> section.</li> <li>• Updated the <a href="#">“File Access Security”</a> section based on the newly created <i>VA FileMan (Version 22) and Kernel (Version 8.0) File Access Security</i> supplemental document on the VA Software Document Library (VDL).</li> <li>• Deleted “Default Task Priority” section from this manual.</li> <li>• Moved the <a href="#">“Error Screens”</a> section from the <a href="#">“TaskMan: System Management—Operation”</a> section to the <a href="#">“Error Processing”</a> section.</li> <li>• Updated the <a href="#">“Alpha/Beta Tracking”</a> section in Section <a href="#">23</a>. Merged information from the <i>Kernel 8.0 &amp; Kernel Toolkit 7.3 Systems Management Guide</i> (this manual) into the <i>Kernel 8.0 &amp; Kernel Toolkit 7.3 Developer’s Guide</i> in order to avoid duplication and confusion with instructions/procedures.</li> <li>• Updated VA OIT organization changes and the document properties (e.g., Title, Author, Creation Dates, Keywords, etc.).</li> <li>• Updated references to the VDL.</li> <li>• Removed all references to HSD&amp;D.</li> <li>• Updated Alert options in <a href="#">Figure 10-3</a> and added the missing descriptions for those Alert-related options.</li> <li>• Completed updates to remove obsolete references to MSM, PDP, 486, VAX Alpha,</li> </ul>	<p>OIFO:</p> <ul style="list-style-type: none"> <li>• Maintenance Development Manager—J.Sch.</li> <li>• Developers—G.B., A.C., R.D., W.F., J.G., J.I., R.Men., R.Met., S.O., and B.T.</li> <li>• Technical Writer—T.B. and S.S.</li> </ul>



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		<p>etc. and updated references to DSM for OpenVMS to Caché where appropriate.</p> <ul style="list-style-type: none"> <li>• Updated content references to checksum compares based on Kernel patch XU*8.0*393.</li> <li>• Changed references from “%INDEX” to “XINDEX” where appropriate.</li> <li>• Updated Section III, <a href="#">Device Handler</a>.</li> <li>• Deleted “Kermit” section.</li> <li>• Updated “<a href="#">Special Queueing</a>” section in “<a href="#">TaskMan: System Management—Operation</a>.” Added <a href="#">Table 42</a>.</li> <li>• Updated “<a href="#">Security Forms</a>” section in “<a href="#">Signon/Security: System Management</a>.”</li> </ul> <p><b>Software Versions:</b>  <b>Kernel 8.0</b>  <b>Toolkit 7.3</b></p>	
02/08/2007	5.0	<p>The Kernel Toolkit documentation set is being combined with the Kernel documentation set. All Kernel Toolkit content will be moved to the appropriate Kernel manual, section, and chapter.</p> <p>In the <i>Kernel 8.0 &amp; Kernel Toolkit 7.3 Systems Management Guide</i>, the following Kernel Toolkit chapters have been added to the Section VI, “<a href="#">Toolkit</a>.”</p> <ul style="list-style-type: none"> <li>• Multi-Term Look-Up (MTLU)</li> <li>• Routine Tools</li> <li>• Verification Tools</li> <li>• Also Changed Kernel document title references to: <ul style="list-style-type: none"> <li>○ Kernel 8.0 &amp; Kernel Toolkit 7.3 Developer’s Guide (previously known as the Kernel Programmer Manual).</li> <li>○ Kernel 8.0 &amp; Kernel Toolkit 7.3 Systems Management Guide (previously known as the Kernel Systems Manual).</li> </ul> </li> </ul> <p><b>Software Versions:</b>  <b>Kernel 8.0</b>  <b>Toolkit 7.3</b></p>	<p>OIFO:</p> <ul style="list-style-type: none"> <li>• Maintenance Development Manager—J.Sch.</li> <li>• Developers—A.C., W.F., J.G., J.I., M.M., R.Men., R.Met., S.O., and B.T.</li> <li>• Technical Writer—T.B. and S.S.</li> </ul>
07/13/2006	4.0	<p>Updates:</p> <ul style="list-style-type: none"> <li>• Made minor formatting updates throughout.</li> <li>• Changed the original “Other Tools” section to become the “Toolkit” section, see note</li> </ul>	<p>OIFO:</p> <ul style="list-style-type: none"> <li>• Maintenance Development Manager—J.Sch.</li> <li>• Developers—A.C., W.F.,</li> </ul>

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		<p>below.</p> <ul style="list-style-type: none"> <li>• Added “Multi-Term Look-Up (MTLU)” and “Tools” chapters from the original <i>Toolkit User Manual (7.3)</i>, see note below.</li> <li>• Removed the “Response Time Measures” section from the original “Capacity Management” chapter in the <i>Toolkit User Manual (7.3)</i>, see note below. Kernel Toolkit patch XT*7.3*102 removed all Response Time Log Option menu options [XURTL*].</li> <li>• All Kernel Toolkit content currently in the Kernel Toolkit User Manual and Kernel Toolkit Technical Manual is being absorbed by the Kernel 8.0 &amp; Kernel Toolkit 7.3 Systems Management Guide, Kernel 8.0 &amp; Kernel Toolkit 7.3 Developer’s Guide, and Kernel 8.0 &amp; Kernel Toolkit 7.3 Technical Manual. Other Toolkit content has been replaced by other manual sets, including: <ul style="list-style-type: none"> <li>○ Duplicate Record Merge: Patient Merge</li> <li>○ Resource Usage Monitor (RUM)</li> <li>○ Statistical Analysis of Global Growth (SAGG)</li> <li>○ Capacity Management (CM) Tools</li> </ul> </li> </ul> <p><b>Software Versions:</b>  <b>Kernel 8.0</b>  <b>Toolkit 7.3</b></p>	<p>and J.I.</p> <ul style="list-style-type: none"> <li>• Technical Writer:—T.B. and S.S.</li> </ul>
02/03/2006	3.0	<p>Updates:</p> <ul style="list-style-type: none"> <li>• Reformatted document to the latest SOP and Style Guidelines.</li> <li>• Updated files, routines, options, APIs, security keys, etc.</li> </ul> <p><b>Software Version: 8.0</b></p>	OIFO Legacy VistA Maintenance Team
12/20/2004	2.1	<p>Reviewed document and edited for the “Data Scrubbing” and the “PDF 508 Compliance” projects.</p> <p><b>Data Scrubbing</b>—Changed all patient/user TEST data to conform to OIT standards and conventions as indicated below:</p> <p>The first three digits (prefix) of any Social Security Numbers (SSN) start with “000” or “666.”</p> <p>Patient or user names are formatted as follows: XUPATIENT,[N] or XUUSER,[N] respectively, where the N is a number written out and</p>	Technical Writer—T.B.

Date	Version	Description	Author
		<p>incremented with each new entry (e.g., XUPATIENT, ONE, XUPATIENT, TWO, etc.).</p> <p>Other personal demographic-related data (e.g., addresses, phones, IP addresses, etc.) were also changed to be generic.</p> <p><b>PDF 508 Compliance</b>—The final PDF document was recreated and now supports the minimum requirements to be 508 compliant (i.e., accessibility tags, language selection, alternate text for all images/icons, fully functional Web links, successfully passed Adobe Acrobat Quick Check).</p> <p><b>Software Version: 8.0</b></p>	
12/09/2004	2.0	<p>Kernel 8.0 documentation reformatting/revision.</p> <p>This is the initial complete reformatting of the <i>Kernel 8.0 &amp; Kernel Toolkit 7.3 Systems Management Guide</i> since its original release in July 1995.</p> <p>The largest change with the <i>Kernel 8.0 &amp; Kernel Toolkit 7.3 Systems Management Guide</i> is that all developer-specific content has been extracted and placed into a new <i>Kernel 8.0 &amp; Kernel Toolkit 7.3 Developer's Guide</i>.</p> <p>Also, at this point in time, only minimal content updates have been made based on select released Kernel patches. Due to time constraints, <i>not</i> all released Kernel patches with content changes have been added at this time. We wanted to get a new baseline document published so that in the future we can more easily update the <i>Kernel 8.0 &amp; Kernel Toolkit 7.3 Systems Management Guide</i>.</p> <p>As time allows, we will be updating this reformatted manual with all released patch information that affects its content. Because of the chapter-numbering scheme, future additions can be made with minimal disruption to the entire manual page flow.</p> <p>Thanks for your patience!</p> <p><b>Software Version: 8.0</b></p>	Technical Writer—T.B.
07/--/1995	1.0	<p>Initial Kernel 8.0 software and documentation release</p> <p><b>Software Version: 8.0</b></p>	<p>Office of Information Field Office (OIFO):</p> <ul style="list-style-type: none"> <li>• Project Manager—H.V.B.</li> <li>• Developers—Kernel Development Team</li> <li>• Technical Writer—K.C.</li> </ul>

## **Patch Revisions**

For the current patch history related to this software, see the Patch Module on FORUM.

# Table of Contents

Revision History .....	ii
List of Figures .....	xxviii
List of Tables .....	xxxvii
Orientation .....	xxxix
<b>1 Introduction .....</b>	<b>1</b>
<b>1.1 Users .....</b>	<b>1</b>
<b>1.2 System Managers .....</b>	<b>2</b>
<b>I. Signon/Security .....</b>	<b>4</b>
<b>2 Signon/Security: User Interface .....</b>	<b>4</b>
<b>2.1 Signing On .....</b>	<b>4</b>
2.1.1 Defining a Strong Verify Code .....	6
2.1.1.1 Why Longer Passwords? .....	8
2.1.2 LOGIN Menu Template .....	8
2.1.3 Signon Shortcuts .....	8
2.1.4 Normal Signoff .....	9
2.1.5 Abnormal Signoff and Error Handling .....	9
2.1.6 Terminal Type Prompt .....	9
<b>2.2 Escaping from a Jumbled Screen .....</b>	<b>10</b>
<b>2.3 Alerts .....</b>	<b>10</b>
<b>2.4 User's Toolbox Menu .....</b>	<b>10</b>
<b>2.5 Change my Division Option .....</b>	<b>11</b>
<b>2.6 Edit User Characteristics Option .....</b>	<b>12</b>
<b>2.7 Display User Characteristics Option .....</b>	<b>14</b>
<b>2.8 Switch UCI Option .....</b>	<b>15</b>
<b>2.9 Summary .....</b>	<b>15</b>
<b>3 Signon/Security: System Management .....</b>	<b>16</b>
<b>3.1 Signon Process .....</b>	<b>16</b>
3.1.1 Introductory Text .....	16
3.1.2 Parameters Checked during Signon .....	17
3.1.2.1 Signon Attempts and Device Lock-out Times .....	17
3.1.2.2 MAX SIGNON ALLOWED .....	18
3.1.2.3 PROHIBITED TIMES FOR SIGN-ON .....	19
3.1.2.4 Multiple Sign-On Restriction .....	20
3.1.2.5 INTERACTIVE USER'S PRIORITY .....	20
3.1.2.6 ASK DEVICE TYPE AT SIGN-ON .....	20
3.1.2.7 Display Attributes (DA) Return Codes .....	21
3.1.2.8 SELECTABLE AT SIGNON .....	21
3.1.2.9 LIFETIME OF VERIFY CODE .....	21
3.1.2.10 AUTO-GENERATE ACCESS CODES .....	21
3.1.2.11 DEFAULT INSTITUTION and AGENCY .....	21

3.1.2.12	AUTO MENU.....	22
3.1.2.13	TYPE-AHEAD .....	22
3.1.2.14	TIMED READ .....	22
3.1.2.15	POST SIGN-IN MESSAGE.....	22
3.1.2.16	2-Factor Authentication (2FA).....	23
3.1.3	XU USER SIGN-ON Option .....	23
3.1.4	XU USER START-UP Option.....	24
3.1.5	Clear all users at startup Option.....	24
3.1.6	Enabling and Disabling Logons.....	24
<b>3.2</b>	<b>Adding New Users .....</b>	<b>25</b>
3.2.1	Add a New User to the System Option.....	25
3.2.1.1	NEW PERSON (#200) File Required Fields .....	25
3.2.2	Grant Access by Profile Option .....	26
3.2.3	Security Forms.....	26
<b>3.3</b>	<b>Edit an Existing User Option.....</b>	<b>34</b>
3.3.1	Additional Attributes Editable by Users .....	42
3.3.2	Edit User Characteristics Form and Template.....	42
<b>3.4</b>	<b>Deactivating and Reactivating Users .....</b>	<b>43</b>
3.4.1	Deactivating Users.....	43
3.4.2	Automatically Deactivating Users.....	44
3.4.2.1	Termination Process .....	45
3.4.2.2	Academic Affiliation Waiver .....	45
3.4.3	Purging Mail and Security Keys for Inactive Users.....	46
3.4.4	Reactivating Users.....	46
<b>3.5</b>	<b>User Management Menu.....</b>	<b>46</b>
3.5.1	Find a User Option.....	46
3.5.2	Proxy User List Option .....	47
3.5.3	List Users Option .....	47
3.5.4	Print Sign-on Log Option.....	47
3.5.5	Proxy (Connector) Detail Report Option.....	49
3.5.6	Proxy (Connector) Inquire Option.....	50
3.5.7	Release user Option .....	50
3.5.8	Remote Access User Sign-on Log Option.....	51
3.5.9	User Inquiry Option .....	51
3.5.10	User Status Report Option .....	51
3.5.11	Users with Foreign Visits Option .....	51
<b>3.6</b>	<b>Signon Audits .....</b>	<b>51</b>
3.6.1	Signon Statistics .....	52
3.6.2	Failed Access Attempts Audit.....	52
3.6.3	Purge Old Access and Verify Codes .....	53
<b>4</b>	<b>File Access Security.....</b>	<b>54</b>
<b>4.1</b>	<b>User Interface.....</b>	<b>54</b>
<b>4.2</b>	<b>System Management .....</b>	<b>55</b>

4.2.1	When is File Access Security Checked? .....	56
4.2.2	What in VA FileMan is Still Protected by the File Manager Access Code? ....	56
4.2.3	Purpose for Granting File Access.....	56
4.2.4	Who Needs File Access? .....	57
4.2.5	Levels of File Access Security.....	57
4.2.6	Audit Access to Files.....	60
4.2.7	How to Grant File Access.....	60
4.2.8	Using the File Access Options .....	61
4.2.8.1	Understanding DUZ (User Number) .....	61
4.2.8.2	Using Ranges of File Numbers.....	64
4.2.8.3	Queuing File Access Specifications.....	65
<b>4.3</b>	<b>Running the File Access Security Conversion.....</b>	<b>65</b>
4.3.1	Advantages.....	65
4.3.2	Advance Preparation for the Conversion.....	65
4.3.2.1	^DISV Global.....	66
4.3.2.2	Adding Explicit File Access for System Administrators .....	66
4.3.3	Summary of the File Access Security Conversion .....	68
4.3.4	File Access Security Conversion Instructions.....	69
4.3.5	After the File Access Security Conversion.....	70
<b>5</b>	<b>Electronic Signatures .....</b>	<b>72</b>
<b>5.1</b>	<b>User Interface.....</b>	<b>72</b>
5.1.1	Electronic Signature code Edit Option.....	72
<b>5.2</b>	<b>System Management .....</b>	<b>72</b>
5.2.1	Electronic Signature Block Edit Option.....	72
5.2.2	Clear Electronic signature code Option .....	73
<b>6</b>	<b>DEA ePCS Utility .....</b>	<b>74</b>
<b>6.1</b>	<b>Overview .....</b>	<b>74</b>
6.1.1	History .....	74
6.1.2	Requirements .....	75
6.1.3	Benefits.....	76
6.1.4	Intended Audience .....	76
<b>6.2</b>	<b>Processes .....</b>	<b>77</b>
6.2.1	Manual Paper-based Process.....	77
6.2.2	e-Prescribing Process.....	78
<b>6.3</b>	<b>Configuring the DEA ePCS Utility .....</b>	<b>80</b>
6.3.1	Set the XUEPCS REPORT DEVICE Parameter.....	80
6.3.1.1	General Parameter Tools Menu .....	80
6.3.1.2	XPAREDIT Routine .....	81
6.3.2	Add DEA ePCS Utility Users.....	82
6.3.2.1	Assign the XUEPCSEEDIT Security Key .....	82
6.3.2.2	Assign the XU EPCS EDIT DATA Option .....	84
6.3.2.3	Assign the XUSSPKI UPN SET Option .....	87
<b>6.4</b>	<b>Using the DEA ePCS Utility.....</b>	<b>90</b>

6.4.1	DEA ePCS Utility Functions Main Menu.....	90
6.4.2	Print DEA Expiration Date Null Option .....	93
6.4.3	Print DISUSER DEA Expiration Date Null Option.....	94
6.4.4	Print DEA Expiration Date Expires 30 days Option .....	96
6.4.5	Print DISUSER DEA Expiration Date Expires 30 days Option.....	97
6.4.6	Print Prescribers with Privileges Option .....	98
6.4.7	Print DISUSER Prescribers with Privileges Option.....	100
6.4.8	Print PSDRPH Key Holders Option.....	102
6.4.9	Print Setting Parameters Privileges Option .....	103
6.4.10	Print Audits for Prescriber Editing Option .....	104
6.4.11	Task Changes to DEA Prescribing Privileges Report Option.....	106
6.4.12	Task Allocation Audit of PSDRPH Key Report Option.....	110
6.4.13	Allocate/De-Allocate of PSDRPH Key Option.....	113
6.4.14	Edit Facility DEA# and Expiration Date Option.....	114
6.4.15	ePCS Edit Prescriber Data Option .....	114
6.4.16	ePCS Set SAN from PIV Card Option .....	115
6.4.16.1	XUSSPKI SAN Bulletin.....	115
<b>6.5</b>	<b>Prescription Validation and Verification Process—PKIServer.exe Application</b> .....	<b>116</b>
<b>6.6</b>	<b>PIV Card Validation—Revocation Server .....</b>	<b>117</b>
<b>6.7</b>	<b>Windows Authentication and Cryptographic Operations .....</b>	<b>118</b>
6.7.1	History .....	118
6.7.2	Current Capabilities .....	118
6.7.3	Future Capabilities.....	119
<b>II.</b>	<b>Menu Manager.....</b>	<b>120</b>
<b>7</b>	<b>Menu Manager: User Interface .....</b>	<b>120</b>
<b>7.1</b>	<b>Navigating Kernel’s Menus .....</b>	<b>120</b>
7.1.1	Choosing Options .....	120
7.1.2	Listing Options .....	121
7.1.3	Displaying Option Help.....	121
7.1.4	Listing Secondary and Common Options .....	121
7.1.5	Displaying Option Descriptions .....	123
7.1.6	Jumping to Options—”Up-arrow Jump”).....	124
7.1.7	Jumping to Options—”Rubber-band Jump” .....	124
7.1.8	Common Menu .....	125
7.1.8.1	Selecting Common Options with the Double Quote .....	125
<b>7.2</b>	<b>Menu Templates Option .....</b>	<b>126</b>
7.2.1	LOGIN Menu Template.....	126
<b>7.3</b>	<b>Summary .....</b>	<b>127</b>
<b>8</b>	<b>Menu Manager: System Management .....</b>	<b>128</b>
<b>8.1</b>	<b>Creating Menus and Options .....</b>	<b>128</b>
8.1.1	Option Name and Menu Text .....	129
8.1.2	Synonyms and Display Order.....	130



8.1.3	PRIORITY.....	130
8.1.4	HELP FRAME.....	130
8.1.5	DISPLAY OPTION.....	130
8.1.6	If the Option Invokes Non-VistA Applications.....	130
8.1.7	If the Option Should Be Regularly Scheduled.....	130
8.1.8	Auditing Option Use.....	131
<b>8.2</b>	<b>Display Menus and Options Menu.....</b>	<b>132</b>
8.2.1	Diagramming Options.....	132
8.2.2	Option Descriptions.....	133
8.2.3	Displaying Options.....	133
8.2.4	Option Access by User Option.....	133
<b>8.3</b>	<b>Managing Menus and Options.....</b>	<b>134</b>
8.3.1	Managing Primary Menus.....	134
8.3.2	Assigning Secondary Menus.....	134
8.3.3	ALWAYS SHOW SECONDARIES Field.....	134
8.3.4	Redefining the Common Menu.....	134
8.3.5	Altering Exported Menus.....	135
8.3.6	Delete Unreferenced Options Option.....	135
8.3.7	Fix Option File Pointers Option.....	135
8.3.8	Testing a User's Menus.....	136
8.3.9	Managing Out-Of-Order Option Sets.....	136
<b>8.4</b>	<b>Restricting Option Usage.....</b>	<b>137</b>
8.4.1	Setting Options Out of Order.....	137
8.4.2	Locks.....	137
8.4.3	Prohibited Times.....	138
8.4.4	Permitted Devices.....	138
8.4.5	QUEUING REQUIRED Flag.....	138
<b>8.5</b>	<b>Menu Manager Options that Should Be Scheduled.....</b>	<b>138</b>
8.5.1	Clean Old Job Nodes in XUTL Option.....	138
8.5.2	Rebuilding Primary Menu Trees.....	139
<b>8.6</b>	<b>Error Messages during Menu Jumping.....</b>	<b>140</b>
<b>8.7</b>	<b>^XUTL Global: Structure and Function.....</b>	<b>141</b>
8.7.1	User Stacks.....	141
8.7.2	XQT Nodes (MENU Templates).....	142
8.7.3	Display Nodes.....	142
8.7.4	Jump Nodes.....	144
<b>8.8</b>	<b>Menu Startup Parameter.....</b>	<b>145</b>
<b>8.9</b>	<b>Menu Manager Variables (Troubleshooting).....</b>	<b>146</b>
<b>8.10</b>	<b>Security Keys.....</b>	<b>147</b>
<b>8.11</b>	<b>User Interface.....</b>	<b>147</b>
<b>8.12</b>	<b>System Management.....</b>	<b>148</b>
8.12.1	Identifying Locked Options.....	148
8.12.2	Key Management.....	148
8.12.3	Allocating and De-allocating Security Keys.....	148

8.12.4	Delegating Security Keys .....	149
8.12.5	Creating and Editing Security Keys .....	150
8.12.5.1	PERSON LOOKUP .....	150
8.12.5.2	KEEP AT TERMINATE.....	150
8.12.5.3	SUBORDINATE KEY (Exploding Keys).....	150
8.12.6	Deleting Security Keys .....	151
8.12.7	Reindexing All Users' Security Keys Option .....	151
8.12.8	Using Security Keys with Reverse Locks .....	151
8.12.9	Security Key Delegation Levels.....	152
<b>9</b>	<b>Secure Menu Delegation.....</b>	<b>153</b>
<b>9.1</b>	<b>User Interface: Acting as a Delegate.....</b>	<b>153</b>
9.1.1	Delegate's Menu .....	153
9.1.2	Edit a User's Options Option .....	154
9.1.3	Build a New Menu Option .....	155
9.1.4	Copy Everything About an Option to a New Option Option .....	155
9.1.5	Copy One Users Menus and Keys to others Option .....	155
9.1.6	Limited File Manager Options (Build) Option.....	155
9.1.6.1	Characteristics of Intended Users.....	156
9.1.6.2	System Administrator Setup to Enable Building Options from Templates .....	156
9.1.6.3	Building Options .....	156
<b>9.2</b>	<b>System Management: Managing Delegates.....</b>	<b>157</b>
9.2.1	Delegating Options: Select Options to be Delegated Option .....	158
9.2.1.1	Delegating Security Keys .....	159
9.2.1.2	Delegation Level (Options and Keys) .....	159
9.2.2	Further Delegation .....	160
9.2.3	Options too Sensitive to Delegate .....	160
9.2.4	Replicate or Replace a Delegate Option .....	160
9.2.5	Remove Options Previously Delegated Option .....	160
9.2.6	Specify Allowable New Menu Prefix Option.....	161
9.2.7	Reports .....	161
<b>10</b>	<b>Alerts .....</b>	<b>162</b>
<b>10.1</b>	<b>User Interface.....</b>	<b>162</b>
10.1.1	Processing Alerts.....	162
10.1.2	Deleting Alerts .....	164
10.1.3	Forwarding Alerts.....	165
10.1.4	Surrogates and Alerts .....	165
<b>10.2</b>	<b>System Management .....</b>	<b>166</b>
10.2.1	Alert Management Menu.....	167
10.2.1.1	Alerts - Set/Remove Surrogate for Users Option .....	167
10.2.1.2	Delete Old (>14 d) Alerts Option.....	167
10.2.1.3	Make an Alert on the Fly Option .....	168
10.2.1.4	Purge Alerts for a User Option.....	168

10.2.1.5	Report Menu for Alerts Menu.....	168
10.2.1.6	Set Backup Reviewer for Alerts Option.....	170
10.2.1.7	Surrogate for which Users? Option.....	171
<b>11</b>	<b>Server Options.....</b>	<b>172</b>
<b>11.1</b>	<b>System Management.....</b>	<b>172</b>
11.1.1	What is a Server Option? .....	172
11.1.2	What Can Server Options Do?.....	172
11.1.3	Can Server Requests Be Denied? .....	172
11.1.4	How Can the Number of Instances of a Server Option Be Controlled?.....	173
11.1.5	Setting Up a Server Option .....	173
11.1.6	Testing if a Site is Reachable: XQSPING Server Option.....	176
11.1.7	Testing a Server Option: XQSCHK .....	177
11.1.8	Errors and Warnings from the XQSCHK Server Option.....	178
<b>12</b>	<b>Help Processor .....</b>	<b>180</b>
<b>12.1</b>	<b>User Interface.....</b>	<b>180</b>
12.1.1	Help Frames in the Menu System .....	181
<b>12.2</b>	<b>System Management .....</b>	<b>182</b>
12.2.1	Display/Edit Help Frames Option .....	182
12.2.2	List Help Frames Option .....	182
12.2.3	New/Revised Help Frames Option .....	182
12.2.4	Cross Reference Help Frames Option .....	183
12.2.5	Fix Help Frame File Pointers Option (Deleting Help Frames).....	183
12.2.6	Assigning/De-assigning Help Frame Editors .....	183
12.2.7	Disk Space Concerns .....	183
12.2.8	Creating and Editing Help Frames .....	183
12.2.8.1	Namespacing of Help Frames .....	184
12.2.8.2	Help Frame Layout Considerations .....	184
12.2.8.3	Linking a Help Frame as Help for an Option or Menu .....	184
<b>13</b>	<b>Error Processing .....</b>	<b>185</b>
<b>13.1</b>	<b>User Interface.....</b>	<b>185</b>
<b>13.2</b>	<b>System Management .....</b>	<b>185</b>
13.2.1	Error Screens.....	185
13.2.1.1	List Error Screens Option .....	186
13.2.1.2	Add Error Screens Option .....	186
13.2.1.3	Edit Error Screens Option.....	186
13.2.1.4	Remove Error Screens Option.....	187
13.2.2	Enhanced Error Processing .....	187
13.2.3	Print 1 Occurrence of Each Error for T-1 (QUEUE) Option.....	187
13.2.4	Print 2 Occurrences of Errors on T-1 (QUEUED) Option.....	187
13.2.5	Clean Error Trap Option.....	188
13.2.6	Error Trap Display Option .....	188
13.2.7	Interactive Print of Error Messages Option.....	190

<b>III. Device Handler .....</b>	<b>191</b>
14 Device Handler: User Interface .....	191
<b>14.1 Printing to Devices .....</b>	<b>191</b>
14.1.1 Specifying Right Margin and Page Length .....	193
<b>14.2 Queuing.....</b>	<b>193</b>
<b>14.3 Specifying a Special Subtype .....</b>	<b>194</b>
14.3.1 Spool Document Names—An Exception.....	196
<b>14.4 Alternate Syntax for Device Specification .....</b>	<b>196</b>
<b>14.5 Summary .....</b>	<b>197</b>
15 Device Handler: System Management.....	198
<b>15.1 DEVICE (#3.5) File.....</b>	<b>198</b>
15.1.1 DEVICE File Fields .....	199
15.1.1.1 OpenVMS-Specific DEVICE Fields.....	202
15.1.2 Device Edit Menu.....	203
15.1.3 Sample Device File Entries .....	204
15.1.3.1 HFS Devices .....	204
15.1.3.2 NULL Devices .....	206
15.1.3.3 BROWSER Devices .....	207
15.1.3.4 P-MESSAGE Devices .....	207
15.1.3.5 TELNET Devices.....	207
<b>15.2 Mixed OS Environment Fields .....</b>	<b>208</b>
15.2.1 Edit Logical/Physical Mapping Option .....	208
15.2.2 Enter/Edit Kernel Site Parameters option.....	209
<b>15.3 Device Security .....</b>	<b>209</b>
<b>15.4 TERMINAL TYPE (#3.2) File.....</b>	<b>210</b>
15.4.1 Terminal Type Naming Conventions .....	211
15.4.2 How Shared Device and Terminal Type Attributes are Used.....	211
15.4.3 Terminal Type Information Retained by User .....	212
<b>15.5 Devices and Signon.....</b>	<b>212</b>
15.5.1 Device Selection at Signon and Virtual Terminal Devices .....	212
15.5.2 Terminal Type Selection at Signon .....	213
15.5.2.1 Managing Display Attributes (DA) Return Codes.....	213
<b>15.6 Troubleshooting .....</b>	<b>213</b>
15.6.1 Loopback Test of Device Port Option.....	214
15.6.2 Send Test Pattern to Terminal Option.....	214
15.6.3 Out of Service Set/Clear Option .....	214
15.6.4 Verify HFS and NULL Device Setup ( <i>required</i> ) .....	214
15.6.4.1 HFS Device .....	214
15.6.4.2 NULL Device .....	214
<b>15.7 Device Identification and Cross-References .....</b>	<b>215</b>
16 Host Files.....	217
<b>16.1 Host Files: User Interface.....</b>	<b>217</b>
<b>16.2 Host Files: System Management .....</b>	<b>218</b>

16.2.1	Host File Server Device Edit Option.....	218
16.2.2	Caché and GT.M HFS Device Setup.....	219
<b>17</b>	<b>Spooling.....</b>	<b>220</b>
<b>17.1</b>	<b>Spooling: User Interface .....</b>	<b>220</b>
17.1.1	Sending Output to the Spooler.....	220
17.1.2	Retrieving Spooled Documents.....	222
17.1.2.1	List Spool Documents Option .....	222
17.1.2.2	Delete A Spool Document option.....	222
17.1.3	Browsing a Spool Document.....	222
17.1.3.1	Browse a Spool Document Option.....	222
17.1.4	Printing Spool Documents.....	223
17.1.4.1	Print A Spool Document Option.....	223
17.1.5	Making Spool Documents into Mail Messages .....	223
17.1.5.1	Make spool document into a mail message Option.....	223
<b>17.2</b>	<b>Spooling: System Management.....</b>	<b>224</b>
17.2.1	Spool Document Storage .....	224
17.2.2	Overflowing Spool Document Storage .....	224
17.2.3	Granting Spooling Privileges.....	224
17.2.4	Managing Spool Documents .....	225
17.2.5	Spooler Site Parameters Edit Option.....	226
17.2.6	Purge old Spool documents Option.....	226
17.2.7	Defining Spool Device Types .....	227
17.2.7.1	Caché and GT.M.....	227
17.2.8	Spool Device Edit Option .....	227
17.2.9	Auto-Despooling .....	227
17.2.10	Generating Spool Document Names.....	228
<b>18</b>	<b>Special Devices .....</b>	<b>229</b>
<b>18.1</b>	<b>Browser Device.....</b>	<b>229</b>
18.1.1	User Interface .....	229
18.1.2	System Management.....	231
18.1.2.1	Storing Host Files in a Specific Directory.....	231
<b>18.2</b>	<b>Form Feeds .....</b>	<b>232</b>
18.2.1	User Interface .....	232
18.2.2	System Management.....	232
<b>18.3</b>	<b>Magtape.....</b>	<b>233</b>
18.3.1	System Management.....	233
<b>18.4</b>	<b>Network Channel Devices.....</b>	<b>234</b>
18.4.1	System Management.....	234
18.4.1.1	Network Channel Device Edit.....	234
<b>18.5</b>	<b>Resources .....</b>	<b>235</b>
18.5.1	System Management.....	235
18.5.1.1	Limiting Simultaneous Running of a Particular Task.....	235
18.5.1.2	Running Sequences of Tasks.....	236

18.5.1.3	Creating Resource Devices .....	236
<b>18.6</b>	<b>Sequential Disk Processors (Obsolete) .....</b>	<b>236</b>
<b>18.7</b>	<b>Slaved Printers .....</b>	<b>237</b>
18.7.1	User Interface .....	237
18.7.2	System Management .....	237
18.7.2.1	Device and Terminal Type File Entries .....	238
18.7.2.2	Use of Slaved Printer: Processing Steps .....	239
18.7.2.3	Queuing to Slaved Printers .....	239
<b>IV.</b>	<b>TaskMan .....</b>	<b>240</b>
<b>19</b>	<b>TaskMan: User Interface .....</b>	<b>240</b>
<b>19.1</b>	<b>Creating Tasks .....</b>	<b>240</b>
19.1.1	Background Jobs .....	240
19.1.2	Queuing Output .....	240
19.1.3	Other Sources of Tasks .....	240
<b>19.2</b>	<b>Working with Tasks .....</b>	<b>241</b>
19.2.1	Selecting Tasks .....	242
19.2.2	Tasks in the Task List .....	242
19.2.3	Display Status of Tasks .....	243
19.2.4	Stopping Tasks .....	243
19.2.5	Editing Tasks .....	243
19.2.6	Listing and Printing Tasks .....	244
19.2.7	Selecting Another Task .....	244
<b>19.3</b>	<b>Summary .....</b>	<b>244</b>
<b>20</b>	<b>TaskMan: System Management—Overview .....</b>	<b>245</b>
<b>20.1</b>	<b>TaskMan’s Division of Labor .....</b>	<b>245</b>
20.1.1	Queuers .....	245
20.1.1.1	Programs that Use the TaskMan API .....	245
20.1.1.2	Option Scheduling through the OPTION SCHEDULING (#19.2) File... ..	246
20.1.2	Manager .....	246
20.1.3	Submanagers .....	247
<b>20.2</b>	<b>TaskMan’s Files .....</b>	<b>249</b>
20.2.1	TaskMan Globals: ^%ZTSCH and ^%ZTSK .....	249
20.2.2	SCHEDULE File .....	250
20.2.3	TASKS (#14.4) File .....	251
20.2.4	Other Files .....	251
<b>20.3</b>	<b>System Configuration Terminology .....</b>	<b>252</b>
<b>20.4</b>	<b>TaskMan Security Key .....</b>	<b>252</b>
<b>21</b>	<b>TaskMan: System Management—Configuration .....</b>	<b>253</b>
<b>21.1</b>	<b>Defining TaskMan Environments .....</b>	<b>253</b>
<b>21.2</b>	<b>Configuring TaskMan .....</b>	<b>253</b>
21.2.1	TaskMan’s Reach .....	254
21.2.2	TASKMAN SITE PARAMETERS (#14.7) File .....	254

21.2.3	VOLUME SET (#14.5) File .....	257
21.2.4	UCI ASSOCIATION (#14.6) File .....	260
21.2.4.1	Partial File Entries .....	260
21.2.4.2	Complete File Entries .....	261
21.2.5	Sample Configuration: Standardized VA Caché and GT.M Configuration ....	262
<b>21.3</b>	<b>Manager Startup .....</b>	<b>263</b>
<b>21.4</b>	<b>Multiple TaskMan Managers and Load Balancing.....</b>	<b>263</b>
21.4.1	Configuration for Multiple Managers.....	263
21.4.2	Starting Up, Pausing, and Stopping Multiple Managers .....	263
21.4.3	Load Balancing .....	263
21.4.4	Monitor Taskman Option.....	264
<b>21.5</b>	<b>Device Handler's Influence on TaskMan.....</b>	<b>265</b>
<b>21.6</b>	<b>Running TaskMan with a DCL Context .....</b>	<b>267</b>
21.6.1	Setup for Running TaskMan in a DCL Context in a Cache/VMS Environment .....	267
21.6.2	How to Restart TaskMan when Running in a DCL Context .....	270
<b>22</b>	<b>TaskMan: System Management—Operation .....</b>	<b>274</b>
<b>22.1</b>	<b>TaskMan Management Menu .....</b>	<b>274</b>
22.1.1	List Tasks Option .....	274
22.1.1.1	All your tasks Option .....	276
22.1.1.2	Your future tasks Option.....	276
22.1.1.3	List of tasks Option.....	276
22.1.1.4	Unsuccessful tasks Option .....	276
22.1.1.5	Future tasks Option .....	276
22.1.1.6	Tasks waiting for a device Option.....	276
22.1.1.7	Running tasks Option .....	276
22.1.2	Dequeue Tasks Option .....	277
22.1.3	Requeue Tasks Option .....	277
22.1.4	Delete Tasks Option .....	278
22.1.5	Cleanup Task List Option.....	278
<b>22.2</b>	<b>Taskman Management Utilities.....</b>	<b>279</b>
22.2.1	Monitor Taskman Option.....	279
22.2.1.1	RUN Node.....	280
22.2.1.2	Status List .....	280
22.2.1.3	Schedule List.....	281
22.2.1.4	IO List.....	281
22.2.1.5	Job List.....	282
22.2.1.6	Task List.....	282
22.2.1.7	Monitor Action Prompt.....	282
22.2.1.8	Inspecting the Tasks in the Monitor's Lists .....	283
22.2.2	Check Taskman's Environment Option .....	283
22.2.3	Restart Task Manager Option .....	286
22.2.4	Place Taskman in a WAIT State Option .....	286
22.2.5	Remove Taskman from WAIT State Option .....	287

22.2.6	Stop Task Manager Option .....	287
22.2.7	SYNC flag file control Option .....	287
22.2.8	Clean Task File Option.....	288
22.2.9	Queueable Task Log Clean Up Option.....	288
<b>22.3</b>	<b>Scheduling Options.....</b>	<b>289</b>
22.3.1	Which Options to Queue .....	289
22.3.1.1	PARENT OF QUEUABLE OPTIONS Menu.....	289
22.3.1.2	Printing Options Recommended to Run and Scheduled to Run.....	289
22.3.1.3	Schedule/Unschedule Options .....	290
22.3.1.4	Queued to Run At What Time.....	290
22.3.1.5	How to Delete a Regularly Scheduled Task.....	290
22.3.1.6	How to Requeue a Regularly Scheduled Task .....	290
22.3.1.7	Device For Queued Job Output .....	291
22.3.1.8	Queued To Run On Volume Set.....	291
22.3.1.9	Reschedule Frequency.....	291
22.3.1.10	Task Parameters .....	292
22.3.1.11	Special Queueing .....	292
22.3.1.12	Problems with Scheduled Options .....	294
22.3.1.13	One-time Option Queue Option .....	294
<b>22.4</b>	<b>Taskman Error Log Menu.....</b>	<b>295</b>
22.4.1	Show Error Log Option.....	295
22.4.2	Clean Error Log Over Range Of Dates Option .....	296
22.4.3	Purge Error Log Of Type Of Error Option.....	296
22.4.4	Delete Error Log Option .....	296
<b>22.5</b>	<b>Troubleshooting .....</b>	<b>297</b>
22.5.1	SCHEDULE File.....	297
22.5.2	TASKS (#14.4) File .....	301
22.5.3	Task Status Codes.....	302
22.5.4	Task Rejection Messages .....	304
22.5.5	TaskMan State Messages.....	305
22.5.5.1	BALANCE State .....	305
22.5.5.2	ERROR State.....	305
22.5.5.3	PAUSE State.....	306
22.5.5.4	RUN State .....	306
22.5.5.5	WAIT State.....	307
<b>V.</b>	<b>Kernel Installation and Distribution System .....</b>	<b>308</b>
<b>23</b>	<b>KIDS: System Management—Installations.....</b>	<b>308</b>
<b>23.1</b>	<b>KIDS Options .....</b>	<b>309</b>
23.1.1	Distributions .....	310
23.1.2	Installations.....	311
<b>23.2</b>	<b>Build Entries and the BUILD (#9.6) File.....</b>	<b>311</b>
<b>23.3</b>	<b>INSTALL (#9.7) File.....</b>	<b>312</b>
<b>23.4</b>	<b>Changes in the Role of the PACKAGE (#9.4) File.....</b>	<b>312</b>



<b>23.5</b>	<b>Transport Mechanism: Distributions.....</b>	<b>313</b>
23.5.1	Two Kinds of Distributions.....	313
<b>23.6</b>	<b>What Happens to DIFROM? .....</b>	<b>313</b>
<b>23.7</b>	<b>Installing Standard Distributions.....</b>	<b>314</b>
23.7.1	Installation Sequence.....	314
23.7.1.1	Phase 1: Loading Transport Globals from a Distribution or PackMan Message.....	314
23.7.1.2	Phase 2: Answering Installation Questions for Transport Globals in a Distribution .....	314
23.7.1.3	Phase 3: KIDS Installation of Software .....	315
23.7.2	Installation Menu.....	315
23.7.3	Loading a Standard Distribution .....	316
23.7.3.1	When the Distribution is Split across Diskettes.....	316
23.7.4	Loading Transport Globals from a Distribution .....	318
23.7.5	Verifying Checksums in a Transport Global .....	319
23.7.6	Printing Loaded Transport Globals.....	320
23.7.7	Comparing Loaded Transport Globals to the Current System .....	320
23.7.8	Backing Up Transport Globals .....	322
23.7.9	Running Installations.....	323
23.7.9.1	Processing Each Transport Global .....	323
23.7.9.2	Scheduling Installations.....	323
23.7.10	When the Installation is Queued .....	323
23.7.11	Re-answering Installation Questions .....	324
23.7.12	Information Stored in the INSTALL (#9.7) File.....	324
23.7.13	Answering Installation Questions for a Distribution.....	325
23.7.14	Installation Progress .....	326
23.7.15	Once the Installation Finishes .....	326
23.7.16	Restarting Aborted Installations .....	327
23.7.17	Recovering from an Aborted Distribution Load.....	327
<b>23.8</b>	<b>Installing Global Distributions .....</b>	<b>328</b>
<b>23.9</b>	<b>Purging the BUILD and INSTALL Files.....</b>	<b>329</b>
<b>23.10</b>	<b>Alpha/Beta Tracking .....</b>	<b>330</b>
<b>24</b>	<b>KIDS: System Management—Utilities .....</b>	<b>331</b>
<b>24.1</b>	<b>Build File Print Option .....</b>	<b>332</b>
<b>24.2</b>	<b>Install File Print Option.....</b>	<b>333</b>
<b>24.3</b>	<b>Edit Install Status Option .....</b>	<b>334</b>
<b>24.4</b>	<b>Convert Loaded Package for Redistribution Option .....</b>	<b>334</b>
<b>24.5</b>	<b>Display Patches for a Package Option.....</b>	<b>337</b>
<b>24.6</b>	<b>Purge Build or Install Files Option .....</b>	<b>337</b>
24.6.1	Versions to Retain.....	337
24.6.2	Selecting Software Names for Purging.....	338
24.6.3	Purging Selected Entries.....	338
24.6.4	Reasons to Retain BUILD and INSTALL File Entries .....	339
<b>24.7</b>	<b>Rollup Patches into a Build Option .....</b>	<b>339</b>

24.8	Update Routine File Option.....	340
24.9	Verify a Build Option .....	340
24.10	Verify Package Integrity Option.....	341
<b>VI.</b>	<b>Toolkit.....</b>	<b>342</b>
25	Multi-Term Look-Up (MTLU) .....	345
25.1	Overview .....	345
25.2	Introduction to Multi-Term Look-Up (MTLU).....	345
25.3	Functional Description.....	345
25.4	Usage Considerations.....	346
25.5	User Interface.....	347
25.5.1	Multi-Term Look-Up Menu Options .....	347
25.5.1.1	Standard Device Chart .....	349
25.5.2	Using the Multi-Term Lookup (MTLU) Option.....	350
25.5.3	Using the Print Utility Option .....	352
25.5.4	Using the Utilities for MTLU Option .....	353
25.5.4.1	Delete Entries from Look-Up Option .....	354
25.5.4.2	Add Entries To Look-Up File Option .....	354
25.5.4.3	Add/Modify Utility Option .....	357
25.5.5	Examples.....	362
25.5.5.1	Example 1 .....	362
25.5.5.2	Example 2 .....	363
25.5.5.3	Example 3 .....	363
25.6	Systems Management .....	363
25.6.1	Implementation of Multi-Term Look-Up (MTLU) .....	363
26	Parameter Tools .....	367
26.1	Introduction.....	367
26.2	Background.....	367
26.3	Description.....	368
26.4	Definitions.....	368
26.4.1	Entity.....	369
26.4.2	Parameter .....	369
26.4.3	Instance .....	370
26.4.4	Value .....	370
26.4.5	Parameter Template .....	370
26.5	Why Use Parameter Tools? .....	371
26.6	General Parameter Tools Menu .....	371
26.6.1	List Values for a Selected Parameter Option.....	372
26.6.2	List Values for a Selected Entity Option .....	372
26.6.3	List Values for a Selected Package Option .....	373
26.6.4	List Values for a Selected Template Option .....	374
26.6.5	Edit Parameter Values Option.....	374
26.6.6	Edit Parameter Values with Template Option.....	375
26.6.7	Edit Parameter Definition Keyword Option .....	375

<b>26.7 Example.....</b>	<b>376</b>
Glossary.....	378
Index.....	383

## List of Figures

Figure 1: Signing on to VistA—Sample Roll-and-Scroll User Authentication Dialogue.....	5
Figure 2: Access Denied Due to No Primary Menu or Menu “Out of Order” Message .....	6
Figure 3: Entering the Access and Verify Codes at the Same Time .....	8
Figure 4: Entering the Access and Verify Codes at the Same Time and Jumping Directly to a Specified Option .....	8
Figure 5: System Commands: Menu Options for Signoff .....	9
Figure 6: System Commands: View Alerts “VA” Option.....	10
Figure 7: User’s Toolbox Menu Options .....	10
Figure 8: Edit User Characteristics Option—ScreenMan Form.....	12
Figure 9: Display User Characteristics Option—Sample Output and User Dialogue.....	14
Figure 10: Introductory text edit Option .....	16
Figure 11: Enter/Edit Kernel Site Parameters Option .....	17
Figure 12: Enter/Edit Kernel Site Parameters Option—ScreenMan Form 1.....	17
Figure 13: Kernel Signon Flow Chart .....	19
Figure 14: Post Sign-in Text Edit Option .....	22
Figure 15: Clear All Users at Startup Option .....	24
Figure 16: User Management Menu Options: Associated Menu Options when Adding a New User.....	25
Figure 17: Reprint Access agreement letter Option.....	26
Figure 18: Security Forms—Sample User Entries (1 of 4).....	28
Figure 19: Security Forms—Sample User Entries (2 of 4).....	30
Figure 20: Security Forms—Sample User Account Notification Form (3 of 4) .....	32
Figure 21: Security Forms—Sample Computer Account Access Policy Form (4 of 4) .....	33
Figure 22: Edit an Existing User Option—Menu .....	34
Figure 23: VA FileMan Line Editor—Sample User Dialogue.....	37
Figure 24: Edit an Existing User Option—Screen 1 .....	40
Figure 25: Edit an Existing User Option—Screen 2.....	40
Figure 26: Edit an Existing User Option—Screen 3.....	41
Figure 27: Edit an Existing User Option—Screen 4.....	41
Figure 28: Edit an Existing User Option—Screen 5.....	42
Figure 29: User Management Menu Options.....	43
Figure 30: User Management Menu Options.....	46
Figure 31: Sample Kernel Sign-On Log Report .....	49
Figure 32: CPU/Service/User/Device Stats Option.....	52
Figure 33: Purge Log of Old Access and Verify Codes Option .....	53
Figure 34: Sample VA FileMan Menu Options .....	54
Figure 35: User has <i>Not</i> been Granted Security Access to any VA FileMan Files—Sample User Dialogue .....	55
Figure 36: File Access Security Menu Options.....	61
Figure 37: Displaying the DUZ Array for a Signed-on User at a Programmer Prompt.....	63
Figure 38: Displaying the DUZ (Internal Entry Number) in a VA FileMan Report.....	64
Figure 39: KILLing ^DISV—Sample Code.....	66
Figure 40: Updating File Access Settings ( <i>Before</i> Conversion) .....	67

Figure 41: Enabling File Access Security—Sample User Dialogue .....	69
Figure 42: ^XUINCON Conversion Routine—Sample User Dialogue .....	70
Figure 43: Running a Conversion—Sample User Dialogue .....	70
Figure 44: Creating a PRINT Template to Display File Access Security—Sample User Dialogue .....	71
Figure 45: User Edit Menu Options .....	72
Figure 46: DEA ePCS—Manual Paper-based Process to Prescribe Schedule II Controlled Substances .....	78
Figure 47: DEA ePCS—ePrescribing Process to Prescribe Schedule II - V Controlled Substances .....	79
Figure 48: DEA ePCS: General Parameter Tools Menu [XPAR MENU TOOLS]—Editing DEA ePCS Site Parameter .....	81
Figure 49: DEA ePCS: XPAREDIT Routine—Editing DEA ePCS Site Parameter: Test Account .....	82
Figure 50: DEA ePCS: Adding DEA ePCS Utility Users by Assigning the XUEPCSEdit Security Key .....	83
Figure 51: DEA ePCS: Assigning the XU EPCS EDIT DATA Option—Sample User Entries (1 of 2) .....	85
Figure 52: DEA ePCS: Assigning the XU EPCS EDIT DATA Option—Sample User Entries (2 of 2) .....	86
Figure 53: DEA ePCS: Assigning the XUSSPKI UPN SET Option—Sample User Entries (1 of 2) .....	88
Figure 54: DEA ePCS: Assigning the XUSSPKI UPN SET Option—Sample User Entries (2 of 2) .....	89
Figure 55: DEA ePCS: DEA ePCS Utility Functions Main Menu [XU EPCS UTILITY FUNCTIONS] .....	90
Figure 56: DEA ePCS: Print DEA Expiration Date Null Option—Sample User Entries and Report .....	94
Figure 57: DEA ePCS: Print DISUSER DEA Expiration Date Null Option—Sample User Entries and Report .....	95
Figure 58: DEA ePCS: Print DEA Expiration Date Expires 30 days Option—Sample User Entries and Report .....	96
Figure 59: DEA ePCS: Print DISUSER DEA Expiration Date Expires 30 days Option—Sample User Entries and Report .....	97
Figure 60: DEA ePCS: Print Prescribers with Privileges Option—Sample User Entries and Report .....	99
Figure 61: DEA ePCS: Print DISUSER Prescribers with Privileges Option—Sample User Entries and Report .....	101
Figure 62: DEA ePCS: Print PSDRPH Key Holders Option—Sample User Entries and Report .....	103
Figure 63: DEA ePCS: Print Setting Parameters Privileges Option—Sample User Entries and Report .....	104
Figure 64: DEA ePCS: Print Audits for Prescriber Editing Option: Sort by <i>Edited By then Date/time</i> —Sample User Entries and Report .....	105
Figure 65: DEA ePCS: Print Audits for Prescriber Editing Option: Sort by <i>User Edited then Edited By</i> —Sample User Entries and Report .....	106

Figure 66: DEA ePCS: Task Changes to DEA Prescribing Privileges Report Option: TaskMan schedule setup—Sample User Entries.....	108
Figure 67: DEA ePCS: Task Changes to DEA Prescribing Privileges Report Option—Sample User Entries (No Report Displays) .....	109
Figure 68: DEA ePCS: Task Allocation Audit of PSDRPH Key Report Option: TaskMan Schedule Setup—Sample User Entries.....	111
Figure 69: DEA ePCS: Task Allocation Audit of PSDRPH Key Report Option—Sample User Entries (No Report Displays).....	112
Figure 70: DEA ePCS: Task Allocation Audit of PSDRPH Key Report Option—Sample Report Printed to Device Entered into the XUEPCS REPORT DEVICE Parameter.....	112
Figure 71: DEA ePCS: Allocate/De-Allocate of PSDRPH Key Option: <i>Allocating</i> PSDRPH— Sample User Entries .....	113
Figure 72: DEA ePCS: Allocate/De-Allocate of PSDRPH Key Option: <i>De-allocating</i> PSDRPH— Sample User Entries .....	113
Figure 73: DEA ePCS: Edit Facility DEA# and Expiration Date Option—Sample User Entries	114
Figure 74: One Question Mark (?) Help—Sample User Dialogue.....	121
Figure 75: Using ?Option to Get Help on a Named Option—Sample User Dialogue .....	121
Figure 76: Two Question Marks (??) Help—Listing Primary, Secondary, and Common Menu Options .....	122
Figure 77: Three Question Marks (???) Help—Sample User Dialogue .....	123
Figure 78: Using the “Up-arrow Jump”—Sample User Dialogue .....	124
Figure 79: List of Choices—Sample User Dialogue.....	124
Figure 80: “Rubber-band Jump”—Sample User Dialogue .....	124
Figure 81: Selecting Common Options via the Double Quote—User’s Toolbox Menu Option .	125
Figure 82: Menu Templates Option .....	126
Figure 83: Invoking a Template—Sample User Dialogue .....	126
Figure 84: Edit Options Option .....	128
Figure 85: Defining Local Primary Menus (System Administrators)—Sample User Dialogue ..	129
Figure 86: Auditing Menu Options.....	131
Figure 87: Display Menus and Options Menu.....	132
Figure 88: Inquire Option—Sample User Dialogue.....	133
Figure 89: Option Access by User Option .....	133
Figure 90: Delete Unreferenced Options Option.....	135
Figure 91: Fix Option File Pointers Option.....	135
Figure 92: Fix Option File Pointers Option—Sample User Dialogue.....	136
Figure 93: Switch Identities Option.....	136
Figure 94: Out-Of-Order Set Management Menu Options .....	136
Figure 95: Restrict Availability of Options Option.....	137
Figure 96: Clean old Job Nodes in XUTL Option.....	138
Figure 97: Building Primary Menu Trees Options .....	139
Figure 98: Menu Jump Error Message (1 of 6).....	140
Figure 99: Menu Jump Error Message (2 of 6).....	140
Figure 100: Menu Jump Error Message (3 of 6).....	140
Figure 101: Menu Jump Error Message (4 of 6).....	140
Figure 102: Menu Jump Error Message (5 of 6).....	141

Figure 103: Menu Jump Error Message (6 of 6) .....	141
Figure 104: User Stack Example.....	142
Figure 105: Display Nodes for EVE Example .....	143
Figure 106: Display Nodes for a Secondary Menu .....	144
Figure 107: Jump Nodes Example—Lookup Nodes.....	144
Figure 108: Jump Nodes Example—Menu Pathways.....	145
Figure 109: Sample Locked Menu Options Showing Required Security Key—Entering Two Question Marks (??) .....	147
Figure 110: Display User Characteristics Option—Sample Output.....	147
Figure 111: Diagram Menus Option—Sample User Dialogue.....	148
Figure 112: Key Management Menu Options .....	148
Figure 113: Attributes for the Provider Security Key—Sample User Dialogue .....	150
Figure 114: Reindex the users key's Option.....	151
Figure 115: Delegate's Menu Management Options .....	153
Figure 116: Edit a User's Options—Sample User Dialogue.....	154
Figure 117: Limited File Manager Options (Build)—Sample User Dialogue.....	157
Figure 118: Delegating Options: Select Options to be Delegated Option—Sample User Dialogue .....	158
Figure 119: Alert—Sample User Message .....	162
Figure 120: View Alerts “VA” Option—Sample User Dialogue.....	164
Figure 121: Alert Management Menu Options .....	167
Figure 122: Report Menu for Alerts Menu Options .....	168
Figure 123: Sample Message Received when “pinging” a Domain Address.....	176
Figure 124: XQSCHK Server Option—Sample MailMan Return Message .....	177
Figure 125: Help Frame Example .....	180
Figure 126: Display a Help Frame for an Option—Entering One Question Mark (?) and Option Name .....	181
Figure 127: Display a Help Frame for an Option—Entering Three Question Marks (???).....	181
Figure 128: Display a Help Frame for an Option—Entering Four Question Marks (????).....	181
Figure 129: Help Processor Menu Options.....	182
Figure 130: Display/Edit Help Frames Option—Displaying Help Using the ?option Syntax .....	182
Figure 131: List Help Frames Option—Sample User Dialogue.....	182
Figure 132: Estimating the Size of the HELP FRAME (#9.2) File Using Kernel's Block Count Utility.....	183
Figure 133: Linking Help Frames to an Option—Sample User Dialogue .....	184
Figure 134: List Error Screens Option .....	186
Figure 135: Add Error Screens Option .....	186
Figure 136: Edit Error Screens Option .....	186
Figure 137: Remove Error Screens Option .....	187
Figure 138: Error Processing Options .....	187
Figure 139: Choosing the Number of Days to Leave Errors in the Error Trap.....	188
Figure 140: Choosing a Start and End Date Range to Delete Errors from the Error Trap.....	188
Figure 141: Error Trap Display Option—Sample User Dialogue.....	189
Figure 142: Local Symbol Table Help .....	190

Figure 143: Choosing to Examine the Operating System's Error Log—Sample User Dialogue .....	190
Figure 144: Choosing the Home Device .....	191
Figure 145: Choosing a Printer Device .....	191
Figure 146: Choosing the Closest Printer Device .....	191
Figure 147: Device Syntax Help—One Question Mark (?) .....	192
Figure 148: Displaying Devices Help—Two Question Marks (??) .....	192
Figure 149: Sample Printer Listing .....	192
Figure 150: Specifying a Device and Queuing a Print Job—Sample User Dialogue (1 of 2)....	193
Figure 151: Specifying a Device and Queuing a Print Job—Sample User Dialogue (2 of 2)....	194
Figure 152: Queuing a Print Job—Sample User Dialogue.....	194
Figure 153: Terminal-Type Device Entry— <i>Without</i> Pauses.....	194
Figure 154: Terminal-Type Device Entry— <i>With</i> Pauses.....	195
Figure 155: Partial Device Specification—Unknown Subtype .....	195
Figure 156: Device Specification—Four Semicolon Piece: Sample .....	195
Figure 157: Device Specification—Four Semicolon Piece: Syntax .....	195
Figure 158: Device Syntax—Specifying a Spool Document Name: Sample Formats (1 of 2) ..	196
Figure 159: Device Syntax—Specifying a Spool Document Name: Sample Formats (2 of 2) ..	196
Figure 160: Specifying a Device—Using Alternate Syntax .....	197
Figure 161: Device Edit Options.....	203
Figure 162: HFS Device—Sample Data Entry Screen.....	204
Figure 163: HFS Device—Sample DEVICE File Entry .....	204
Figure 164: HFS Device—Sample Data Entry Screen with the Terminal Type CLOSE EXECUTE.....	205
Figure 165: Mixed Operating System: VMS (Primary) and Linux (Secondary) NULL Device— Sample Data Entry Screen.....	206
Figure 166: Mixed Operating System: VMS (Primary) and Linux (Secondary) NULL Device— Sample DEVICE File Entries.....	206
Figure 167: BROWSER Device—Sample DEVICE File Entry .....	207
Figure 168: P-MESSAGE Device—Sample DEVICE File Entry .....	207
Figure 169: TELNET Device—Sample DEVICE File Entry (1 of 2).....	207
Figure 170: TELNET Device—Sample DEVICE File Entry (2 of 2).....	207
Figure 171: Enter/Edit Kernel Site Parameters Option—ScreenMan Form 3: MIXED OS (#.05) and SECONDARY HFS DIRECTORY (#320.2) Fields.....	209
Figure 172: Terminal Type Edit Options.....	210
Figure 173: DA Return Code Edit Option .....	213
Figure 174: Device Management—Troubleshooting Options .....	213
Figure 175: VMS NULL Device—Sample DEVICE File Entry .....	214
Figure 176: Mixed Operating System: VMS (Primary) and Linux (Secondary) NULL Device— Sample DEVICE File Entry .....	215
Figure 177: Linux NULL Device Example—Caché NULL Device Setup .....	215
Figure 178: Windows NULL Device Example—Caché NULL Device Setup .....	215
Figure 179: NULL Device Example—P-OTHER Terminal Type Setup .....	215
Figure 180: Displaying Signon Devices on a Specific CPU—Sample User Dialogue .....	216
Figure 181: Displaying Signon Devices with a Specific \$I—Sample User Dialogue.....	216



Figure 182: Global Listing for Device Cross-references—\$I Value = 99 and IEN = 251 .....	216
Figure 183: Global Listing for Virtual Terminal Device Cross-references—\$I Value = _TNA and IEN = 251.....	216
Figure 184: Choosing a Host File Server (HFS) Device—Sample User Dialogue.....	217
Figure 185: Host File Server Device Edit Option .....	218
Figure 186: Host File Server Device for Caché and GT.M—Sample Settings .....	219
Figure 187: Unable to Send Output to a Spool Device—Sample Message .....	220
Figure 188: Specifying Spooled Output Margin and Length .....	220
Figure 189: Spool Document Name Prompt.....	220
Figure 190: Specifying Spool Device and Document Name .....	221
Figure 191: Spooling Output to a Spool Device on the Same CPU .....	221
Figure 192: Queuing Output to a Spool Device .....	221
Figure 193: Spooler Parameters at the Device Prompt (Summary) .....	221
Figure 194: Spooler Menu Options.....	222
Figure 195: Formatting/Sending a Document to a Spool Device to Print as a MailMan Message—Sample User Dialogue .....	223
Figure 196: Make Spool Document into a Mail Message Option .....	223
Figure 197: Edit User's Spooler Access Option.....	224
Figure 198: Edit User's Spooler Access—Sample User Dialogue .....	225
Figure 199: Spool Management Menu Options .....	225
Figure 200: Spooler Site Parameters Option.....	226
Figure 201: Purge old Spool documents Option .....	226
Figure 202: Spool Device for Caché and GT.M.....	227
Figure 203: Spool Device Edit Option .....	227
Figure 204: Device Edit Option—Sample User Dialogue.....	227
Figure 205: Generating Spool Document Name—Sample User Dialogue .....	228
Figure 206: Print File Entries Option—Sample User Dialogue when Sending a Report to the Browser Device.....	229
Figure 207: Print File Entries Option—Sample Domain List report, as Displayed in the Browser Device.....	230
Figure 208: Caché and GT.M Browser Device—TERMINAL TYPE (#3.2) File Entry.....	231
Figure 209: Caché and GT.M Browser Device—DEVICE (#3.5) File Entry .....	232
Figure 210: Device Edit Option—Sample User Dialogue.....	232
Figure 211: Terminal Type Edit Option—Sample User Dialogue.....	232
Figure 212: Edit Devices by Specific Types Option .....	233
Figure 213: Network Channel Device Edit Option .....	234
Figure 214: Network Channel Device Edit Option—Sample Output .....	235
Figure 215: Resource Device Edit Option .....	236
Figure 216: Resource Device—Sample Output.....	236
Figure 217: Slaved Printer—Sample User Dialogue.....	237
Figure 218: Home Device Example (VT320)—DEVICE (#3.5) File Entry .....	238
Figure 219: Home Device Example (VT320)—TERMINAL TYPE (#3.2) File Entry .....	238
Figure 220: Slaved Printer Example: DEC LA50—DEVICE (#3.5) File Entry .....	238
Figure 221: Slaved Printer Example: DEC LA50—TERMINAL TYPE (#3.2) File Entry.....	239

Figure 222: Slaved Printer Example: Epson LQ870—DEVICE (#3.5) File Entry.....	239
Figure 223: Slaved Printer Example: Epson LQ870—TERMINAL TYPE (#3.2) File Entry.....	239
Figure 224: Queuing Output—Sample User Dialogue.....	240
Figure 225: TaskMan User Option .....	241
Figure 226: TaskMan User Option—Sample User Dialogue.....	242
Figure 227: Edit Task Option—Sample User Dialogue.....	244
Figure 228: TaskMan Manager and Submanager Process Flow Diagram.....	248
Figure 229: Site Parameters Edit Option .....	254
Figure 230: Volume Set Edit Option.....	257
Figure 231: Sample Volume Set Setup on FORUM .....	258
Figure 232: UCI Association Table Edit Option .....	260
Figure 233: VOLUME SET (#14.5) File Standardized VA Caché and GT.M Configuration.....	262
Figure 234: UCI ASSOCIATION (#14.6) File—Standardized VA Caché and GT.M Configuration .....	262
Figure 235: TASKMAN SITE PARAMETERS (#14.7) File Standardized VA Caché and GT.M Configuration .....	262
Figure 236: Customized Header Page Routine .....	266
Figure 237: Customized Header Page .....	266
Figure 238: Create TASKMAN .....	267
Figure 239: Create the TASKMAN Directory.....	267
Figure 240: Create System Logical Name for the Directory with the COM Files .....	268
Figure 241: Create System Logical Name for the Directory with the COM Files .....	268
Figure 242: Sample User Dialogue to Retrieve DCL Command Files.....	269
Figure 243: Sample User Dialogue to Edit TaskMan Parameters.....	270
Figure 244: ZTM2WDCL.COM Command File .....	271
Figure 245: ZTMS2WDCL.COM Command File.....	272
Figure 246: Example of OpenVMS User TASKMAN on ALPHA AXP Systems .....	273
Figure 247: Example of OpenVMS TASKMAN Queue .....	273
Figure 248: List Tasks Option .....	274
Figure 249: List Tasks Option Submenu Options .....	275
Figure 250: All your tasks Suboption—Sample of TaskMan Tasks Running .....	275
Figure 251: Dequeue Tasks Option.....	277
Figure 252: Requeue Tasks Option.....	277
Figure 253: Delete Tasks Option.....	278
Figure 254: Cleanup Task List Option .....	278
Figure 255: Monitor Taskman Option .....	279
Figure 256: Sample Monitor TaskMan Screen .....	280
Figure 257: TaskMan Monitor Actions.....	282
Figure 258: Options for Inspecting Tasks in the TaskMan Monitor's Lists .....	283
Figure 259: Check Taskman's Environment Option .....	283
Figure 260: Check TaskMan's Environment Option—First Screen.....	284
Figure 261: Check TaskMan's Environment Option—Second Screen.....	285
Figure 262: Restart Task Manager Option .....	286
Figure 263: Place Taskman in a WAIT State Option .....	286

Figure 264: Remove Taskman from WAIT State Option.....	287
Figure 265: Stop Task Manager Option .....	287
Figure 266: SYNC flag file control Option.....	287
Figure 267: Clean Task File Option.....	288
Figure 268: Print Options Recommended for Queueing and Print Options that are Scheduled to Run Options.....	289
Figure 269: Schedule/Unschedule Options Option.....	290
Figure 270: One-time Option Queue Option.....	294
Figure 271: Show Error Log Option.....	295
Figure 272: Clean Error Log Over Range Of Dates Option.....	296
Figure 273: Purge Error Log Of Type Of Error Option .....	296
Figure 274: Delete Error Log Option .....	296
Figure 275: ^%ZTSCH Global Structure.....	300
Figure 276: TASKS (#14.4) File Nodes (1 of 2).....	301
Figure 277: TASKS (#14.4) File Nodes (2 of 2).....	301
Figure 278: KIDS Menu Options .....	309
Figure 279: Edits and Distribution Menu Options .....	310
Figure 280: Installation Menu Options.....	311
Figure 281: KIDS File Diagram .....	312
Figure 282: KIDS Installation Menu Options.....	315
Figure 283: Load a Distribution Option—Sample User Dialogue .....	316
Figure 284: Loading Transport Globals from a Distribution—Flowchart.....	318
Figure 285: Print Transport Global Option—Sample Printed Transport Global .....	320
Figure 286: Compare Transport Global to Current System Option—Sample Comparison Output .....	321
Figure 287: Compare Transport Global to Current System Option—Sample Comparison Output in Columnar Format .....	322
Figure 288: Queued KIDS Installation—Sample Installation Task .....	323
Figure 289: Answering Installation Questions for a Distribution—Flowchart .....	325
Figure 290: Installation Progress—Sample Output.....	326
Figure 291: KIDS Global Distribution—Sample Message.....	328
Figure 292: Installation of a Global Distribution—Load a Distribution Option.....	329
Figure 293: KIDS Utilities Menu Options .....	331
Figure 294: Build File Print Option—Sample Output .....	332
Figure 295: Install File Print Option—Sample Output .....	333
Figure 296: Edit Install Status Option—Sample User Dialogue .....	334
Figure 297: Convert Loaded Package for Redistribution—Sample User Dialogue (1 of 2) .....	335
Figure 298: Convert Loaded Package for Redistribution—Sample User Dialogue (2 of 2) .....	335
Figure 299: Transport a Distribution—Sample User Dialogue .....	336
Figure 300: Display Patches for a Package Option—Sample User Dialogue .....	337
Figure 301: Purge or Install Files Option—Sample User Dialogue .....	338
Figure 302: Rollup Patches into a Build Option—Sample User Dialogue .....	339
Figure 303: Update Routine File Option—Sample User Dialogue .....	340
Figure 304: Verify a Build Option—Sample User Dialogue.....	341

Figure 305: Multi-Term Lookup Main Menu Options.....	347
Figure 306: Standard Device Chart.....	349
Figure 307: Multi-Term Lookup (MTLU) Option Process Chart.....	350
Figure 308: Multi-Term Lookup (MTLU) Option—Sample User Entries .....	351
Figure 309: Print Utility Option Process Chart .....	352
Figure 310: Print Utility Option—Sample User Entries and Sample Output .....	353
Figure 311: Delete Entries From Look-Up Option—Sample User Entries.....	354
Figure 312: Add Entries To Look-Up File Option Process Chart (1 of 2) .....	355
Figure 313: Add Entries To Look-Up File Option Process Chart (2 of 2) .....	356
Figure 314: Add Entries To Look-Up File Option—Sample User Entries .....	357
Figure 315: Add/Modify Utility Menu Options .....	358
Figure 316: Add/Modify Utility Option—Shortcuts Process Chart (1 of 2) .....	358
Figure 317: Add/Modify Utility Option—Shortcuts Process Chart (2 of 2) .....	359
Figure 318: Add/Modify Utility Option—Keywords Process Chart.....	360
Figure 319: Add/Modify Utility Option—Adding or Editing a Synonym Process Chart (1 of 2)..	361
Figure 320: Add/Modify Utility Option—Adding or Editing a Synonym Process Chart (2 of 2)..	362
Figure 321: Shortcut Option—Sample User Entries .....	362
Figure 322: Keyword Option—Sample User Entries.....	363
Figure 323: Synonym Option—Sample User Entries.....	363
Figure 324: VA FileMan Utility Functions Option—Sample User Entries .....	364
Figure 325: Add Entries To Look-Up File—Sample User Entries .....	365
Figure 326: VA FileMan Edit File Option—Sample User Entries .....	366
Figure 327: General Parameters Tools Menu [XPAR MENU TOOLS].....	372
Figure 328: List Values for a Selected Parameter Option—Sample User Entries and Report..	372
Figure 329: List Values for a Selected Entity Option—Sample User Entries.....	373
Figure 330: List Values for a Selected Entity Option—Sample Report .....	373
Figure 331: List Values for a Selected Package Option—Sample User Entries and Report ....	374
Figure 332: List Values for a Selected Template Option—Sample User Entries and Report ...	374
Figure 333: Edit Parameter Values Option—Sample User Entries .....	375
Figure 334: Edit Parameter Definition Keyword Option—Sample User Entries.....	375
Figure 335: Setting Up the PARAMETER DEFINITION (#8989.51) File.....	376
Figure 336: Use ^XPAREDIT to Enter Value for New Parameter .....	376
Figure 337: Get Value of New Parameter for VistA Application .....	377
Figure 338: Adding a Sample Parameter Template.....	377

## List of Tables

Table 1: Documentation Symbol Descriptions .....	xli
Table 2: User's Toolbox Menu Options and Documentation References.....	11
Table 3: Edit User Characteristics Option—Editable Fields .....	12
Table 4: Edit an Existing User Option—Editable Fields/Attributes .....	34
Table 5: Deactivate a User Option—Editable Fields/Attributes .....	43
Table 6: Kernel Sign-On Log Report Data Values .....	47
Table 7: Kernel Signon Auditing Files .....	52
Table 8: File Access—Security Level Properties .....	57
Table 9: DUZ Array Variables .....	61
Table 10: DEA ePCS Utility—Main Menu Options.....	91
Table 11: Menu Diagramming Options to Discover Tree Roots and Relationships between Options/Suboptions.....	132
Table 12: Menu Manger Variables (Always Defined).....	146
Table 13: Secure Menu Delegation Menu Options .....	157
Table 14: Alert Processing Codes .....	163
Table 15: SERVER ACTION (#221) Field Security Values for Server Requests .....	173
Table 16: OPTION (#19) File Field Values When Setting Up a Server Option.....	173
Table 17: XQSCHK Server Option—Error/Warning Messages.....	178
Table 18: Help System Command Actions .....	181
Table 19: Sample Semicolon-delimited Pieces at the “DEVICE:” Prompt.....	193
Table 20: Alternate Device Attribute Codes.....	196
Table 21: Device-related Files Global Locations .....	198
Table 22: DEVICE File Fields.....	199
Table 23: Device Types in the TYPE Field in the DEVICE (#3.5) File .....	201
Table 24: Queuing Settings.....	201
Table 25: Mixed OS Environment Fields in the DEVICE (#3.5) File.....	202
Table 26: Mixed OS Environment Fields in the KERNEL SYSTEM PARAMETERS (#8989.3) File.....	208
Table 27: Common Fields in the TERMINAL TYPE (#3.2) File.....	210
Table 28: Terminal Type Naming Conventions.....	211
Table 29: Sample Period-delimited Pieces Used for Device Lookup .....	216
Table 30: HFS Input/Output Modes of Operation .....	217
Table 31: HFS-related Fields in the DEVICE (#3.5) File.....	218
Table 32: HFS I/O Operation Modes for Caché and GT.M .....	219
Table 33: User Spooler-related Fields in the NEW PERSON (#200) File .....	225
Table 34: Spooler Site Parameter Fields in the KERNEL SYSTEM PARAMETERS (#8989.3) File.....	226
Table 35: Fields in the DEVICE (#3.5) and TERMINAL TYPE (#3.2) Files that May Not be Relevant for Certain Devices .....	233
Table 36: Escape Sequences Used to Toggle the Slaved Printing Modes for DEC VT220/VT320 Terminals.....	237
Table 37: TaskMan System Configuration Terminology .....	252
Table 38: TASKMAN SITE PARAMETERS (#14.7) File—Field Entries.....	254

Table 39: VOLUME SET (#14.5) File—Field Entries .....	258
Table 40: UCI ASSOCIATION (#14.6) File—Partial and Complete Field Entries .....	261
Table 41: DEVICE (#3.5) file—TaskMan-related Field Entries .....	265
Table 42: Special Queueing Field Settings.....	292
Table 43: Option Scheduling Frequency Code Formats .....	293
Table 44: Day Codes Used in Option Scheduling Frequency Code Formats.....	293
Table 45: Examples of Option Scheduling Frequency Code Formats.....	294
Table 46: ^%ZTSCH (SCHEDULE File) Nodes .....	297
Table 47: TaskMan Task Status Codes .....	302
Table 48: TaskMan Rejection Messages.....	304
Table 49: TaskMan PAUSE States .....	306
Table 50: TaskMan RUN States.....	306
Table 51: KIDS-related Terms and Definitions .....	308
Table 52: Parameter Entities.....	369
Table 53: Templates—Parameter Tools.....	371

## Orientation

### How to Use this Manual

Throughout this manual, advice and instruction are offered about the numerous Kernel 8.0 & Kernel Toolkit 7.3 tools and functionality provided for the Veterans Health Information Systems and Technology Architecture (VistA) system management and end-users (e.g., site parameters).

The *Kernel 8.0 & Kernel Toolkit 7.3 Systems Management Guide* is divided into six major sections, based on the following functional divisions within Kernel/Kernel Toolkit:

- I. [Signon/Security](#) (e.g., techniques for granting user access and monitoring computing activity)
- II. [Menu Manager](#) (e.g., techniques for managing menus)
- III. [Device Handler](#)
- IV. [TaskMan](#)
- V. [Kernel Installation and Distribution System](#)
- VI. [Toolkit](#)



**REF:** For information on developer tools (e.g., Direct Mode Utilities and Application Program Interfaces [APIs]), see the *Kernel 8.0 & Kernel Toolkit 7.3 Developer's Guide*. Kernel and Kernel Toolkit APIs are also available in HTML format at a VA Intranet website.

Information on recommended system configuration and setting Kernel's site parameters, as well as lists of files, routines, options, and other components are documented in the *Kernel 8.0 & Kernel Toolkit 7.3 Technical Manual*.

Information about managing computer security, which includes a detailed description of techniques that can be used to monitor and audit computing activity, is presented in the *Kernel Security Tools Manual*.

Instructions for installing Kernel are provided in the *Kernel Installation Guide*. This guide also includes information about software application management (e.g., *recommended* settings for site parameters and scheduling time frames for tasked options).

This manual is further organized within each section of Kernel in the following order:

1. User Interface—Information of relevance to general end-users.
2. System Management—Information of relevance to system managers.

When a subject is large enough (e.g., Signon/Security), separate chapters are devoted to the “User Interface” and “System Management” topics. In other cases, where the subject matter is smaller (e.g., the discussion of the Browser device), the two divisions of audience are contained entirely within a chapter or sub-chapter.

## Intended Audience

The intended audience of this manual is the following stakeholders:

- Enterprise Program Management Office (EPMO)—VistA legacy development teams.
- System Administrators—System administrators at Department of Veterans Affairs (VA) sites who are responsible for computer management and system security on the VistA M Servers.
- Information Security Officers (ISOs)—Personnel at VA sites responsible for system security.
- Product Support (PS)—Personnel who support Kernel-related products.

## Disclaimers

### Software Disclaimer

This software was developed at the Department of Veterans Affairs (VA) by employees of the Federal Government in the course of their official duties. Pursuant to title 17 Section 105 of the United States Code this software is *not* subject to copyright protection and is in the public domain. VA assumes no responsibility whatsoever for its use by other parties, and makes no guarantees, expressed or implied, about its quality, reliability, or any other characteristic. We would appreciate acknowledgement if the software is used. This software can be redistributed freely provided that any derivative works bear some notice that they are derived from it.



**CAUTION:** Kernel routines should *never* be modified at the site. If there is an immediate national requirement, the changes should be made by emergency Kernel patch. Kernel software is subject to FDA regulations requiring Blood Bank Review, among other limitations. Line 3 of all Kernel routines states:

Per [VA Directive 6402](#) (pending signature), this routine should not be modified.



**CAUTION:** To protect the security of VistA systems, distribution of this software for use on any other computer system by VistA sites is prohibited. All requests for copies of Kernel for *non-VistA* use should be referred to the VistA site's local Office of Information Field Office (OIFO).

### Documentation Disclaimer

This manual provides an overall explanation of using Kernel; however, no attempt is made to explain how the overall VistA programming system is integrated and maintained. Such methods and procedures are documented elsewhere. We suggest you look at the various VA Internet and Intranet SharePoint sites and websites for a general orientation to VistA. For example, visit the Office of Information and Technology (OIT) Enterprise Program Management Office (EPMO) Intranet Website.



**DISCLAIMER:** The appearance of any external hyperlink references in this manual does *not* constitute endorsement by the Department of Veterans Affairs (VA) of this Website or the information, products, or services contained therein. The VA does *not* exercise any editorial control over the information you find at these locations. Such links are provided and are consistent with the stated purpose of this VA Intranet Service.





# Documentation Conventions

This manual uses several methods to highlight different aspects of the material:

- Various symbols are used throughout the documentation to alert the reader to special information. [Table 1](#) gives a description of each of these symbols:

**Table 1: Documentation Symbol Descriptions**

Symbol	Description
	<b>NOTE / REF:</b> Used to inform the reader of general information including references to additional reading material.
	<b>CAUTION / RECOMMENDATION / DISCLAIMER:</b> Used to caution the reader to take special notice of critical information.

- Descriptive text is presented in a proportional font (as represented by this font).
- Conventions for displaying TEST data in this document are as follows:
  - The first three digits (prefix) of any Social Security Numbers (SSN) begin with either “000” or “666”.
  - Patient and user names are formatted as follows:
    - *<Application Name/Abbreviation/Namespace>*PATIENT,<N>
    - *<Application Name/Abbreviation/Namespace>*USER,<N>

Where:

- *<Application Name/Abbreviation/Namespace>* is defined in the Approved Application Abbreviations document.
- <N> represents the first name as a number spelled out and incremented with each new entry.

For example, in Kernel (XU or KRN) test patient and user names would be documented as follows:

KRNPATIENT,ONE; KRNPATIENT,TWO; KRNPATIENT,THREE; ...  
KRNPATIENT,14; etc.

KRNUSE,ONE; KRNUSE,TWO; KRNUSE,THREE; ... KRNUSE,14; etc.

- “Snapshots” of computer commands and online displays (i.e., screen captures/dialogues) and computer source code, if any, are shown in a *non*-proportional font and may be enclosed within a box.
  - User’s responses to online prompts are **boldface** and (optionally) highlighted in yellow (e.g., **<Enter>**).
  - Emphasis within a dialogue box is **boldface** and (optionally) highlighted in blue (e.g., **STANDARD LISTENER: RUNNING**).
  - Some software code reserved/key words are **boldface** with alternate color font.
  - References to “<Enter>” within these snapshots indicate that the user should press the **Enter** key on the keyboard. Other special keys are represented within < > angle brackets. For example, pressing the **PF1** key can be represented as pressing <PF1>.
  - Author’s comments are displayed in italics or as “callout” boxes.



**NOTE:** Callout boxes refer to labels or descriptions usually enclosed within a box, which point to specific areas of a displayed image.

- This manual refers to the M programming language. Under the 1995 American National Standards Institute (ANSI) standard, M is the primary name of the MUMPS programming language, and MUMPS is considered an alternate name. This manual uses the name M.
- Descriptions of direct mode utilities are prefaced with the standard M “>” prompt to emphasize that the call is to be used *only in direct mode*. They also include the M command used to invoke the utility. The following is an example:
  - >D ^XUP
- All uppercase is reserved for the representation of M code, variable names, or the formal name of options, field/file names, and security keys (e.g., XUPROGMODE security key).



**NOTE:** Other software code (e.g., Delphi/Pascal and Java) variable names and file/folder names can be written in lower or mixed case (i.e., CamelCase).

## Documentation Navigation

This document uses Microsoft® Word’s built-in navigation for internal hyperlinks. To add **Back** and **Forward** navigation buttons to your toolbar, do the following:

1. Right-click anywhere on the customizable Toolbar in Word 2007 or higher (*not* the Ribbon section).
2. Select **Customize Quick Access Toolbar** from the secondary menu.
3. Select the drop-down arrow in the “Choose commands from:” box.
4. Select **All Commands** from the displayed list.
5. Scroll through the command list in the left column until you see the **Back** command (circle with arrow pointing left).
6. Select/Highlight the **Back** command and select **Add** to add it to your customized toolbar.
7. Scroll through the command list in the left column until you see the **Forward** command (circle with arrow pointing right).

8. Select/Highlight the **Forward** command and select **Add** to add it to the customized toolbar.
9. Select **OK**.

You can now use these **Back** and **Forward** command buttons in the Toolbar to navigate back and forth in the Word document when selecting hyperlinks within the document.



**NOTE:** This is a one-time setup and is automatically available in any other Word document once you install it on the Toolbar.

## How to Obtain Technical Information Online

Exported VistA M Server-based software file, routine, and global documentation can be generated through the use of Kernel, MailMan, and VA FileMan utilities.



**NOTE:** Methods of obtaining specific technical information online are indicated where applicable under the appropriate section.

**REF:** See the *Kernel 8.0 & Kernel Toolkit 7.3 Technical Manual* for further information.

## Help at Prompts

VistA M Server-based software provides online help and commonly used system default prompts. Users are encouraged to enter question marks at any response prompt. At the end of the help display, you are immediately returned to the point from which you started. This is an easy way to learn about any aspect of VistA M Server-based software.

## Obtaining Data Dictionary Listings

Technical information about VistA M Server-based files and the fields in files is stored in data dictionaries (DD). You can use the List File Attributes option [DILIST] on the Data Dictionary Utilities menu [DI DDU] in VA FileMan to print formatted data dictionaries.



**REF:** For details about obtaining data dictionaries and about the formats available, see the “List File Attributes” chapter in the “File Management” section in the *VA FileMan Advanced User Manual*.

## Assumptions

This manual is written with the assumption that the reader is familiar with the following:

- VistA computing environment:
  - Kernel—VistA M Server software
  - VA FileMan data structures and terminology—VistA M Server software
- Microsoft® Windows environment
- M programming language

## Reference Materials

Readers who wish to learn more about Kernel should consult the following:

- *Kernel Release Notes*
- *Kernel Installation Guide*
- *Kernel 8.0 & Kernel Toolkit 7.3 Systems Management Guide* (this manual)
- *Kernel 8.0 & Kernel Toolkit 7.3 Developer's Guide*
- *Kernel 8.0 & Kernel Toolkit 7.3 Technical Manual*
- *Kernel Security Tools Manual*
- Kernel VA Intranet Website.

This site contains other information and provides links to additional documentation.

VistA documentation is made available online in Microsoft® Word format and in Adobe® Acrobat Portable Document Format (PDF). The PDF documents *must* be read using the Adobe® Acrobat Reader, which is freely distributed by Adobe® Systems Incorporated at: <http://www.adobe.com/>

VistA documentation can be downloaded from the VA Software Document Library (VDL):  
<http://www.va.gov/vdl/>



**REF:** Kernel manuals are located on the VDL at:  
<http://www.va.gov/vdl/application.asp?appid=10>

VistA documentation and software can also be downloaded from the Product Support (PS) Anonymous Directories.

# 1 Introduction

This manual provides descriptive information about Kernel 8.0 & Kernel Toolkit 7.3 for use by system administrators, application developers, Automated Data Processing Application Coordinators (ADPACs), and other end-users.

This manual assumes that the reader is familiar with the computing environment of the VA's Veterans Health Information Systems and Technology Architecture (VistA), and understands VA FileMan data structures and terminology. Some understanding of the M programming language is helpful for some parts of the manual. No attempt is made to explain how the overall VistA programming system is integrated and maintained; such methods and procedures are documented elsewhere. This manual does, however, provide an explanation of Kernel utilities, describing how they can be used to establish a standard user interface, monitor and manage the computer system, customize the environment according to local site needs, and define new areas of computing activities for users.

Kernel is an applications development environment, as well as a run-time environment providing standard services to applications software. It is *not* an operating system, but a set of utilities and associated files that are executed in an M environment. Kernel is central to VA VistA software strategy, in that it permits any VistA software application to run without modification on any hardware/software platform that supports American National Standards Institute (ANSI) Standard M. All operating system-specific or hardware-specific code is isolated to Kernel. Therefore, porting VistA to a new environment requires modification only to a handful of Kernel routines.

As a whole, Kernel provides a computing environment that permits controlled user access, presents menus for choosing from various computing activities, allows device selection for output, enables the tasking of background processes, and offers numerous tools for system management and application programming. Kernel also provides tools for software distribution and installation.

VistA users see the same user interface, regardless of the underlying system architecture, because VistA applications are built using Kernel facilities for signon, database access, option selection, and device selection. As a result, user interaction with the system is constant across VistA applications.

## 1.1 Users

Kernel provides the doorway into the VistA computer system, the menus that tie together the options and utilities to enhance those options.

For the doorway, Kernel provides the 2-Factor Authentication (2FA) system that you use to establish your identity to the VistA computer system.

Once you have signed on, Kernel provides your menus. Each user on the computer system, as identified by their Microsoft® Windows Active Directory profile, has their own individual set of menus and options.

The person or department managing the computer system organizes each user's menus. From your menu, you can run any application the computer system managers have made available to you. Kernel's menu system is what is used to make VistA applications (e.g., Scheduling, Nursing, and Personnel) available to users.

To produce output from VistA applications (e.g., to printers or to the terminal screen), Kernel provides a common device interface called the Device Handler. To queue a job rather than run it directly, the Device Handler links to a common queuing system called TaskMan.

This manual contains information about these and other parts of Kernel. The intent of this manual is to help you learn to use Kernel and take fullest advantage of the facilities it provides. This manual also includes information for system managers and developers; to find the information of interest to you, the general user, look for chapters and sub-chapters containing the phrase "User Interface" in their titles.

ADP Application Coordinators (ADPACs) may want to skim through the *Kernel 8.0 & Kernel Toolkit 7.3 Systems Management Guide* and concentrate on the user interface chapters and sub-chapters, particularly issues concerning every Kernel user (e.g., signon process and menu navigation).

## 1.2 System Managers

Kernel provides the backbone of an M computing platform, providing a mechanism to organize M programs as options, and a way to organize those options into a menu system for users. Kernel provides the following major system management components:

- Alerts provide an integrated notification system.
- Device Handler provides a common device interface.
- Electronic Signature Codes provide a secure electronic approval system.
- File Access Security system manages access to VA FileMan files.
- Kernel Installation and Distribution System (KIDS) provides an application distribution and installation system.
- Menu Manager provides a common menu management system.
- Signon/Security organizes users and allows secure logons.
- TaskMan provides a common job queuing system.

Kernel provides the system manager the means to manage a secure, multi-user M-based computer system. Some typical daily tasks performed by system managers using Kernel system management tools include:

- Setting up accounts for new users and terminating accounts for expired users.
- Adding and subtracting options from users' menus.
- Controlling file access for users.
- Monitoring TaskMan task queues.
- Terminating unwanted tasks.
- Monitoring devices.
- Creating and modifying links to output devices in the DEVICE (#3.5) file.
- Installing software applications.

Within chapters and sub-chapters of this manual you can find general user information in the "User Interface" section and system manager information in the "System Management" section.



**REF:** For information on developer tools (e.g., Direct Mode Utilities and Application Program Interfaces [APIs]), see the *Kernel 8.0 & Kernel Toolkit 7.3 Developer's Guide*. Kernel and Kernel Toolkit APIs are also available in HTML format at a VA Intranet Website.

Information on recommended system configuration and setting Kernel's site parameters, as well as lists of files, routines, options, and other components are documented in the *Kernel 8.0 & Kernel Toolkit 7.3 Technical Manual*.

Information about managing computer security, which includes a detailed description of techniques that can be used to monitor and audit computing activity, is presented in the *Kernel*

*Security Tools Manual.*

Instructions for installing Kernel are provided in the *Kernel Installation Guide*. This guide also includes information about software application management (e.g., recommended settings for site parameters and scheduling time frames for tasked options).

# I. Signon/Security

## 2 Signon/Security: User Interface

The first step you take each time you access the computer system is called signing on. When you sign on to the VistA computer system, you are required to use the appropriate user credentials:

- Access and Verify codes
- 2-Factor Authentication (2FA)—Digital certificate in a VA-approved smart card, such as the Personal Identification Verification (PIV) smart card plus a Personal Identification Number (PIN).



**NOTE:** Access and Verify codes is the fallback signon in cases when 2FA signon is *not* available.

These credentials identify you to the computer system, and, as these credentials are private to you, serve to prevent unauthorized access to your account.



**NOTE:** Because Access and Verify code authentication is less secure than 2FA, their use may be deprecated and disabled at some future date.

You are shielded from most steps in the signon process. In the background, Kernel's Signon/Security does the following:

- Establishes the proper environment.
- Records and monitors the signon event.
- Takes you to Menu Manager, which presents a list of menu options that let you interact with other parts of Kernel and software applications.

When you complete a session on the computer system, you sign out to exit.

### 2.1 Signing On

To authenticate yourself to VistA (Kernel's "front door"), you need to sign onto the system. The user signon (authentication) interface varies based on the type of Vista application software being run:

- 2-Factor Authentication (2FA)—VistA supports delegated 2-Factor Authentication (2FA) through Identity and Access Management (IAM). A smart card containing Public Key Infrastructure (PKI) digital certificates combined with a private security is used to authenticate and uniquely identify the user. The user is prompted for a Personal Identification Number (PIN) to unlock the security key and authenticate. This method of authentication provides a higher level of security and takes precedence over all other forms of authentication. As client applications are migrated to 2-Factor Authentication (2FA), other forms of authentication may be deprecated and disabled.
- Character User Interface (CHUI)-based applications—This includes M-based roll-and-scroll applications used to access Kernel on the VistA M Server (e.g., Laboratory, Pharmacy). With this type of authentication interface, users are first prompted with an "ACCESS CODE:" prompt. Entering an Access code and pressing the <Enter> key brings up the "VERIFY CODE:" prompt.



**REF:** For a sample of the roll-and-scroll signon prompts, please see [Figure 1](#).



- Graphical User GUI client/server applications—This includes rich client or client/server applications used to access Kernel on the VistA M Server via RPC Broker (Delphi/Pascal)- or VistALink (Java)-based components (e.g., Computerized Patient Record System [CPRS] or Care Management). With this type of authentication interface, users are presented with a GUI signon dialogue box. Users can click in or tab to the Access and Verify code entry fields and press **OK**.



**REF:** For a sample of the RPC Broker signon dialogue box and more information on RPC Broker, see the RPC Broker documentation located on the VA Software Document Library (VDL) at: <http://www.va.gov/vdl/application.asp?appid=23>

- Web-based applications—This includes Web-based applications that use a client Web browser and Kernel Authentication and Authorization Java (2) Enterprise Edition (KAAJEE) to access Kernel on the VistA M Server (e.g., Blind Rehab). With this type of authentication interface, users are presented with a GUI signon dialogue Web page. Users can click in or tab to the Access and Verify code entry fields and press **Login**.



**REF:** For a sample of the KAAJEE signon dialogue Web page and more information on KAAJEE, see the KAAJEE documentation located on the VA Software Document Library (VDL) at: <http://www.va.gov/vdl/application.asp?appid=151>

Figure 1 shows a sample of the roll-and-scroll signon prompts. Your Access code establishes your unique identity to Kernel. Your matching Verify code corroborates your identity completing the VistA Kernel authentication process. Asterisks only are displayed when you enter your Access and Verify codes, so that the actual characters are *not* displayed (echoed back) on the screen. Codes are encrypted after they are entered and compared with the encrypted stored values for a match.



**REF:** For a description of valid and strong Verify code, see the “[Defining a Strong Verify Code](#)” section.

**Figure 1: Signing on to VistA—Sample Roll-and-Scroll User Authentication Dialogue**

```

ACCESS CODE: *****
VERIFY CODE: *****
Device: _TNA8628: <Enter>
Not a valid ACCESS CODE/VERIFY CODE pair.

```

**An invalid Access and Verify code pair produces an error.**

```

ACCESS CODES: *****
VERIFY CODES: *****
Good evening FRIEND      You last signed on Apr 21,1992 at 07:57

There was 1 unsuccessful attempt since you last signed on:

You were last executing the 'MailMan Menu' menu option.
Do you wish to resume? YES//

```

Entering a valid Access and Verify code combination completes the signon authentication process and takes you beyond Signon/Security into Kernel’s Menu Manager (or other security role-based access keys) used to authorize your appropriate level of access to data or application functionality.

If you have *not* been assigned a primary menu, Kernel displays a message indicating that access is *not* allowed, and signs you out from the computer system. Similarly, if your primary menu has been marked as “out-of-order” (an option attribute), Kernel also denies you access (see [Figure 2](#)).



**REF:** For more information on primary menus, see the “[Menu Manager](#)” section.

**Figure 2: Access Denied Due to No Primary Menu or Menu “Out of Order” Message**

```
ACCESS CODES: *****
VERIFY CODES: *****
No access allowed for this user.
```

## 2.1.1 Defining a Strong Verify Code

While Access codes are a unique identifier (i.e., username) for your user record in Kernel’s NEW PERSON (#200) file, Verify codes are secret passwords assuring that the person signing on is the one for whom the user record was established. You rarely need to be issued a new Access code, but you *must* change your Verify code (i.e., password) if you suspect that someone else has used it to gain access to the system or when your Verify code has expired (i.e., every **90** days or less). You can change your Verify code with the Edit User Characteristics option [XUEDITSELF], which is available from the Common menu User’s Toolbox menu.



**NOTE:** Kernel records all signons to VistA using appropriate user credentials via either of the following methods:

- Access and Verify codes.
- 2-Factor Authentication (2FA)—Digital certificate in a VA-approved smart card, such as the Personal Identification Verification (PIV) smart card plus a Personal Identification Number (PIN).

Once a user starts using PIV for all access to VistA, their Verify code will expire after **90** days. An expired Verify code will *not* prevent access to VistA through PIV+PIN. If for some reason the user later needs to access VistA with their Access and Verify codes, the first time they sign on with their expired Verify code they will be prompted to reset their Verify code before continuing.



**REF:** For more more information on using the Edit User Characteristics option [XUEDITSELF] to reset the Verify code, see the “[Edit User Characteristics Option](#)” section.



**REF:** For more information on Verify code expiration dates, see Section [3.1.2.9, LIFETIME OF VERIFY CODE.](#)”

As of Kernel patch XU\*8.0\*180, *strong* Access and Verify codes *must* adhere to the following criteria:

- Access and Verify codes *cannot* be identical.
- Verify codes (i.e., passwords) *must* be at least **8** characters in length. A *minimum* of **15** characters is *recommended*, and may be enforced at a later date.

- Strong passwords in general contain at least three of the following four character types:
  - Uppercase letters
  - Lowercase letters
  - Numbers
  - Special characters/symbols that are neither letters nor numbers (e.g., -, \_ #, &, \$, \*, @)



**NOTE:** The caret (^) is a reserved symbol and *cannot* be used as part of a Verify code. Also, some *non-VistA*-based systems restrict certain special characters/symbols used as part of a username or password.

Because VistA is case-insensitive, VistA only has three sets of characters from which to build a strong Verify code (i.e., password):

- Letters (of any case)
- Numbers
- Special characters/symbols that are neither letters nor numbers (e.g., -, \_ #, &, \$, \*, @)



**NOTE:** Some *non-VistA*-based systems restrict certain special characters/symbols used as part of a username or password.

- Verify codes *must* be changed at least every **90** days (or less). You *must* change your Verify code at periodic intervals as specified by the system administrators. Information systems shall *not* permit re-assignment of the last three passwords used. When required, you are prompted during signon to pick a new Verify code.



**REF:** For more information on Verify code expiration dates, see Section [3.1.2.9, LIFETIME OF VERIFY CODE.](#)”

- Accounts that have been inactive for **90** days shall be disabled.
- To preclude password guessing, an intruder lockout feature shall suspend accounts after **five** invalid attempts to log on:
  - Where around-the-clock system administration service is available, system administrator intervention shall be required to clear a locked account.
  - Where around-the-clock system administration service is *not* available, accounts shall remain locked out for at least **ten** minutes.



**NOTE:** These rules are taken from the *VA Account and Password Management Interim Policy* document.

All of these restrictions are enforced whenever Access or Verify codes are created or changed.

These changes were made to meet [VA Directive 6500](#) and [VA Handbook 6500](#).



**REF:** For more tips and general advice regarding Access and Verify codes and security in general, see the *Kernel Security Tools Manual*.

### 2.1.1.1 Why Longer Passwords?

Passwords used to access VA systems *must* be at least **8** characters long because longer passwords are stronger, and thus, harder to guess than shorter ones. While VistA currently supports **8**-character passwords (Verify codes), current security policy *recommends* that a minimum of **15** characters be used. This policy will be enforced in a future VistA Kernel patch.

The more tries it takes a hacker or a program to guess a password, the more secure the system is. Adding just one character to the length of a password greatly increases the difficulty of guessing the password.

For an **8**-character password made up of letters and numbers (assuming you can repeat characters and that there are no restrictions, such as requiring the first character to be a letter), there are **36** possibilities for the first position, **36** possibilities for the second position, **36** possibilities for the third position, and so on. Thus, there are **36 x 36 x 36 x 36 x 36 x 36 x 36 x 36 = 2,821,109,907,456** possibilities for an **8**-character password.

If you have forgotten your Verify code (password), the site's Information Security Officer (ISO) should delete the existing Verify code, and then instruct you to sign on again. At the "Verify code" prompt simply press the <Enter> key without making any other entries. You are prompted to enter a new Verify code and then re-prompted to enter the same Verify code again as confirmation. If you do *not* want to bother inventing a Verify code, entering a question mark (?) at the Verify code prompt displays a possible although cryptic choice (e.g., DKMI&493). Entering a question mark a second time displays another choice. When you log off, you're reminded to remember the new Verify code for use at your next signon.

### 2.1.2 LOGIN Menu Template

You can execute a script of options on your first signon of the day by having a MENU template called LOGIN.



REF: For more information, see the "[Menu Manager: User Interface](#)" chapter.

### 2.1.3 Signon Shortcuts

In roll-and-scroll VistA, to reach the primary menu in one step at the "ACCESS CODES:" prompt, you can enter the Access and Verify code as one string separated by a semicolon:

**Figure 3: Entering the Access and Verify Codes at the Same Time**

```
ACCESS CODES: ACCESSCODE;VERIFYCODE
Good afternoon.      You last signed on today at 12:00
```

To "jump start" directly to a particular option, you can specify the name of an option after another semicolon:

**Figure 4: Entering the Access and Verify Codes at the Same Time and Jumping Directly to a Specified Option**

```
ACCESS CODES: ACCESSCODE;VERIFYCODE;INTRO
Good afternoon.      You last signed on today at 12:00
INTROductory text edit
```

To force the Kernel query of the terminal type identity, you can include a colon anywhere in the string.



REF: If you want to avoid the terminal type query, see the "[Terminal Type Prompt](#)" section.

## 2.1.4 Normal Signoff

When you complete a session on the computer system, you should sign off the system so that no one can come along and use the computer system under your identity. There are several ways you can sign off of the system.

**Figure 5: System Commands: Menu Options for Signoff**

SYSTEM COMMAND OPTIONS	[ XUCOMMAND ]
Halt	[ XUHALT ]
Continue	[ XUCONTINUE ]
Restart Session	[ XURELOG ]

One way to sign off is to enter “halt” at any menu prompt. When you sign off using “halt,” at next signon, after entering Access and Verify codes, your normal primary menu is your first menu.

Or, to sign off, you can enter “continue.” At your next signon, after entering Access and Verify codes, your last-used menu when you signed off is your first menu for that session.

If remotely connected via modem or other network device, you can enter “restart” to sign out of Kernel without dropping the communication line.

Finally, you can sign off without using any of these shortcuts simply by pressing <Enter> at each menu prompt to step back up the menu pathway and finally exit.



**REF:** For more information on menus and menu prompts, see the “[Menu Manager: User Interface](#)” section.

## 2.1.5 Abnormal Signoff and Error Handling

If you encounter an error while using the VistA computer system, Kernel traps it, issue the message “Sorry ‘bout that”, and attempt to return you to your primary menu. Kernel can recover from most error conditions and, given a suitable environment, permits you to continue. Some error conditions, however, cause an abnormal exit such that you are immediately logged off the computer system. When this happens, you can sign on again if you still need to use the computer system.

## 2.1.6 Terminal Type Prompt

When signing on, you may be prompted to enter a terminal type. You should *not* see this prompt very often, however, since Kernel usually can identify your terminal type without needing to prompt you to enter one. If you are prompted, you should enter the name of the actual terminal type to use (e.g., C-VT220). The entered terminal type tells Kernel how to support screen-oriented and other enhanced displays. If unusual circumstances arise and the wrong terminal type is in effect, you can redefine it by using the Edit User Characteristics option [XUEDITSELF] (available through the User’s Toolbox menu).

The Edit User Characteristics option [XUSEREDITSELF] lets you edit a setting (ASK DEVICE TYPE AT SIGN-ON) that allows you to decide whether to bypass the usual terminal type query. If you always work at the same terminal and want to save a small amount of time during the signon process, you can set ASK DEVICE TYPE AT SIGN-ON to **DON’T ASK**. Kernel then assumes that your last terminal type should be used as the default.

If you have ASK DEVICE TYPE AT SIGN-ON set to **DON’T ASK**, and sign on using a terminal whose terminal type is different from the one normally used, you should signon by including a colon (: ) after your Access code. This forces Kernel to query the terminal for its identity. Alternatively, once signed on, you could invoke the Edit User Characteristics option [XUSEREDITSELF] to change your terminal type

to the one currently in use. Or, you could use this option to reset the ASK DEVICE TYPE AT SIGN-ON question to **ASK**, log off and sign back on (whereby Signon/Security obtains the correct terminal type identification).



**REF:** For more more information on the Edit User Characteristics option [XUEDITSELF], see the [“Edit User Characteristics Option”](#) section.

## 2.2 Escaping from a Jumbled Screen

One consequence of your signon terminal type *not* matching the actual one being used is that full-screen display could appear jumbled. To escape from a ScreenMan form (e.g., Edit User Characteristics), all you need to do is enter two carets (^), each followed by the <Enter> key. To escape from VA FileMan’s Screen Editor, you should press <PF1>E to exit.

## 2.3 Alerts

After signing on, you could be presented with an alert notice just before the menu prompt. If so, you need to pick the View Alerts “VA” option [XQALERT] for viewing alerts to take care of urgent, pending matters.



**REF:** For more information about alerts, see the [“Alerts”](#) chapter.

**Figure 6: System Commands: View Alerts “VA” Option**

```
SYSTEM COMMAND OPTIONS ... [XUCOMMAND]
View Alerts "VA"           [XQALERT]
```

## 2.4 User’s Toolbox Menu

The User’s Toolbox menu [XUSERTOOLS] is available from any menu prompt, by entering the toolbox synonym (e.g., “TBOX”) or “User’s Toolbox.” It makes available, from one menu, some of the most frequently used Kernel options.

**Figure 7: User’s Toolbox Menu Options**

```
Select User's Toolbox Option:

Change my Division [XUSER DIV CHG]
Display User Characteristics [XUSERDISP]
Edit User Characteristics [XUSEREDITSELF]
Electronic Signature code Edit [XUSESIG]
Menu Templates ... [XQTUSER]
Spooler Menu ... [XU-SPL-MENU]
  **> Locked with XUMGR
Switch UCI [XU SWITCH UCI]
TaskMan User [XUTM USER]
User Help [XUSERHELP]
```

[Table 2](#) lists the options contained in the User’s Toolbox menu and the chapters where each option is described:

**Table 2: User’s Toolbox Menu Options and Documentation References**

Option Text	Chapter Described
Change my Division [XUSER DIV CHG]	<a href="#">Signon/Security: User Interface</a>
Display User Characteristics [XUSERDISP]	<a href="#">Signon/Security: User Interface</a>
Edit User Characteristics [XUSEREDITSELF]	<a href="#">Signon/Security: User Interface</a>
Electronic Signature code Edit [XUSESIG]	<a href="#">Electronic Signatures</a>
Menu Templates [XU-SPL-MENU]	<a href="#">Menu Manager: User Interface</a>
Spooler Menu [XU-SPL-MENU] (locked with XUMGR security key)	<a href="#">Spooling</a>
Switch UCI [XU SWITCH UCI]	<a href="#">Signon/Security: User Interface</a>
TaskMan User [XUTM USER]	<a href="#">TaskMan: User Interface</a>
User Help [XUUSERHELP]	(accesses online help)

## 2.5 Change my Division Option

The Change my Division option [XUSER DIV CHG] allows users to select from a list of divisions, if any, stored for that user in the NEW PERSON (#200) file.

## 2.6 Edit User Characteristics Option

The Edit User Characteristics option [XUSEREDITSELF] is one of the options available from the User's Toolbox menu. It allows you define some characteristics of your online environment via ScreenMan, as shown in [Figure 8](#):

**Figure 8: Edit User Characteristics Option—ScreenMan Form**

```

                                EDIT USER CHARACTERISTICS
NAME: XUUSER,ONE                                PAGE 1 OF 1
-----
                                INITIAL: OX                                PHONE:
                                NICK NAME: ONE                            OFFICE PHONE: (555) 555-5555
                                TITLE: DOCTOR                            VOICE PAGER:
                                DIGITAL PAGER:
ASK DEVICE TYPE AT SIGN-ON: DON'T ASK
                                AUTO MENU: YES, MENUS GENERATED
                                TYPE-AHEAD: ALLOWED
                                TEXT TERMINATOR:
                                PREFERRED EDITOR: SCREEN EDITOR - VA FILEMAN
                                NETWORK USERNAME: VHAIXXUUSERO
                                ELECTRONIC SIGNATURE CODE: <Hidden>
Want to edit VERIFY CODE (Y/N):
-----
Exit      Save      Refresh
Enter a command or '^' followed by a caption to jump to a specific field.
COMMAND:                                Press <PF1>H for help      Insert



```

There are a number of NEW PERSON (#200) file field values that you can edit with the Edit User Characteristics option [XUEDITSELF]:

**Table 3: Edit User Characteristics Option—Editable Fields**

Field	Description
INITIAL (#1)	Enter your initials, which can serve as an alternate way for users to specify your account (e.g., when sending mail to you).
NICK NAME (#13)	Enter a nick name, which can serve as an alternate way for users to specify your account (e.g., when sending mail to you).
TITLE (#8)	Enter a title from a given list of choices or enter a new TITLE.
Telephone Contact Information: <ul style="list-style-type: none"> <li>PHONE (HOME) (#.131)</li> <li>OFFICE PHONE (#.132)</li> <li>VOICE PAGER (#.137)</li> <li>DIGITAL PAGER (#.138)</li> </ul>	Enter the appropriate phone numbers in the fields indicated.
ASK DEVICE TYPE AT SIGN-ON (#200.05)	This field controls whether Kernel should determine what kind of terminal you are using when you sign on. If this is set to DON'T ASK, Kernel assumes you are using the same kind of terminal you used the last time you signed on. This can cause problems if you are using a



Field	Description
	different kind of terminal (screen displays may <i>not</i> work properly), so this should normally be set to ASK.
AUTO MENU (#200.06)	This field determines whether, in the menu system, a list of items on the current menu is displayed with the menu prompt. Beginning users should usually set AUTO MENU to YES so that they can see menu items for each menu. Experienced users who are familiar with their menus may prefer to set this field to <b>NO</b> , which makes menu displays speedier, since individual items on each menu are <i>not</i> displayed.
TYPE-AHEAD (#200.09)	This field controls whether characters you type faster than the system can process end up being processed or not. Normally you should set TYPE-AHEAD to <b>YES</b> , so that keystrokes you enter are <i>not</i> lost due to system slowness.
TEXT TERMINATOR (#31.2)	<p>The TEXT TERMINATOR is a setting used by VA FileMan's Line Editor. When you are using the Line Editor and are importing text from an external source, you may <i>not</i> want a blank line to indicate the end-of-file, which could prematurely terminate the text transfer. By default, the TEXT TERMINATOR in VA FileMan's Line Editor is the carriage return character (&lt;Enter&gt;). Setting this to another character string, like ZZ (something that is <i>not</i> encountered in the target text) can permit downloading without interruption. If you change the setting of the TEXT TERMINATOR from the default of the carriage return character, you need to remember your TEXT TERMINATOR when using the Line Editor; otherwise, you are unable to exit the Line Editor.</p> <p> <b>REF:</b> For more information on the TEXT TERMINATOR, see the <i>VA FileMan User Manual</i>.</p>
PREFERRED EDITOR (#31.3)	Users can choose which text editor Kernel uses when you edit word-processing fields on the system. You can choose any editor defined on your system.
NETWORK USERNAME (#501.1)	<p>Enter your network user name. This is the username that is used by the Windows Active Directory (AD). It allows VISN data extracts to link the VistA user with their network user name.</p> <p>Format:  "VHA" + 3 character station ID + first 5 characters of last name + first character of first name</p> <p>For example, for user One Xuuser at Station ID 999, the network user name would be:  VHA999XUUSEO</p> <p>Holders of the XUMGR security key can override this field.</p> <p> <b>NOTE:</b> This field was added to the NEW PERSON (#200) file with Kernel patch XU*8.0*514.</p>
ELECTRONIC SIGNATURE CODE (#20.4)	Enter a new electronic signature code. This is a code (similar to a password) used to electronically sign documents within VistA. When you press <b>Enter</b> , the code is hidden for security purposes.
VERIFY CODE (#7.2)	Users can change their VERIFY CODE by answering <b>YES</b> to this field. First enter your current VERIFY CODE; then, enter a new VERIFY

Field	Description
	CODE. You are asked to confirm the new VERIFY CODE by entering it a second time; if you confirm it, the new VERIFY CODE takes effect immediately.

## 2.7 Display User Characteristics Option

The Display User Characteristics option [XUUSERDISP], like Edit User Characteristics option [XUSEREDITSELF], is an option in the User's Toolbox menu. It prints out a description of many of the characteristics of your current computing environment, including some of the characteristics that can be set through the Edit User Characteristics option [XUSEREDITSELF].

**Figure 9: Display User Characteristics Option—Sample Output and User Dialogue**

```
XUUSER,TWO (#9999)  DEVICE: DEVICE: TELNET ($I: TNA730:)  JOB: 541754169

ENVIRONMENT                ATTRIBUTES
-----
Site ..... TESTSITE      Type-ahead ..... Y
UCI ..... KRN,KDE        Time-out ..... 300
Signed on ... 08:48       Fileman code(s).. #
Terminal type C-VT100

Person Class: Physicians (M.D. and D.O.)
                Physician/Osteopath
                Pathology, Anatomic

KEYS HELD
-----
XMMGR                XUPROG                XUPROGMODE

MENU PATH
-----
SYSTEM COMMAND OPTIONS (XUCOMMAND)
  User's Toolbox (XUSERTOOLS)
  Display User Characteristics (XUUSERDISP)

'^' to escape, <CR> to view Mailman user info: <Enter>

Current Banner: Technical Writer
Last used MailMan: 07/12/06@15:09
NEW messages: 274 (274 in the IN basket)

Office phone: (555) 555-5555
Fax: (555) 555-5555
Add'l phone: (555) 555-5555
Add'l phone: (555) 555-5555

Introduction:
My name is One Xmuser and I am one of the Technical Writers for the
Common Services (CS) products/projects (e.g., Broker, Components,
Kernel, VA FileMan, MailMan, Toolkit).

Mail Groups:
FO-SITE STAFF (Public)
KERNEL PROGRAMMERS (Public)
```

## 2.8 Switch UCI Option

The Switch UCI option [XU SWITCH UCI] allows users to select from a list of UCIs, if any, stored for that user in the NEW PERSON (#200) file.

## 2.9 Summary

VistA's Kernel's Signon/System Security module provides the means for signing into Kernel with a unique identity. Once you complete the signon process, you are sent to Kernel's menu system, where you can run any option your system manager has placed in your menus. When you finish a computer session, always be sure to sign off; this protects your account from misuse by someone else.

## 3 Signon/Security: System Management

This section describes the system management tools for Kernel's Signon/Security module.

### 3.1 Signon Process

If signons are enabled, as shown in the Signon Flow Chart in [Figure 13](#), the signon process begins with a gathering of information from the KERNEL SYSTEM PARAMETERS (#8989.3) file and then from the DEVICE (#3.5) file to determine whether to allow signon for this session and, if so, how to create an appropriate environment. If, for example, the MAX SIGNON ALLOWED limit has been reached, the signon attempt fails. If the current device is tied to a routine (as specified in the TIED ROUTINE field of the DEVICE [#3.5 file]), that routine is executed and the session is halted. If *not*, the user is prompted for Access and Verify codes. After a successful signon, attributes for that user are then retrieved from the NEW PERSON (#200) file. Signon/Security then sends the user to Menu Manager. If a primary menu is associated with the device (PRIMARY MENU OPTION field in the DEVICE [#3.5] file), that menu is presented. Otherwise, the user's primary menu is presented. If the user does *not* have a primary menu (the PRIMARY MENU OPTION field in the NEW PERSON [#200] file is **NULL**), the session is halted.

The signon flow chart in this section (see [Figure 13](#)) illustrates the procedural steps taken by Kernel's Signon/Security system to determine whether to permit signons and, if so, how to create an appropriate computing environment. Typically, after site parameters and device characteristics are checked:

1. System prompts the user for their Access and Verify codes. Alternatively, client applications that are enabled to use 2-Factor Authentication (2FA) will automatically enter a Security Assertion Mark-up Language (SAML) token obtained from Identity and Access Management (IAM) instead of an Access and Verify code to authenticate and identify the user.
2. System collects user attributes.
3. System presents a primary menu prompt to the user.

#### 3.1.1 Introductory Text

Before gathering system parameters or prompting for Access and Verify codes, Signon/Security displays contents of the INTRO TEXT field in the KERNEL SYSTEM PARAMETERS (#8989.3) file. The text can be edited with the Enter/Edit Kernel Site Parameters option [XUSITEPARM] or with the Introductory text edit option [XUSERINT], an option specially designed for this purpose).

**Figure 10: Introductory text edit Option**

SYSTEMS MANAGER MENU ...	[ EVE ]
Operations Management ...	[ XUSITEMGR ]
Introductory text edit	[ XUSERINT ]

### 3.1.2 Parameters Checked during Signon

Various parameters are checked as an initial step in the signon process. The KERNEL SYSTEM PARAMETERS (#8989.3) file stores the default values for most of the parameters. Values for critical fields should be defined by system administrators when Kernel is installed. The values in the KERNEL SYSTEM PARAMETERS (#8989.3) file can be edited any time, though, with the Enter/Edit Kernel Site Parameters option [XUSITEPARM].

Figure 11: Enter/Edit Kernel Site Parameters Option

```
SYSTEMS MANAGER MENU ... [EVE]
Operations Management ... [XUSITEMGR]
  Kernel Management Menu ... [XUKERNEL]
    Enter/Edit Kernel Site Parameters [XUSITEPARM]
```

Figure 12: Enter/Edit Kernel Site Parameters Option—ScreenMan Form 1

```
Kernel Site Parameter edit
DOMAIN:XXX.FO-SITE.MED.VA.GOV

DEFAULT # OF ATTEMPTS: 3          AGENCY CODE: VA
DEFAULT LOCK-OUT TIME: 600
DEFAULT MULTIPLE SIGN-ON: Only one  MULTIPLE SIGN-ON LIMIT: 2
  DEFAULT AUTO-MENU: YES          DEFAULT AUTO SIGN-ON: Disabled
  DEFAULT LANGUAGE: 1
  DEFAULT TYPE-AHEAD: YES
DEFAULT TIMED-READ (SECONDS): 300      BROKER TIMEOUT: 180

  BYPASS DEVICE LOCK-OUT: NO          CCOW TOKEN TIMEOUT:6000:
  LIFETIME OF VERIFY CODE: 90        ASK DEVICE TYPE AT SIGN-ON: YES
  DEFAULT INSTITUTION: SAN FRANCISCO
  AUTO-GENERATE ACCESS CODES: NO
  LOG RESOURCE USAGE?: YES

-----
Exit      Save      Next Page      Refresh

Enter a command or ``^`` followed by a caption to jump to a specific field.

COMMAND:                                     Press <PF1>H for help Insert
```

#### 3.1.2.1 Signon Attempts and Device Lock-out Times

The DEFAULT # OF ATTEMPTS field in the KERNEL SYSTEM PARAMETERS (#8989.3) file holds the default limit of the number of times a user can try to enter a valid Access and Verify code pair. When the limit is reached, Signon/Security is unresponsive for the duration specified by the DEFAULT LOCK-OUT TIME field. The values for number of attempts and lock-out time are overridden by any values for the current device specified by comparable fields in the DEVICE (#3.5) file. Device values are ignored, however, if the BYPASS DEVICE LOCK-OUT site parameter in the KERNEL SYSTEM PARAMETERS (#8989.3) file is set to **YES**. In particular, the fields that are bypassed are OUT-OF-SERVICE DATE, SECURITY, and PROHIBITED TIMES FOR SIGN-ON. Device values are put back into effect for the current device if the DEVICE file's PERFORM DEVICE CHECKING field is set to **YES**.

### 3.1.2.2 MAX SIGNON ALLOWED

One Kernel site parameter used in the initial signon screening is MAX SIGNON ALLOWED. It is a field within the VOLUME SET Multiple field in the KERNEL SYSTEM PARAMETERS (#8989.3) file. Its value sets an upper limit for number of M processes (interactive, background, and system) that can run concurrently on the specified Volume Set or CPU. The TASKMAN JOB LIMIT, a field in the TASKMAN SITE PARAMETERS (#14.7) file, should be set to a number slightly lower than MAX SIGNON ALLOWED to leave room for a few interactive logons when TaskMan is busiest.



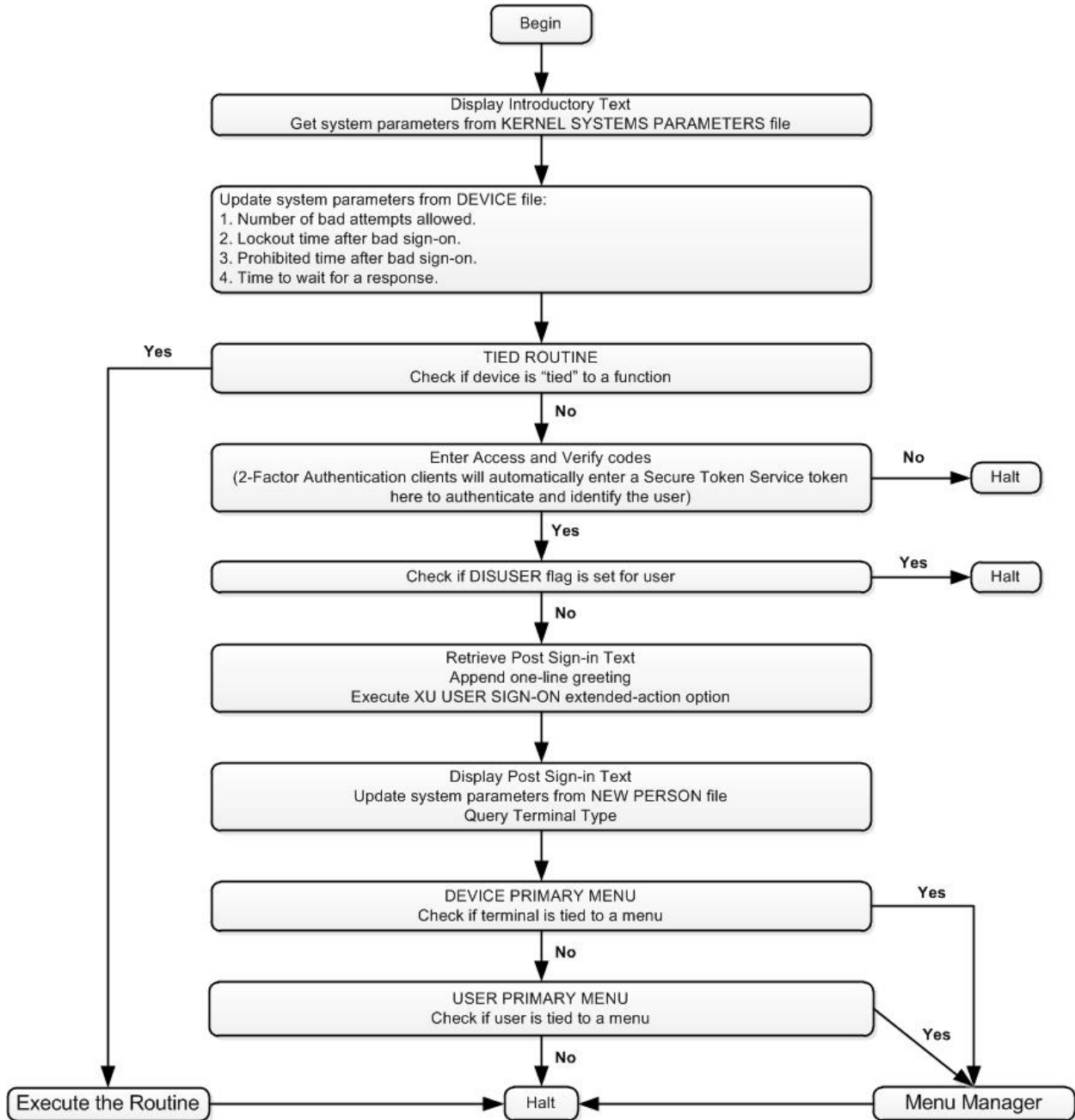
**NOTE: OpenVMS Sites:** The OpenVMS interactive logins parameter (set by the DCL command **SET LOGINS/INTERACTIVE**) should be set to a number less than the Kernel MAX SIGNON ALLOWED to conserve system resources. If the OpenVMS limit is set too high in relation to the Kernel limit, users try to access Kernel only to be rejected when reaching Signon/Security. That means that they would waste system resources by creating a new OpenVMS process and activating a Caché image, all to no avail.

**REF:** For more information about alerts, see “[Alerts.](#)”

### 3.1.2.3 PROHIBITED TIMES FOR SIGN-ON

Time periods can be specified, during which interval signons can be barred by device or by user. This is controlled by the PROHIBITED TIMES FOR SIGN-ON field in the DEVICE (#3.5) file and a comparable field in the NEW PERSON (#200) file.

**Figure 13: Kernel Signon Flow Chart**



### 3.1.2.4 Multiple Sign-On Restriction

The DEFAULT MULTIPLE SIGN-ON field in the KERNEL SYSTEM PARAMETERS (#8989.3) file controls whether users can create two or more simultaneous sessions by signing on to more than one device. The setting is overridden by comparable fields in the DEVICE (#3.5) and NEW PERSON (#200) files, respectively. The value is checked at signon to prevent unauthorized multiple sessions.

If multiple signons are prohibited, problems can occur if users experience an abnormal exit such that the signon record *cannot* be cleared. To clear an individual user, use the [Release User option](#) [XUSERREL]. To make sure all users are clear when the system is brought up after a crash, system administrators can use the Clear all users at startup option [XUSER-CLEAR-ALL].

### 3.1.2.5 INTERACTIVE USER'S PRIORITY

The INTERACTIVE USER'S PRIORITY parameter in the KERNEL SYSTEM PARAMETERS (#8989.3) file should usually be left **NULL**. A setting here affects the job priority of interactive users and could result in poor response time.

### 3.1.2.6 ASK DEVICE TYPE AT SIGN-ON

The ASK DEVICE TYPE AT SIGN-ON parameter controls whether the user's current device at signon is queried for its display attributes (**DA**). Thus, the correct terminal type can be identified without prompting the user.

It is *recommended* that ASK DEVICE TYPE AT SIGN-ON be set to **ASK** so that Signon/Security performs the **DA** query and allows the Device Handler to set up the correct terminal type attributes. This has become more important with the advent of screen control. VA FileMan's Screen Editor and Screen Manager, for example, does *not* function properly if the terminal type recorded by Kernel fails to match the actual terminal type being used.

As with other parameters, the site default (ASK DEVICE TYPE AT SIGN-ON field in the KERNEL SYSTEM PARAMETERS [#8989.3] file) is overridden by a **DON'T ASK** setting for the device (like-named field in the DEVICE [#3.5] file), which would similarly be overridden by a **DON'T ASK** setting for the user (like-named field in the NEW PERSON [#200] file). A **NULL** value functions as **ASK**. The user override can be set by any user via the Edit User Characteristics option [XUSEREDITSELF].



**REF:** For more more information on the Edit User Characteristics option [XUEDITSELF], see the "[Edit User Characteristics Option](#)" section.

If the parameter is set to **DON'T ASK**, Signon/Security does *not* perform the **DA** query and assumes the user's last terminal type is still appropriate. Although the difference in resource consumption is negligible, the user can appreciate a split second's savings in time. Thus, bypassing the **DA** query can be acceptable, if the same terminal type is always being used. But if the user should sign onto another terminal type, problems can occur with the presentation of screen-oriented displays unless the user knows how to change the terminal type to match the actual current one.

If the device is *non*-ANSI-standard, Signon/Security may *not* find a **DA** but continues to determine the terminal's identity by querying its answerback message. All known *non*-ANSI devices (e.g., Qume 102 terminal) should have their answerback messages programmed. This is accomplished by using the terminal type setup mechanism and entering **C-QUME** as the Qume 102's answerback message. The name *must* match an entry in Kernel's TERMINAL TYPE (#3.2) file to take effect. If the answerback message contains additional characters (e.g., a serial number), the message does *not* match an entry in the TERMINAL TYPE (#3.2) file and is useless for signon purposes.

If the terminal's **DA** return code does *not* match an entry in the DA RETURN CODES (#3.22) file, or if the terminal is *non*-ANSI and *cannot* be programmed with an appropriate answerback message,



Signon/Security prompts the user to identify the terminal type if the user's ASK DEVICE TYPE AT SIGN-ON setting is set to **ASK**. This is the only case in which the terminal type prompt is asked during signon. The last terminal type used is presented as the default (it is stored in the NEW PERSON [#200] file). If ASK DEVICE TYPE AT SIGN-ON is set to **DON'T ASK**, Signon/Security assumes that the last terminal type is appropriate and does *not* prompt the user for validation.

### 3.1.2.7 Display Attributes (DA) Return Codes

The DA RETURN CODES (#3.22) file is used to equate **DA** return codes to entries in the TERMINAL TYPE (#3.2) file. You can use the DA Return Code Edit option [XU DA EDIT] to automate the population of the DA RETURN CODES (#3.22) file.



**REF:** For more information, see the “[Managing Display Attributes \(DA\) Return Codes](#)” section in the “[Device Handler: System Management](#)” section.

### 3.1.2.8 SELECTABLE AT SIGNON

System administrators can also control which devices can be selected at signon with a field in the TERMINAL TYPE (#3.2) file. The SELECTABLE AT SIGN-ON flag should be set to **YES** for all devices commonly used for sign on. Ordinarily, it should *not* be set for printers (e.g., **P-** terminal types **P-DEC** or **P-OTHER**). To allow the loading of ScreenMan forms and proper functioning of other screen-oriented displays, the flag should also *not* be set for **PK-** types, that is, printers with keyboards. This is *not* an actual restriction, however, but a recommendation.

### 3.1.2.9 LIFETIME OF VERIFY CODE

To insure that users change their Verify codes at periodic intervals, system administrators should set the LIFETIME OF VERIFY CODE parameter in the KERNEL SYSTEM PARAMETERS (#8989.3) file to a certain number of days. The maximum number is **90** days and the minimum number is **1** day. Thus, sites can choose any number from **1-90** days before requiring users to change their Verify code. At the end of that period (e.g., every **90** days), users *must* then change their Verify codes. Signon/Security checks whether the Verify code needs to be changed, and if so, prompts the user at signon to enter a new Verify code.

### 3.1.2.10 AUTO-GENERATE ACCESS CODES

When assigning Access codes, the security officer or system administrators can invent an alphanumeric string or can ask Kernel to generate one. If the AUTO-GENERATE ACCESS CODES site parameter in the KERNEL SYSTEM PARAMETERS (#8989.3) file is set to **YES**, only generated, cryptic codes can be assigned. It is *not* necessary to pick the first one presented; others can be generated for selection.

### 3.1.2.11 DEFAULT INSTITUTION and AGENCY

The institution running Kernel software is defined during the Kernel installation when prompted for the DEFAULT INSTITUTION in the KERNEL SYSTEM PARAMETERS (#8989.3) file. This field is a pointer to the INSTITUTION (#4) file. One or more institutional affiliations can also be associated with a user (e.g., a VA Outpatient Clinic and an Army Medical Center). This data is stored in the DIVISION Multiple field in the NEW PERSON (#200) file. If a user is associated with more than one institution (division), the user is prompted at signon to select a division. In this way, the local variable **DUZ(2)** can be set to the appropriate value. If the user's DIVISION Multiple field is **blank**, the DEFAULT INSTITUTION field (File #8989.3) is used to define **DUZ(2)**. Since the INSTITUTION (#4) file contains a pointer to the AGENCY (#4.11) file, the signed-on user's agency affiliation can also be determined.

The KERNEL SYSTEM PARAMETERS (#8989.3) file also contains the AGENCY CODE (#9). This field is *not* a pointer but is instead a SET OF CODES (e.g., **N** for Navy or **V** for VA). This field is

presented for editing during Kernel installation. Its value is used at sign on to set the **DUZ**(“**AG**”) local variable. Thus, the agency associated with the overall Kernel system can be determined.

### 3.1.2.12 AUTO MENU

The AUTO MENU flag, stored in the local variable **DUZ**(“**AUTO**”), is used by Menu Manager to control whether all items on a menu are presented automatically after each cycle through the menu system. If the items are *not* displayed, the user can always invoke the display by entering a question mark (?). New users often like to see all the menu choices. Experienced users probably do *not* need to see the choices and the display can be suppressed to save system resources. The user setting for AUTO MENU in the NEW PERSON (#200) file overrides any comparable device setting in the DEVICE (#3.5) file, which will, in turn, override the site parameter default in the KERNEL SYSTEM PARAMETERS (#8989.3) file. Users can edit the setting with the Edit User Characteristics option [XUSEREDITSELF].



**REF:** For more more information on the Edit User Characteristics option [XUEDITSELF], see the “[Edit User Characteristics Option](#)” section.

### 3.1.2.13 TYPE-AHEAD

If TYPE-AHEAD is disabled, any keystrokes that the user enters while computer system processes previously issued instructions do *not* register. If TYPE-AHEAD is enabled, keystrokes entered in advance of processing are stored in the TYPE-AHEAD buffer and is interpreted when the earlier process is finished. New users may experience unwanted results if TYPE-AHEAD is enabled and they had *not* anticipated the effect. Experienced users may prefer TYPE-AHEAD for efficiency. The user setting overrides the device setting, which, in turn, overrides the site parameter setting. Users can edit the setting with the Edit User Characteristics option [XUSEREDITSELF].



**REF:** For more more information on the Edit User Characteristics option [XUEDITSELF], see the “[Edit User Characteristics Option](#)” section.

### 3.1.2.14 TIMED READ

The value for the TIMED READ parameter is stored in the local variable **DTIME** and is used to calculate how long Kernel should wait before terminating a **READ**. If, for example, a user does *not* respond to a menu prompt in the number of seconds defined by the TIMED READ, Kernel takes steps towards signoff and, without subsequent user response, halts the user session. The user setting overrides the device setting, which, as usual, overrides the site default.

### 3.1.2.15 POST SIGN-IN MESSAGE

The POST SIGN-IN MESSAGE is similar to introductory text (i.e., INTRO TEXT field in File #8989.3), except that Kernel displays it only after a successful signon. Like the introductory text, you can edit the message text using the Enter/Edit Kernel Site Parameters option [XUSITEPARM]; alternately, you can use the Post sign-in Text Edit option [XUSERPOST], which is specially designed for this purpose:

**Figure 14: Post Sign-in Text Edit Option**

SYSTEMS MANAGER MENU ...	[ EVE ]
Operations Management ...	[ XUSITEMGR ]
Post sign-in Text Edit	[ XUSERPOST ]

Applications can append information to the POST SIGN-IN MESSAGE (on a per-user, per signon basis only) by attaching to the User sign-on event option [XU USER SIGN-ON].



**REF:** For more information on the User sign-on event option [XU USER SIGN-ON], see the “Signon/Security: Developer Tools” section in the *Kernel 8.0 & Kernel Toolkit 7.3 Developer’s Guide*.

### 3.1.2.16 2-Factor Authentication (2FA)

The KERNEL SYSTEM PARAMETERS (#8989.3) file also contains fields that are required to enable 2-Factor Authentication (2FA). These fields are *not* included in the Enter/Edit Kernel Site Parameters option [XUSITEPARM], because they should *not* be edited in VA production systems. If VistA is being installed in a *non-VA* environment, they can be edited using VA FileMan.

Field descriptions:

- SECURITY TOKEN SERVICE (#200.1): When using brokered authentication with a security token issued by a Security Token Service (STS), this field contains the identification of the issuer of the token. The STS is trusted by both the client and the server to provide the interoperable security tokens. Security Assertion Markup Language (SAML) tokens are standards-based XML tokens that are used to exchange security information, including:
  - Attribute statements
  - Authentication decision statements
  - Authorization decision statements

They can be used as part of a Single Sign-On (SSO) solution allowing a client to talk to services running on disparate technologies. The value of this field should be set to the domain name of the STS as found in the “Issued to:” field of the STS PKI certificate used to digitally sign the token. For VA production systems, the value should be set to the following value:

**eauth.va.gov**

- ORGANIZATION (#200.2): Identity and Access Management field used to identify the VistA instance organization. For internally authenticated users, this field matches the SUBJECT ORGANIZATION (#205.2) field of the user identified in the NEW PERSON (#200) file. For VA production systems, this field should always contain the following value:

**Department of Veterans Affairs**

- ORGANIZATION ID (#200.3): Identity and Access Management field used to uniquely identify the VistA instance organization. For internally authenticated users, this field matches the SUBJECT ORGANIZATION ID (#205.3) field of the user identified in the NEW PERSON (#200) file. For VA production systems, this field should always contain the following value:

**urn:oid:2.16.840.1.113883.4.349**

### 3.1.3 XU USER SIGN-ON Option

The User sign-on event option [XU USER SIGN-ON] can attach action-type options to this extended-action-type option, so that software-specific actions can be performed at signon.



**REF:** For more information, see the “Signon/Security: Developer Tools” section in the *Kernel 8.0 & Kernel Toolkit 7.3 Developer’s Guide*.

### 3.1.4 XU USER START-UP Option

The User start-up event option [XU USER START-UP] is a protocol option used exclusively during a VistA user signon event. Items attached to this option are “TYPE: action” options in the OPTION (#19) file, which can be used for software-specific actions that prompt users for input upon VistA signon before their Primary Menu Option is displayed. Unlike the User sign-on event option [XU USER SIGN-ON], it can provide interactive prompting to users. It is *not* used for GUI signon. It is called from the **XQ12** routine.



**REF:** This option was added with Kernel patch XU\*8.0\*593. For more information, see the “Signon/Security: Developer Tools” section in the *Kernel 8.0 & Kernel Toolkit 7.3 Developer’s Guide*.

### 3.1.5 Clear all users at startup Option

Figure 15: Clear All Users at Startup Option

PARENT OF QUEUABLE OPTIONS ... Clear all users at startup	[ZTMQUEUABLE OPTIONS] [XUSER-CLEAR-ALL]
--	--

If multiple signons are prohibited, users may be prevented from signing on to the system when it is brought up after a crash (which can cause numerous abnormal exits). To prevent this problem from occurring, system administrators can use the Clear all users at startup option [XUSER-CLEAR-ALL]. Kernel *recommends* this option be scheduled to run at system startup. Although this option can be invoked interactively without ill effects, it was designed as a background process, thus, it is placed along with other tasked options on the PARENT OF QUEUABLE OPTIONS menu.



**REF:** For information on how to release a single user, see the “[Proxy \(Connector\) Detail Report Option](#)” section.

### 3.1.6 Enabling and Disabling Logons

System administrators have full control over whether logons are enabled. Access to a particular Volume Set can be disabled by setting the INHIBIT LOGONS? flag in the VOLUME SET (#14.5) file. Setting the flag to **YES** sets the `^%ZIS(“14.5”,“LOGON”,“volume set”)` node, whose presence disallows user logons. That is, logons through Signon/Security, invoking the `^ZU` routine, fails (terminals for user access are usually linked to `ZU` within the operating system setup. Some special terminals, like the console, are untied.) The `^%ZIS(“14.5”,“LOGON”,“volume set”)` node is also checked after each cycle through the menu system; signed-on users are logged off as soon as they return to a menu prompt.

## 3.2 Adding New Users

Creating a new user account involves adding a record to the NEW PERSON (#200) file, assigning an Access code, and assigning a primary menu. You need the XUMGR security key to assign primary menu options. Even the at-sign (@; Programmer access) is insufficient, as checked by the PRIMARY MENU OPTION field's input transform.

**Figure 16: User Management Menu Options: Associated Menu Options when Adding a New User**

SYSTEMS MANAGER MENU ...	[EVE]
User Management ...	[XUSER]
Add a New User to the System	[XUSERNEW]
Grant Access by Profile <locked: XUMGR>	[XUSERBLK]
User Inquiry	[XUSERINQ]

### 3.2.1 Add a New User to the System Option

You can use the Add a New User to the System option [XUSERNEW] to set up user accounts one-by-one. The option presents a standard scrolling-mode editing sequence for user attributes.

When using this option, entry of a social security number in the SSN (#9) field is usually required. While SSN is *not* required in the NEW PERSON (#200) file data dictionary, it is a required field when using this option. If the option is used by someone who holds the XUSPF200 security key, however, entry of an SSN is *not* required.

You can also print security forms for the new user with this option.

When signing on for the first time, the new user should simply press <Enter> at the “Verify code” prompt, which then lets them enter their own secret Verify code.

#### 3.2.1.1 NEW PERSON (#200) File Required Fields

When adding new users, a default set of fields is required, at a minimum. This set is defined by the NEW PERSON IDENTIFIERS field in the KERNEL SYSTEM PARAMETERS (#8989.3) file. If it is **NULL**, the default set of required fields for the NEW PERSON (#200) file entries is:

- INITIAL (#1)
- SEX (#4)
- SSN (#9)

If, given local site policy, a different set should be used, system administrators can use this field to specify other identifiers.



**NOTE:** SSN is *not* required if the person entering accounts holds the XUSPF200 security key.

### 3.2.2 Grant Access by Profile Option

The Grant Access by Profile option [XUSERBLK] includes features unavailable in the Add a New User to the System option [XUSERNEW]. With the Grant Access by Profile option you can grant access to one or more people based on a typical user profile. All characteristics of the typical user, including menus, keys, and service/section, are copied to the new user or replace the characteristics of an existing user. For new users, access security forms are generated as part of the process. These forms can be delivered to the service/section coordinator by inter-office mail and can be distributed to the new users.

The Grant Access by Profile option is locked with the XUMGR security key and is strictly limited for use by system administrators. It *must* be restricted, because any user profile, even that of a developer, can be copied to another user. As with the Add a New User to the System option [XUSERNEW], the SSN (#9) field is required when adding new records except by holders of the XUSPF200 security key or if another default set of New Person Identifiers has been defined.

Access is assigned according to an existing user profile. Characteristics of the new user are cloned from the existing one. Rather than copying the characteristics from an actual user, creating several dummy users with profiles of typical positions can be worthwhile. A user (e.g., PHARMACY,TECH or RESIDENT,SURGERY) could be created with the appropriate user attributes, including menu options, keys, and service/section codes.

Several steps are involved in copying access to new or existing users. First you enter the name of the user account to clone from. Then, optionally, you can specify a TERMINATION DATE. Next, you enter the names of the new users to create. The system pauses for each new user as it verifies identifiers, checks for duplicates, and updates the NEW PERSON (#200) file. You *must* enter a device upon which to print the computer account notification letters. You can either run the access assignment immediately or queue it for a later time.

### 3.2.3 Security Forms

Figure 17: Reprint Access agreement letter Option

SYSTEMS MANAGER MENU ...	[ EVE ]
User Management ...	[ XUSER ]
Reprint Access agreement letter	[ XUSERREPRINT ]

Two security forms are printed for each new user:

- **The Computer Account Notification**—Includes the user's auto-generated Access code and the name of the service/section coordinator who can answer questions.
- **The Computer Access Policy**—A contract to which users *must* adhere. It states the terms of granting access to sensitive information; the user *must* accept these terms as a condition of being given system access.

These security forms are stored in the XUSER COMPUTER ACCOUNT help frame and should be edited for local use as follows:

1. Copy the XUSER COMPUTER ACCOUNT help frame into a new site help frame (e.g., SFO COMPUTER ACCOUNT).
2. Edit the security forms for local use. Replace the “placeholder” text with the actual name and address of the facility.
3. Repoint the Kernel Parameter to the new site XUSER COMPUTER ACCOUNT help frame using VA FileMan.

For example:

Figure 18: Security Forms—Sample User Entries (1 of 4)

```
>D ^XUP

Setting up programmer environment
This is a TEST account.

Terminal Type set to: C-VT320

You have 13 new messages.
Select OPTION NAME: SYSTEMS MANAGER MENU

    Device Management ...
    Programmer Options ...
    Operations Management ...
    Spool Management ...
    Information Security Officer Menu ...
    Taskman Management ...
    User Management ...
    Application Utilities ...
    Capacity Management ...
    Manage Mailman ...
    Menu Management ...
    VA FileMan ...
    Verifier Tools Menu ...

Select Systems Manager Menu Option: VA FILEMAN

    VA FileMan Version 22.0

    Enter or Edit File Entries
    Print File Entries
    Search File Entries
    Modify File Attributes
    Inquire to File Entries
    Utility Functions ...
    Data Dictionary Utilities ...
    Transfer Entries
    Other Options ...

Select VA FileMan Option: TRANSFER ENTRIES

Select TRANSFER OPTION: TRANSFER FILE ENTRIES

INPUT TO WHAT FILE: HELP FRAME// HELP FRAME <Enter>    (562 entries)
TRANSFER FROM FILE: HELP FRAME// <Enter>
TRANSFER DATA INTO WHICH HELP FRAME: ISC COMPUTER ACCESS
Not a known package or a local namespace.
Are you adding 'ISC COMPUTER ACCESS' as a new HELP FRAME (the 563RD)? No// Y
<Enter> (Yes)
HELP FRAME NUMBER: 742// <Enter>
HELP FRAME HEADER: Computer Access
TRANSFER FROM HELP FRAME: XUSER COMPUTER ACCOUNT <Enter> Batch user access document
WANT TO DELETE THIS ENTRY AFTER IT'S TRANSFERRED? No// <Enter> (No)
...SORRY, LET ME THINK ABOUT THAT A MOMENT...
SINCE THE TRANSFERRED ENTRY MAY HAVE BEEN 'POINTED TO'
BY ENTRIES IN THE 'HELP FRAME' FILE, ETC.,
DO YOU WANT THOSE POINTERS UPDATED (WHICH COULD TAKE QUITE A WHILE)? No// <Enter>
(No)

    Enter or Edit File Entries
```



Print File Entries  
Search File Entries  
Modify File Attributes  
Inquire to File Entries  
Utility Functions ...  
Data Dictionary Utilities ...  
Transfer Entries  
Other Options ...

Select VA FileMan Option: **ENTER OR EDIT FILE ENTRIES**

INPUT TO WHAT FILE: HELP FRAME// **<Enter>**

EDIT WHICH FIELD: ALL// **TEXT <Enter>** (word-processing)

Select HELP FRAME NAME: **ISC COMPUTER ACCESS <Enter>** Computer Access

NAME: ISC COMPUTER ACCESS// **<Enter>**

HEADER: Computer Access// **<Enter>**

TEXT: . . .

. . .

suspension/termination of access privileges.

I affirm with my signature that I have read, understand, and agree to fulfill the provisions of this User Access notice.

|INDENT(5)||WIDTH(75)||NOWRAP|

Signature:\_\_\_\_\_

|#20.2| |#29|

RETURN THIS FORM TO: IRMS - NEW ACCTS (xxx/xxx)

Edit? NO// **YES**

Figure 19: Security Forms—Sample User Entries (2 of 4)

```
==[ WRAP ]==[ INSERT ]===== < TEXT >===== [ <PF1>H=Help ]====
| INDENT(5) | | WIDTH(70) |
| NOWRAP |
| CENTER("USER ACCOUNT NOTIFICATION") |
```

**Read through and edit entries specific to your site information and save your changes.**

```
| CENTER("Department of Veterans Affairs") |
| CENTER("SuperStar VAMC") |
| CENTER("123 Any Street") |
| CENTER("Any Town, ST., 99999") |
| XUVT(12) |
| #20.2 |
| #29 | ( | #29:#1.5 | )
| XUVT(19) |
---
| WRAP |
```

A user account has been created in your name to enable you to access on-line clinical and/or administrative data required to perform your duties as an employee of the Department of Veterans Affairs. Please read  
 <=====T=====T=====T=====T=====T=====T=====T=====T=====T=====T>

```
Select RELATED FRAME KEYWORD: <Enter>
Want to LOAD KEYWORDS (Y/N)?: N
Select INVOKED BY ROUTINE: <Enter>
Select EDITOR: <Enter>
Select OBJECT: <Enter>
ENTRY EXECUTE STATEMENT: <Enter>
EXIT EXECUTE STATEMENT: <Enter>
Select HELP FRAME NAME: <Enter>
```

```
Enter or Edit File Entries
Print File Entries
Search File Entries
Modify File Attributes
Inquire to File Entries
Utility Functions ...
Data Dictionary Utilities ...
Transfer Entries
Other Options ...
```

```
Select VA FileMan Option: ENTER OR EDIT FILE ENTRIES
```

```
INPUT TO WHAT FILE: HELP FRAME// 8989.2 <Enter> KERNEL PARAMETERS (6 entries)
EDIT WHICH FIELD: ALL// <Enter>
```

```
Select KERNEL PARAMETERS NAME: XUSER COMPUTER ACCOUNT
NAME: XUSER COMPUTER ACCOUNT Replace <Enter>
TYPE: <Enter>
DEFAULT: <Enter>
REPLACEMENT: ISC COMPUTER ACCESS
```

Select KERNEL PARAMETERS NAME: **<Enter>**

- Enter or Edit File Entries
- Print File Entries
- Search File Entries
- Modify File Attributes
- Inquire to File Entries
- Utility Functions ...
- Data Dictionary Utilities ...
- Transfer Entries
- Other Options ...

Select VA FileMan Option: **<Enter>**

FM      VA FileMan ...  
Core Applications ...  
Device Management ...  
Information Security Officer Menu ...  
Manage Mailman ...  
Menu Management ...  
Operations Management ...  
Programmer Options ...  
Spool Management ...  
Taskman Management ...  
User Management ...

Select Systems Manager Menu Option: **USER MANAGEMENT**

- Add a New User to the System
- Grant Access by Profile
- Edit an Existing User
- Deactivate a User
- Reactivate a User
- List users
- User Inquiry
- Switch Identities
- File Access Security ...
- Clear Electronic signature code
- Electronic Signature Block Edit
- Manage User File ...
- OAA Trainee Registration Menu ...
- Person Class Edit
- Reprint Access agreement letter

Select User Management Option: **REPRINT ACCESS AGREEMENT LETTER**

Select NEW PERSON NAME: **REQUEST,ACCESS** **<Enter>**      AR      COMPUTER SPECIALIST

Is REQUEST,ACCESS the one you want? YES// **<Enter>**

DEVICE: **0;80;60** **<Enter>**      Telnet Terminal

**Figure 20: Security Forms—Sample User Account Notification Form (3 of 4)**

USER ACCOUNT NOTIFICATION

Department of Veterans Affairs  
Superstar VAMC  
123 Any Street  
Any Town, ST. 99999

**The name of the user and location is displayed here. For this example, the user's name is "Access Request" at the "Superstar VAMC."**

ACCESS REQUEST  
Superstar VAMC

---

A user account has been created in your name to enable you to access on-line clinical and/or administrative data required to perform your duties as an employee of the Department of Veterans Affairs. Please read the enclosed NEW USER INFORMATION before you attempt your first log-on to the system. Questions about access should be referred to the AIS Application Coordinator in your service, your facility Information Security Officer (ISO), or your IRM Service.

**The names and contact information specific to your site will be displayed here.**

Your Computer Access Coordinator is:  
XUSER,ONE  
123X  
510-555-9999

Your Facility Information Security Officer:  
Two Xuser

Your Alternate Information Security Officer:  
Three Xuser

---

NT Domain: \_\_\_\_\_  
NT Username: VHA\_\_\_\_\_  
NT Password: \_\_\_\_\_

VistA Access Code: \_\_\_\_\_  
VistA Verify Code: \_\_\_\_\_

**Figure 21: Security Forms—Sample Computer Account Access Policy Form (4 of 4)**

COMPUTER ACCOUNT ACCESS POLICY

Department of Veterans Affairs  
SuperStar VAMC

**The name of the user and location is displayed here. For this example, the user's name is "Access Request" at the "Superstar VAMC."**

ACCESS REQUEST  
SuperStar VAMC

As an authorized user of VHA automated information systems (AISs) and having access to data stored in them, I will be given sufficient access to perform my assigned duties. I will use this access ONLY for its intended purpose and understand the following policies that apply to VA data and computer systems:

I agree to safeguard all passwords (e.g., Access/Verify codes, electronic signature codes) assigned to me and am strictly prohibited from disclosing these codes to anyone including family, friends, fellow workers, supervisor(s), and subordinates for ANY reason.

I understand that I may be held accountable for all entries/changes made to any government AIS using my passwords.

I am aware of the regulations and facility AIS security policies designed to ensure the confidentiality of all sensitive information. I am aware that information about patients or employees is confidential and protected from unauthorized disclosure by law. I understand that my obligation to protect VA information does not end with either the termination of my access to this facility's systems or with the termination of my government employment.

I will exercise common sense and good judgment in the use of electronic mail. I understand that electronic mail is not inherently confidential and I have no expectation of privacy in using it. I understand that technical or administrative problems may create situations which requires viewing of my messages. I also understand that facility management officials may authorize access to my electronic mail messages whenever there is a legitimate purpose for such access.

I understand that a violation of this notice constitutes disregard of a local and/or VHA policy and will result in appropriate disciplinary action as defined in VA employee conduct Regulations (VAR 820(b)) as well as suspension/termination of access privileges.

I affirm with my signature that I have read, understand, and agree to fulfill the provisions of this User Access notice.

Signature: \_\_\_\_\_  
ACCESS REQUEST SuperStar VAMC

RETURN THIS FORM TO: IRMS - NEW ACCTS (xxx/xxx)

The name of the user and location is displayed here.

VA FileMan word-processing “windows” are used to retrieve the user’s name, service/section, and service/section coordinator’s name. To be effective, the SERVICE/SECTION field in the NEW PERSON (#200) file *must* be filled in for the new user. The COORDINATOR (IRM) field, a field in the SERVICE/SECTION (#49) file, *must* also be filled in and updated when necessary. Word-processing “windows” are also used for formatting, like [TOP], to separate the two forms. When using the File Access Security system, **READ** access to the SERVICE/SECTION (#49) file is needed to retrieve the Coordinator’s name within the window command.



**REF:** For more information on using word-processing “windows,” the File Access Security system, and navigation, see the *VA FileMan User Manual*.

The Reprint Access Agreement Letter option [XUSERREPRINT] allows you to reprint the computer access agreement letter in case there was a problem printing the first form (e.g., the first form is jammed in the printer). It does *not* reprint the Access code on the letter, however.

### 3.3 Edit an Existing User Option

Figure 22: Edit an Existing User Option—Menu

```
SYSTEMS MANAGER MENU ... [EVE]
User Management ... [XUSER]
  Edit an Existing User [XUSEREDIT]
```


The attributes of an existing user can be edited with the Edit an Existing User option [XUSEREDIT]. This option invokes a screen-oriented display using ScreenMan.



It is impossible to exit the form and save changes unless all required fields (e.g., the SERVICE/SECTION field in the NEW PERSON [#200] file) are filled in.

[Table 4](#) describes each of the user field attributes you can edit with the Edit an Existing User option [XUSEREDIT].




Table 4: Edit an Existing User Option—Editable Fields/Attributes

Field/Attribute	Description
NAME (#.01) (Required)	The user’s name should be entered in capital letters. The syntax should be “LAST, FIRST MI.” with only a comma (no spaces) between the last and first name. A middle initial can follow, separated with a space and followed with a period. It is <i>not</i> appropriate to add credentials (e.g., M.D.), since there are other ways to specify such additional information (by the Title and the Signature Block Printed Name). Furthermore, the parsing algorithms commonly used in software applications only recognize two pieces, before and after the comma, rearranging them and using uppercase/lowercase to generate “First MI. Last”.
INITIAL (#1)	The user’s initials can be entered, usually two or three capital letters with no spaces. The NEW PERSON (#200) file contains a lookup-type cross-reference

Field/Attribute	Description
	by INITIAL (C), so if the INITIAL field is filled in, the user can be found in the NEW PERSON (#200) file by entering the initials. For example, just the initials can be used at the "Select NEW PERSON Name:" prompt, or when addressing mail messages, or for other lookup purposes. Users can edit their initials at any time since this field is included in the common Edit User Characteristics option [XUSEREDITSELF].
TITLE (#8)	This field points to the TITLE (#3.1) file, a file exported with Kernel but without data (records). The User Management options to add or edit a user's record allow <b>LAYGO</b> into the TITLE (#3.1) file, so titles can be added via the NEW PERSON (#200) file. Although <i>not</i> required, it may be wise to assign appropriate titles to users, so this field can be referenced by other software applications. MailMan, for example, displays titles in message headers if the user who is reading mail has so indicated with a flag in MailMan's Edit User Options called Show Titles.
NICK NAME (#13)	Like INITIAL, NICK NAME has a lookup type cross-reference (D) in the NEW PERSON (#200) file so that lookups succeed simply by using the NICK NAME. This field is also included in Edit User Characteristics.
SSN (#9)	The SSN (#9) field is <i>not</i> a required field in the data dictionary for the NEW PERSON (#200) file. SSN is required when using the User Management options to add a new user unless the XUSPF200 security key is held by the person using the option.  It is <i>highly recommended</i> that each new user have the SSN (#9) field filled in to minimize the problem of subsequent duplicate entries. Since many existing users do <i>not</i> have an SSN entered, however, the Edit an Existing User option [XUSEREDIT] does <i>not</i> require that one be entered.
MAIL CODE (#28)	The user's MAIL CODE can be entered for purposes of interoffice routing of manually delivered mail.
PRIMARY MENU OPTION (#201) (Required for functional access)	Users <i>must</i> be assigned a PRIMARY MENU OPTION in order to reach Menu Manager after successfully entering Access and Verify codes. The PRIMARY MENU OPTION should provide a route to all the computing functions the user can be expected to need. The XUMGR security key <i>must</i> be held by the person assigning the menu (unless delegated options are available for use with the Secure Menu Delegation system).   <b>REF:</b> Building and rearranging menus is discussed in the " <a href="#">Menu Manager: System Management</a> " chapter.
SECONDARY MENU OPTIONS (#203)	The SECONDARY MENU OPTIONS can be used to assign particular options to individual users to customize their menu choices. While a user may have a standard primary menu to carry out the usual functions of a department or service, additional special functions just for this user can be assigned as secondary options. This is a multiple field, unlike the PRIMARY MENU OPTION, so additional items can easily be added.
ACCESS CODE (#2) VERIFY CODE (#7.2)	These fields can be used to edit a user's Access or Verify Code as needed. If a user has forgotten the Verify code, or needs a new one, system administrators/ISO should delete the existing code so that when the user logs on and presses the <Enter> key at the "VERIFY CODE" prompt, a new (secret) password (VERIFY CODE) can be entered. To accomplish this, "Y" should be entered at the "Want to edit VERIFY CODE (Y/N) :" prompt. An at-sign (@) should then be entered to delete the existing code. The change is filed

Field/Attribute	Description
	<p>immediately, unlike other changes that are processed as part of the overall transaction when leaving the ScreenMan form.</p> <p>Users can edit their Verify code at any time via the Edit User Characteristics option [XUEDITSELF] on the Common menu. If this option uses a local template, the ability to edit the VERIFY CODE field should probably remain, as a security measure. System administrators can choose to add the ability to edit the ACCESS CODE field as well.</p> <p> <b>REF:</b> For more more information on the Edit User Characteristics option [XUEDITSELF], see the “<a href="#">Edit User Characteristics Option</a>” section.</p>
<p>FILE MANAGER ACCESS CODE (#3)</p>	<p>The FILE MANAGER ACCESS CODE (#3) field in the NEW PERSON [#200] file) is stored in the local variable <b>DUZ(0)</b>. If <b>DUZ(0)=@</b>, the user is a developer with the highest level of Programmer access authority. Other <i>non</i>-reserved symbols can be assigned for File Access Security, depending on the user’s needs. Software applications indicate which symbols are needed for site-specific File Access Security.</p> <p> <b>NOTE:</b> In previous documentation and data dictionaries, it has been <i>implied</i> that the hashtag (#) symbol/character was reserved for File Access Security for system administrators; however, this is <i>not</i> true. It has merely been used as a <i>convention</i>.</p> <p>If the File Access Security conversion has been run, the FILE MANAGER ACCESS CODE (#3) field is <i>not</i> used to control file-level access security as it was <i>before</i> the conversion. The <a href="#">File Access Security</a> system (formerly known as Part 3 of the Kernel installation) permits the association of a user with a file whereby explicit access can be granted. While the conversion process is somewhat involved, the benefits resulting from implementing the <a href="#">File Access Security</a> system are worthwhile.</p> <p>Even after running the file access conversion, the FILE MANAGER ACCESS CODE (#3) field continues to serve several functions:</p> <p>If a user has been granted full file access privileges for a particular file, a further restriction can be placed at the file or field level to prohibit modification of the definition or entry of data. Files have top-level restrictions of <b>READ</b>, <b>WRITE</b>, or <b>DELETE</b> access as do fields and templates.</p> <p>If the file, field, or template is protected with the at-sign (@; Programmer access), the user <i>must</i> also have the at-sign in the FILE MANAGER ACCESS CODE (#3) field in the NEW PERSON (#200) file.</p> <p>The Device Handler also checks the FILE MANAGER ACCESS CODE (#3) field of the user if the SECURITY field in the DEVICE (#3.5) file has been defined with a character string. The user would <i>not</i> be able to select the device unless at least one of the characters in the user’s code matched at least one character in the device code.</p> <p>The most important FILE MANAGER ACCESS CODE (#3) field character is the at-sign (@; Programmer access). It has special meaning and overrides other file access restrictions or other FILE MANAGER ACCESS CODE (#3) field characters. It is <i>not</i> recommended that the at-sign be allocated unless absolutely needed. Allocation is, in part, restricted by the fact that only those few users who have Programmer access to the system can give other users the at-sign.</p>



Field/Attribute	Description
	<p> <b>NOTE:</b> A <b>SET</b> statement from programmer mode can be used to temporarily assign <b>DUZ(0)="@</b> without storing the code in the NEW PERSON (#200) file, which would give permanent Programmer access.</p> <p>Use of the at-sign (@; Programmer access) is less common now than in the past since alternative security measures have been developed. It is still required for several critically sensitive checks, however, such as entering M code into VA FileMan files (e.g., OPTION [#19] and FUNCTION [#.5] files).</p> <p> <b>REF:</b> For more information on File Access Security, see “<a href="#">File Access Security</a>” in this manual and the <i>VA FileMan (Version 22.0) and Kernel (Version 8.0) File Access Security</i> supplemental documentation located on the VA Software Document Library (VDL) at: <a href="http://www.va.gov/vdl/application.asp?appid=5">http://www.va.gov/vdl/application.asp?appid=5</a></p>
PREFERRED EDITOR (#31.3)	<p>If a user’s PREFERRED EDITOR field is <b>NULL</b>, Kernel uses VA FileMan’s Line Editor to edit word-processing fields. If the PREFERRED EDITOR is set to another entry in the ALTERNATE EDITOR (#1.2) file, like VA FileMan’s Screen Editor, Kernel uses that editor when the user edits word-processing fields. As described in VA FileMan’s documentation, users can switch from the Line Editor to another editor by using the Utility suboption on the Edit options menu [XUEDITOPT].</p> <p style="text-align: center;"><b>Figure 23: VA FileMan Line Editor—Sample User Dialogue</b></p> <div data-bbox="496 1041 1425 1409" style="border: 1px solid black; padding: 10px;"> <p style="text-align: center;">Enter one space character on Line 1 and then press the &lt;Enter&gt; key at Line 2.</p> <pre> 1&gt;_ &lt;Enter&gt; 2&gt;&lt;Enter&gt; EDIT Option: Utilities in Word-Processing UTILITY Option: Editor Select ALTERNATE EDITOR: SCREEN EDITOR - VA FILEMAN </pre> </div> <p>If the PREFERRED EDITOR is the Screen Editor, it is also possible to switch to another editor, like the Line Editor, to take advantage of Line Editor features such as File Transfer from Foreign CPU.</p> <p> <b>NOTE:</b> Other editors (e.g., WordMan or VA LetterMan) do <i>not</i> support switching to the Line Editor, which may be a limitation in some circumstances.</p> <p>This field is also included in Edit User Characteristics and MailMan’s Edit User Options so that all users can define a PREFERRED EDITOR if they so choose.</p>
DIVISION (#16)	<p>The DIVISION Multiple field has a corresponding site parameter, the Default Institution, that sets users’ <b>DUZ(2)</b> if this field is <i>not</i> filled in. A user setting, however, takes precedence over the site parameter. This is a multiple field and if the user is associated with more than one institution, the user is prompted at</p>

Field/Attribute	Description
	signon to pick the one corresponding to the computing activities to be carried out in that session.
SERVICE/SECTION (#29) (Required)	This field points to the SERVICE/SECTION (#49) file distributed with Kernel's virgin installation. No data is included. It is a required field since applications have begun to use it in various utilities. Kernel's CPU/Service/User/Device Stats option [XUSTAT], for example, can summarize signon information for all users in the same Service/Section. The Grant Access by Profile option [XUSERBLK] also makes use of this field to specify the Service/Section Coordinator to whom the access forms of the new users should be delivered.
NETWORK USERNAME (#501.1)	This is the username that is used by the Windows Active Directory. It can be used to help identify the user; although it should <i>not</i> be relied on for accuracy as it is manually entered data that is <i>not</i> validated by Active Directory.
TIMED READ (#200.1)	As discussed with other site parameters earlier in this section, TIMED READ defines the length of time Kernel should wait for a user response to a <b>READ</b> . A setting for the user attribute overrides the site default. It is used to define the local variable <b>DTIME</b> .
MULTIPLE SIGN-ON (#200.04)	As discussed with other site parameters, this field controls whether the user is permitted to have two or more concurrent signon sessions. The user setting takes precedence.
AUTO MENU (#200.06)	As discussed with other site parameters, this field controls whether the entire list of menu options is automatically presented or whether the user needs to enter a question mark (?) to invoke the display. The user setting takes precedence.
ASK DEVICE TYPE AT SIGN-ON (#200.05)	As discussed with other site parameters, this field controls whether the device being used at signon is queried for its terminal type. The user setting takes precedence.
TYPE-AHEAD (#200.09)	This field controls whether the user can enter text faster than the computer can read it. If set to <b>YES</b> , the computer buffers input from the user. If set to <b>NO</b> , keystrokes from the user are lost if they are typed faster than the computer can process them.
ALLOWED TO USE SPOOLER (#41)	This field controls whether a user can pick the spool device at the device prompt to send output to the spooler.
PAC (#14, Programmer Access Code)	For users who have been granted the Programmer Mode option [XUPROGMODE] along with the XUPROG and XUPROGMODE security keys, a Programmer Access Code can be assigned as additional security. If a PAC is defined, Kernel prompts for the PAC just before allowing a user to enter programmer mode. If this field is <b>NULL</b> , a PAC is <i>not</i> asked.
CAN MAKE INTO A MAIL MESSAGE (#41.2)	This field controls whether a spooled document can be transformed into a regular mail message for use within MailMan.
DISUSER (#7)	If set to <b>YES</b> , disables access to the system for this user (without terminating the user's account).
FILE RANGE (#31.1)	Users who have VA FileMan privileges to create files can be given a numeric range of numbers to use as file numbers. Assigning number ranges acts as a safeguard to keep users from picking a number within a range that is nationally reserved for VistA software applications. It can also serve local database administration needs of segmenting local development by number ranges.

Field/Attribute	Description
TERMINATION DATE (#9.2)	As described in the “ <a href="#">Deactivating Users</a> ” section, this field indicates when a user’s access privileges should be revoked.
ALWAYS SHOW SECONDARIES (#200.11)	If set to <b>YES</b> , contents of a user’s SECONDARY MENU OPTIONS are shown when the user enters one question mark (?) at a menu prompt. Otherwise, the user <i>must</i> enter two question marks (??) to see their secondary menu.
PROHIBITED TIMES FOR SIGN-ON (#15)	As discussed with other signon parameters, this field can be used to regulate when the user can sign on to the system. The user setting takes precedence over any corresponding device setting.
PHONE (HOME) (#.131) OFFICE PHONE (#.132) PHONE #3 (#.133) PHONE #4 (#.134) COMMERCIAL PHONE (#.135) FAX NUMBER (#.136)	Set up phone numbers for the user in these fields.
VOICE PAGER (#.137) DIGITAL PAGER (#.138)	Set up pager numbers for the user in these fields.
LANGUAGE (#200.07)	Overrides the setting of the DEFAULT LANGUAGE field in the KERNEL SYSTEM PARAMETERS (#8989.3) file. Both of these are used to set the <b>DUZ(“LANG”)</b> flag for each user. VA FileMan uses this setting to enable the display of language-specific dates and times, numeric formats, and dialogues.

**Figure 24: Edit an Existing User Option—Screen 1**

```
                                Edit an Existing User                                Page 1 of 5
NAME: XUUSER,ONE
-----
NAME... XUUSER,ONE                INITIAL: OX
TITLE: COMPUTER SPECIALIST        NICK NAME: ONE
SSN: 000123456                    DOB:
DEGREE:                            MAIL CODE:
DISUSER:                            TERMINATION DATE:
Termination Reason:

PRIMARY MENU OPTION: EVE
Select SECONDARY MENU OPTIONS: ISCSTAFF
Want to edit ACCESS CODE (Y/N):    FILE MANAGER ACCESS CODE: @
Want to edit VERIFY CODE (Y/N):

Select DIVISION:
SERVICE/SECTION: INFORMATION SYSTEMS CENTER
-----
Exit      Save      Next Page      Refresh

Enter a command or '^' followed by a caption to jump to a specific field.

COMMAND:                                Press <PF1>H for help Insert
```

**Figure 25: Edit an Existing User Option—Screen 2**

```
                                Edit an Existing User                                Page 2 of 5
NAME: XUUSER,ONE
-----
NETWORK USERNAME: VHAIXXUUSERO
TIMED READ (# OF SECONDS): 999
MULTIPLE SIGN-ON: ALLOWED          MULTIPLE SIGN-ON LIMIT:
ASK DEVICE TYPE AT SIGN-ON: DON'T ASK    AUTO MENU: YES, MENUS GENERATED
PROHIBITED TIMES FOR SIGN-ON:           TYPE-AHEAD: ALLOWED
AUTO SIGN-ON:
Preferred Editor: SCREEN EDITOR - VA FILEMAN

ALLOWED TO USE SPOOLER:            PAC:
CAN MAKE INTO A MAIL MESSAGE:

FILE RANGE:
ALWAYS SHOW SECONDARIES:
-----
Exit      Save      Next Page      Refresh

Enter a command or '^' followed by a caption to jump to a specific field.

COMMAND:                                Press <PF1>H for help Insert
```

**Figure 26: Edit an Existing User Option—Screen 3**

```

                                Edit an Existing User
NAME: XUUSER,ONE                                     Page 3 of 5
-----
PROHIBITED TIMES FOR SIGN-ON:

        PHONE: 510-768-6874          OFFICE PHONE: 510-768-6874
COMMERCIAL PHONE:                      FAX NUMBER:
        VOICE PAGER:                 DIGITAL PAGER:
        LANGUAGE:

Person Class                               Effective      Expired
Technologists, Technicians and Other Tec   DEC 7,2005    JAN 1,2006
Emergency Medical Service Providers        JAN 1,2006    DEC 7,2005
Other Service Providers                    DEC 7,2005    DEC 8,2005
Allopathic and Osteopathic Physicians      DEC 8,2005

-----
Exit      Save      Next Page      Refresh

Enter a command or '^' followed by a caption to jump to a specific field.

COMMAND:                                     Press <PF1>H for help Insert
```

**Figure 27: Edit an Existing User Option—Screen 4**

```

                                Edit an Existing User
NAME: XUUSER,ONE                                     Page 4 of 5
-----
RESTRICT PATIENT SELECTION:          OE/RR LIST:

CPRS TAB ACCESS:
  Name  Description                               Effective Date  Expiration Date
-----
Exit      Save      Next Page      Refresh

Enter a command or '^' followed by a caption to jump to a specific field.

COMMAND:                                     Press <PF1>H for help Insert
```

**Figure 28: Edit an Existing User Option—Screen 5**

```
                                Edit an Existing User                                Page 5 of 5
NAME: XUUSER,ONE
-----
PERMANENT ADDRESS:
    Street 1:
    Street 2:
    Street 3:
    City:
    State:
    Zip Code:
    E-Mail Address:
Is this person an active Trainee?:
VHA Training Fac.:
Start Date of Training:                Last Training Month & Year:
                                         Trainee Inactive (Date):
Program of Study:
Target Degree Lvl:
-----
Exit      Save      Next Page      Refresh

Enter a command or '^' followed by a caption to jump to a specific field.

COMMAND:                                Press <PF1>H for help      Insert
```

### 3.3.1 Additional Attributes Editable by Users

Some but *not* all of the user attribute fields can be edited by users using the Edit User Characteristics option [XUSEREDITSELF]. The only field the user can edit that is *not* part of the system manager’s Edit an Existing User form is the TEXT TERMINATOR field.



**REF:** For a description of the fields users can edit (using the default Edit User Characteristics form and template), see [Table 3](#) in the “[Edit User Characteristics Option](#)” section.

### 3.3.2 Edit User Characteristics Form and Template

Kernel exports a ScreenMan form and a template to be used in the Edit User Characteristics option [XUSEREDITSELF]. Both are called XUEDIT CHARACTERISTICS. The INPUT template by the same name is invoked if the ScreenMan form *cannot* be loaded on the current terminal type.

System administrators can substitute a locally-developed template by entering its name in the USER CHARACTERISTICS TEMPLATE field in the KERNEL PARAMETERS (#8989.2) file. System administrators can also design a customized form with the same name as the local INPUT template that is displayed instead, terminal type setup permitting. In other words, to invoke a locally modified display, an INPUT template *must* exist. If a ScreenMan form by the same name also exists, an attempt is made to display the form before defaulting to the INPUT template.



**REF:** For more information on creating a local Edit User Characteristics form and template, see the *Kernel Installation Guide*.

For a sample form, see the “[Edit User Characteristics Option](#)” section.

## 3.4 Deactivating and Reactivating Users

Kernel provides options to deactivate and reactivate users on the User Management menu [XUSER]. When users no longer need access privileges, system administrators can partially or entirely close access to their account.


**Figure 29: User Management Menu Options**


SYSTEMS MANAGER MENU ...	[EVE]
User Management ...	[XUSER]
Deactivate a User	[XUSERDEACT]
Purge Inactive Users' Attributes	[XUSERPURGEATT]
Reactivate a User	[XUSERREACT]

### 3.4.1 Deactivating Users

The Deactivate a User option [XUSERDEACT] lets you temporarily or permanently disable access for users. You can schedule termination of a user for a future date. The Deactivate a User option [XUSERDEACT] loads a ScreenMan form with the fields described in [Table 5](#):

**Table 5: Deactivate a User Option—Editable Fields/Attributes**

Field/Attribute	Description
DISABLE USER	<p>Setting the DISABLE USER field to <b>YES</b> prevents a user from signing on, but leaves all of their menus, keys, and other attributes (essentially the user's entire account) still enabled. It sets the DISUSER (#7) field in the user's NEW PERSON (#200) file to <b>YES</b>.</p> <p>You might want to use this feature to prevent access to your system by an external support person, except during pre-approved times (where you may want to monitor their actions). Setting DISUSER to <b>YES</b> prevents them from logging on to the system until you clear the field.</p> <p>If you set this field to <b>YES</b>, <i>do not set any other fields</i> in the Deactivate a User form (they only apply to terminating a user). Then, to re-enable access, use the Reactivate a User option [XUSERREACT].</p> <p> <b>REF:</b> For a description of the Reactivate a User option [XUSERREACT], see the "<a href="#">Reactivating Users</a>" section.</p>
TERMINATION DATE (#9.2)	<p>Terminating a user is the way to formally deactivate a user (as opposed to temporarily disabling their account). Setting this date effectively terminates that user's account, effective from that date forward.</p> <p>The Deactivate a User option [XUSERDEACT] automatically performs the following steps when you deactivate a user:</p> <ul style="list-style-type: none"> <li>• Revokes the user's status as an authorized sender of any mail groups.</li> <li>• Revokes the user's status as a surrogate.</li> <li>• Revokes the user's status as a Secure Menu Delegation delegate.</li> <li>• Deletes the user's Access code, Verify code, Electronic Signature code, VA FileMan Access code (i.e., FILE MANAGER ACCESS CODE [#3] field), and Programmer Access code.</li> <li>• Deletes the user's menu templates.</li> <li>• Deletes the user's delegated options.</li> <li>• Purges the <b>^DISV</b> global on that CPU for that user.</li> </ul>

Field/Attribute	Description
	<p>You can also decide whether all mail messages and all security keys for the account are deleted on the TERMINATION DATE with the final two fields in the Deactivate a User option [XUSERDEACT] (DELETE ALL MAIL ACCESS and DELETE KEYS AT TERMINATION). If the user is expected to return to the facility and needs to have the user account reopened, security keys and mail could be retained.</p> <p> <b>REF:</b> For more information on cleaning up user access and privileges at termination, see the “XU USER TERMINATE Option” section in the “Signon/Security: Developer Tools” section in the <i>Kernel 8.0 &amp; Kernel Toolkit 7.3 Developer’s Guide</i>.</p>
DELETE ALL MAIL ACCESS (#9.21)	Setting the DELETE ALL MAIL ACCESS field causes all mail messages for the user to be deleted when their account is terminated on the TERMINATION DATE.
DELETE KEYS AT TERMINATION (#9.22)	<p>Setting the DELETE KEYS AT TERMINATION field causes all security keys for the user to be deleted at termination (except security keys marked “KEEP AT TERMINATE”).</p> <p>As discussed in the “<a href="#">Security Keys</a>” section, the application developer can export a security key with the KEEP AT TERMINATE field set to <b>YES</b> in such a situation. The Provider security key, included with Kernel, has the flag set to <b>YES</b> for this purpose. Although a user may have been deactivated, it could be important to continue a processing activity that the user had authorized, based on privileges associated with a security key. A medical order could continue to hold an approved status, for example, even though the authorizing provider had been deactivated.</p>

### 3.4.2 Automatically Deactivating Users

The Automatic Deactivation of Users option [XUAUTODEACTIVATE] finds all users in the NEW PERSON (#200) file with a TERMINATION DATE (#9.2) in the past, but who still have an Access code. In addition, it also looks to see if there are any users who have *not* signed on in the last “n” days.



**NOTE:** Kernel records all signons to VistA using appropriate user credentials via either of the following methods:

- Access and Verify codes.
- 2-Factor Authentication (2FA)—Digital certificate in a VA-approved smart card, such as the Personal Identification Verification (PIV) smart card plus a Personal Identification Number (PIN).

The Automatic Deactivation of Users option [XUAUTODEACTIVATE] terminates any users who fit these criteria. Any such users are users who had been scheduled for termination but were *not* terminated (usually because the task that should have terminated them did *not* run). It acts as a safety net to ensure that all users who were scheduled for termination are, in fact, terminated. It should be scheduled to run on a regular basis.



**REF:** For *recommended* frequency of scheduling, see the *Kernel Installation Guide*.



Because the Automatic Deactivation of Users option [XUAUTODEACTIVATE] is *not* intended for interactive use, it is placed on the Parent of Queuable Options menu [ZTMQUEUABLE OPTIONS].

### 3.4.2.1 Termination Process

The termination process does the following:

- Sets the DISUSER (#7) field in the NEW PERSON (#200) file to **YES** (1).
- Deletes the user's Access code.
- Deletes the user's security keys.
- Calls the XU USER TERMINATE protocol in the OPTION (#19) file so other applications can take any action they need.
- If the DELETE ALL MAIL ACCESS (#9.21) field in the NEW PERSON (#200) file is set to **YES**, then the user is also removed from the VistA MailMan system, which deletes their MailMan mail boxes and deletes them from any mail groups.



**CAUTION:** Kernel patch XU\*8\*645 created the XU645 parameter. It determines if a terminated user information should be purged from the system (Inspector General investigation request). When XU645 is set to **YES**, then data is deleted and the background AUTODEACTIVATE job purges those users who were previously terminated. The default value for XU645 is blank, which is equivalent to **NO**; it only deletes the user's Access code and does *not* delete any other information or trigger any background jobs.

### 3.4.2.2 Academic Affiliation Waiver

The *VA Handbook 6500* page 60 (POLICY AND PROCEDURES, Technical Controls, Logical Access Controls), Item “d” states that accounts are automatically disabled if inactive for 30 days. This requirement is repeated in *VA Handbook 6500* Appendix D.

The Office of Academic Affiliation requested a waiver for the 30 day disabling of inactive accounts asking it be 90 days and the waiver was approved.



**REF:** A copy of the approved waiver is available as an attachment to Remedy Ticket #283028.

Kernel patch XU\*8.0\*514 added the ACADEMIC AFFILIATION WAIVER (#13) field to the KERNEL SYSTEM PARAMETERS (#8989.3) file. This field is used to control the LAST SIGN-ON DATE/TIME (#202) field in the NEW PERSON (#200) file. If the Office of Academic Affiliation waiver is applicable to a site, the site can set the ACADEMIC AFFILIATION WAIVER (#13) field to **YES** (1). The default for this field is **NULL**.

When the ACADEMIC AFFILIATION WAIVER (#13) field is set to **YES**, the users is only automatically disabled if they have been inactive for over 90 days (i.e., LAST SIGN-ON DATE/TIME is over 90 days). If it is *not* set, this option works as usual (i.e., 30 day limit).

### 3.4.3 Purging Mail and Security Keys for Inactive Users

You can use the Purge Inactive Users' Attributes option [XUSERPURGEATT] to clean up files. It removes all mailboxes, messages, mail groups, and security keys for users who have been terminated. If any of these users still retain Access codes, they are deleted.

This is particularly significant with mail. A mail message *cannot* be completely removed from a system until all recipients have deleted it from their mail baskets. If a user is no longer active, then it becomes unlikely that the message ever gets purged.

There are two modes of running this option. You can VERIFY the process for each user that the computer selects as eligible. If you choose *not* to verify the process for each user, then for every user with a *non*-future TERMINATION DATE, their set of security keys, mail groups, messages, and mail baskets are deleted.

### 3.4.4 Reactivating Users

You can use the Reactivate a User option [XUSERREACT] to re-enable access for a user who has either been terminated, or whose access has been temporarily disabled. To re-enable access for someone whose account is merely disabled (with the DISUSER field set to **YES**), use this option to simply clear the DISUSER field. Otherwise, using this option, you can fill in all the fields needed for an active account (i.e., FILE MANAGER ACCESS CODE [#3] field, PRIMARY MENU OPTION, etc.).

When you reactivate a user, you are asked whether to deny access to old mail messages. If the reactivated user account is a less privileged account than previously, it may be appropriate to deny the user access to messages that were received in the user's prior capacity. Even if that user's mailbox was deleted at termination, once the user is reactivated, an old message would be delivered if responded to by another recipient.

## 3.5 User Management Menu

Kernel provides the User Management Menu [XUOPTUSER] located under the Operations Management menu [XUSITEMGR]. This menu provides a set of options for system administrators to monitor and support users logged onto the system. It includes the following options:

Figure 30: User Management Menu Options

SYSTEMS MANAGER MENU ...	[EVE]
Operations Management ...	[XUSITEMGR]
User Management Menu ...	[XUOPTUSER]
FIND Find a user	[XU FINDUSER]
PXY Proxy User List	[XUSAP PROXY LIST]
List users	[XUSERLIST]
Print Sign-on Log	[XUSC LIST]
Proxy (Connector) Detail Report	[XUSAP PROXY CONN DETAIL ALL]
Proxy (Connector) Inquire	[XUSAP PROXY CONN DETAIL INQ]
Release user	[XUSERREL]
Remote Access User Sign-on Log	[XUSEC REMOTE ACCESS]
User Inquiry	[XUSERINQ]
User Status Report	[XUSERSTATUS]
Users with Foreign Visits	[XUS VISIT USERS]

### 3.5.1 Find a User Option

The Find a User option [XU FINDUSER] is used to find a user who is currently signed on to the system in this UCI group. If you are on the same CPU as the user, this option also shows the menu path of the user. The option finds users based on the "CUR" cross-reference of the SIGN-ON LOG (#3.081) file.

### 3.5.2 Proxy User List Option

The Proxy User List option [XUSAP PROXY LIST] runs a report listing any users in the NEW PERSON (#200) file that have a USER CLASS (#9.5) field of APPLICATION PROXY or CONNECTOR PROXY.

### 3.5.3 List Users Option



The List Users option [XUSERLIST] lists all users known to the system.

### 3.5.4 Print Sign-on Log Option

The Print Sign-on Log option [XUSC LIST] prints out a Kernel sign-on log report (see [Figure 31](#)) that lists data values from fields in the SIGN-ON LOG (#3.081) file.

[Table 6](#) lists the data displayed on the Kernel sign-on log report (see [Figure 31](#)):

**Table 6: Kernel Sign-On Log Report Data Values**

Report Field	File #3.081 Field Reference	Description
Sign-on time	DATE/TIME (#.001)	This is the date and time that the user signed onto the system.   <b>NOTE:</b> To allow more than one signon per second the time can have values that show hundredth of a second.
ELAPSED TIME (MINUTES)	ELAPSED TIME (MINUTES) (#99)	This is the amount of time in minutes that the user has been signed onto the system.
USER	USER (#.01) Points to the NEW PERSON (#200) file.	This is the user name signed onto the system (i.e., LAST NAME, FIRST NAME).
\$I	DEVICE \$I (#1)	This is the \$I device to which the user signed onto the system. This field holds the Hardware port name that the operating system (OS) can identify when referencing a port on a CPU. On layered systems where opening of host files is supported, this field can hold the host file name.
NODE NAME	NODE NAME (#10)	This is the VAX/VMS cluster node name or system name to which the user signed onto the system.
IPV6 ADDRESS	IPV6 ADDRESS (#100)	This is the IPV6 address from the calling system. Under the Dynamic Host Control Protocol (DHCP) Internet Protocol (IP) addresses are dynamically allocated, so more than one client could have used the same IP address over some time period. Also, under IPV6, each client could have more than one IP address.   <b>NOTE:</b> IPv4 addresses will be stored as IPv4-mapped IPv6 addresses, and all addresses will be stored in expanded IPv6 format.
LOA	LEVEL OF ASSURANCE (#101)	This is the Level of Assurance (LOA) of the user's authentication into Vista. There are currently four levels defined by the <a href="#">National Institution of Standards and</a>

Report Field	File #3.081 Field Reference	Description
		<p><a href="#">Technology Special Publication (NIST SP) 800-63-2 Electronic Authentication Guideline:</a></p> <ul style="list-style-type: none"> <li>• <b>Level 1</b>—No identity proofing requirement. This generally refers to a “self-asserted” user identity and is the lowest form of authentication. This form of authentication does <i>not</i> satisfy <a href="#">VA Handbook 6500</a> security requirements.</li> <li>• <b>Level 2</b>—Single factor authentication. This form of authentication includes username/password or, in the case of VistA, Access/Verify code authentication.</li> <li>• <b>Level 3</b>—Multi-factor authentication. This form of authentication includes VA 2-Factor Authentication (2FA) using smart cards (PKI certificates) and Personal Identification Number (PIN).</li> <li>• <b>Level 4</b>—Highest practical authentication assurance. At this level, in-person identity proofing (e.g., fingerprint or retinal scan) is used to authenticate and identify the user.</li> </ul>
REMOTE APP	REMOTE APP (#18) Points to the REMOTE APPLICATION (#8994.5) file	<p>The REMOTE APP (#18) field was added to the Kernel sign-on log report as of Kernel Patch XU*8.0*630. The data identifies how users are accessing VistA. For example, through any of the following applications:</p> <ul style="list-style-type: none"> <li>• JLV Application using National Health Information Network (NHIN).</li> <li>• VistA Applications (e.g., CPRS GUI, VistA Imaging VIX, etc.).</li> <li>• Terminal Emulator Software (e.g., Micro Focus® Reflection, Attachmate® Reflection, other terminal emulator, or generic default for a telnet/SSH interface).</li> <li>• Web Services.</li> </ul>

**Figure 31: Sample Kernel Sign-On Log Report**

USERS WHO HAVE SIGNED ONTO THE COMPUTER				JUL 19, 2017@09:57		PAGE 1
ELAPSED						
TIME						
Sign-on time	(MINUTES)	USER	\$I	LOA	REMOTE APP	NODE NAME
IPV6 ADDRESS						
-----						
JUL 18,2017@05:54:06	0	XUUSER,TEN	/dev/pts/		vhaausdhct033	
0000:0000:0000:0000:0000:FFFF:0AEC:C164	1		MEDICAL DOMAIN WEB SERVICES			
JUL 18,2017@07:27:04	0	XUUSER,ELEVEN	/dev/pts/		vhaausdhct033	
0000:0000:0000:0000:0000:FFFF:0AED:8292	3		MICRO FOCUS REFLECTION			
JUL 18,2017@08:35:23	0	XUUSER,THREE	/dev/pts/		vhaausdhct033	
0000:0000:0000:0000:0000:FFFF:0A06:112D	2		JLV NHIN			
JUL 18,2017@14:48:57	45	XUUSER,TWO	/dev/pts/		vhaausdhct033	
0000:0000:0000:0000:0000:FFFF:0A06:112B	3		CPRS GUI			
JUL 18,2017@16:09:01	19	XUUSER,TWO	/dev/pts/		vhaausdhct033	
0000:0000:0000:0000:0000:FFFF:0A06:112B	2		TERMINAL EMULATOR			
JUL 18,2017@16:40:22	5	XUUSER,TEN	/dev/pts/		vhaausdhct033	
0000:0000:0000:0000:0000:FFFF:0A06:112D	3		CPRS GUI			
JUL 18,2017@09:57:14	on line	XUUSER,THREE	/dev/pts/		vaausdhct034	
0000:0000:0000:0000:0000:FFFF:0AEA:83A8	2		VISTA IMAGING VIX			

### 3.5.5 Proxy (Connector) Detail Report Option

The Proxy (Connector) Detail Report option [XUSAP PROXY CONN DETAIL ALL] provides information about CONNECTOR PROXY accounts for the purposes of:

- Monitoring compliance with the 3-year mandate (per VA Handbook 6500) to expire/change Verify codes for service accounts.
- Reporting any misconfigured CONNECTOR PROXY accounts.
- Listing account activity to help determine whether accounts are active, and are being accessed from which remote locations.

When running the report, the following options determine how much additional content is listed for each account:

- Check/display connector proxy fields? YES/NO (checks for misconfigured accounts).
- Scan sign-on log for connector proxy activity? YES/NO (lists account activity).

Possible categorizations for whether accounts are reported as “Compliant w/3-year Service Account Mandate?” are:

- YES (account is compliant).
- \*\*\* NO <---- MUST FIX \*\*\* (date created and date verify code last changed > 3 years in the past).
- No, but user *not* active.
- UNABLE TO DETERMINE (until patch XU\*8.0\*574, date verify code last changed for Connector Proxy accounts was incorrectly recorded as 4/10/2005)
- Unable to determine but *not* active.

If an account's Date Verify Code Last Changed is listed as "(changed but date *not* recorded)", that means the "fake" 4/10/2005" date is present, and unless the account was created within the last 3 years, it is impossible to determine if the account is in compliance with the 3-year mandate.

Also, if there is a value in the XUS LOGON ATTEMPT COUNT field, that value is displayed, as it could indicate a remote system attempting to connect and failing with an invalid Verify code.

If the option to "Check/display connector proxy fields?" is selected, the following checks are performed:

- Warnings: (any field listed in the warning section should *not* be populated. However, before changing, consult the National Help Desk or Customer Support as some applications may (currently) be depending (incorrectly) on a misconfigured connector configuration.)
- Values for other fields allowed/expected: (field normally populated for connector proxies).
- Other Fields Populated (not expected fields, but *not* problematic either).
- Other Multiples Populated (not expected, but *not* problematic either).

If the option to "Scan sign-on log for connector proxy activity?" is selected, the report scans the sign-on log for all signon activity associated with the account. Any activity found is displayed, organized by client IP address, and within IP address, by date of signon. The purpose of this report section is to help sites determine which accounts are active, and which external systems (by IP address) are logging onto the site with the specified account. This helps determine which remote applications a change to the account (e.g., Verify code change) might impact, and also helps a site determine whether too many remote applications/data centers are using the same account (which could result in a more widespread service disruption if an account *must* be changed).



**NOTE:** This option can be scheduled.

### 3.5.6 Proxy (Connector) Inquire Option

The Proxy (Connector) Inquire option [XUSAP PROXY CONN DETAIL INQ] provides information about CONNECTOR PROXY accounts for the same purposes as the [Proxy \(Connector\) Detail Report Option](#); however, it allows the selection of a specific NEW PERSON (#200) file CONNECTOR PROXY entry.

### 3.5.7 Release user Option

If multiple signons are prohibited, problems can occur if users experience an abnormal exit such that the signon record cannot be cleared. System administrators can use the Release user option [XUSERREL] to remedy the problem for individual users. To clear all users on startup, schedule the Clear all users at startup option.

### 3.5.8 Remote Access User Sign-on Log Option

The Remote Access User Sign-on Log option [XUSEC REMOTE ACCESS] prints sign-on log entries from remote users (VISITORS) that have been authenticated on an external system (usually another VistA server) using Broker Security Enhancement (BSE) or the (deprecated) Medical Domain Web Service (MDWS) visitor access.

The report shows:

- Remote Site Name.
- Date of First Visit.
- Date of Last Visit.

BSE allows users to be validated through 2-Factor Authentication (2FA) or the traditional VistA Access and Verify codes on their home system and then carry that authentication to other VistA systems. A packet of information is retrieved from the authenticating (home) site, and is entered in the NEW PERSON (#200) file, so that a trace to the original authentication can be made.

### 3.5.9 User Inquiry Option

The User Inquiry Option option [XUSERINQ] displays various attributes of a specified user. If the user is currently signed on, it displays the job and device numbers, the signon time, and what option is being executed. Otherwise, it displays the last signon time. It also displays which security keys are held by the user.

### 3.5.10 User Status Report Option

The User Status Report option [XUUSERSTATUS] produces a report of the users currently signed on to this CPU and UCI. It shows the option each user is running and when they signed on, as well as their device and job numbers.

### 3.5.11 Users with Foreign Visits Option

The Users with Foreign Visits option [XUS VISIT USERS] shows NEW PERSON (#200) file entries that have been VISITORS to this site using Broker Security Enhancement (BSE) or the (deprecated) Medical Domain Web Service (MDWS) visitor access.

## 3.6 Signon Audits

Signon events are recorded in the SIGN-ON LOG (#3.081) file. Statistics, such as the time of access and the user's identity, are stored for audit purposes. If the user exits normally (is *not* "bumped" off the system), the signon record includes the time of exit. If the user exits abnormally with an error or enters programmer mode, the signon record cannot include a time of exit.

Information about signon activity can be reviewed with options on the Operations and System Security menus.

The SIGN-ON LOG (#3.081) file is purged with the Purge Sign-On log option [XUSCZONK] that should be tasked to run on a regular schedule (e.g., every night). This option *cannot* be reached from Menu Manager; like other options that should only be queued, it is on the Parent of Queuable Options menu [ZTMQUEUABLE OPTIONS].

### 3.6.1 Signon Statistics

Statistics about active sessions can be obtained with the CPU/Service/User/Device Stats option [XUSTAT]. This option permits sorting by CPU, by the user's Service/Section (e.g., MAS) by individual users, or by particular devices.

**Figure 32: CPU/Service/User/Device Stats Option**

```

SYSTEMS MANAGER MENU ...                               [EVE]
Operations Management ...                             [XUSITEMGR]
CPU/Service/User/Device Stats                       [XUSTAT]
  
```

### 3.6.2 Failed Access Attempts Audit

When a user enters invalid Access and Verify code pairs, the number of attempts is recorded and the device appears to lock after the site parameter limit of failed access attempts is reached. After this point, Signon/Security continues to record what the user types (but only to create a record in the FAILED ACCESS ATTEMPTS LOG [#3.05] file). If a valid Access code is entered, Signon/Security can link the attempt with a known user and records that user's name in the log. Since it is a valid code, its text is *not* recorded in the log. The text of subsequently entered invalid Verify codes can, however, be recorded as clues to the source of the access attempt. If the Access code is *not* valid, a user's name cannot be associated but the text of the attempt can be recorded. The log also records the time of day, device used, and CPU/UCI location.

**Table 7: Kernel Signon Auditing Files**

File	Global Location	Set Parameters	Display Parameters	Initiate/Terminate	Print Reports	Purge Logs
SIGN-ON LOG (#3.081)	^XUSEC(0,	Predefined	N/A	Always done	Print Sign-on Log [XUSC LIST]	Purge Sign-on Log [XUSCZONK]
FAILED ACCESS ATTEMPTS LOG (#3.05)	^%ZUA(3.05,	Establish System Audit Parameters [XUAUDIT]	Display the Kernel Audit Parameters [XU-SPY-SHOW]	On/Off switch	Devices: Device Failed Access Attempts [XUFDEV] Users: User Failed Access Attempts [XUFDISP]	Failed Access Attempts Log Purge [XUFPURGE]
OLD ACCESS AND VERIFY CODES (#200 XREF)	^VA(200,	Predefined	N/A	Always done	N/A	Purge Log of Old Access and Verify Codes [XUSERAOLD]



### 3.6.3 Purge Old Access and Verify Codes

Figure 33: Purge Log of Old Access and Verify Codes Option

SYSTEMS MANAGER MENU ...	[EVE]
User Management ...	[XUSER]
Purge Log of Old Access and Verify Codes	[XUSERAOLD]

The Purge Log of Old Access and Verify Codes option [XUSERAOLD] purges all inactive Access and Verify codes, which allows for the recycling of codes. Old Access and Verify codes are stored so that users cannot pick a previously used code when required to choose a new code. If old codes are stored indefinitely, though, it may become difficult for users to invent new codes. When you use this option interactively, you can purge codes older than a retention period you specify, from 7 to 90 days. When scheduled, the retention period defaults to 90 days, but can be changed to anything from 30 to 90 days by putting the number of days in the TASK PARAMETERS field.

The log of Access codes is stored in the whole-file AOLD cross-reference of the NEW PERSON (#200) file. The log of Verify codes is stored per user in the VOLD cross-reference of the NEW PERSON (#200) file, *not* a whole-file cross-reference). Thus, Verify codes are *not* necessarily unique between users, while Access codes are.

## 4 File Access Security

The File Access Security system is an optional Kernel module. It provides an enhanced security mechanism for controlling user access to VA FileMan files.



**REF:** For more information on File Access Security, see the *VA FileMan (Version 22.0) and Kernel (Version 8.0) File Access Security* supplemental documentation located on the VA Software Document Library (VDL) at: <http://www.va.gov/vdl/application.asp?appid=5>

### 4.1 User Interface

As a user, you typically access VistA data by use of application options. You enter data into files and retrieve information from files through the menu options within the software. Except under a few unusual circumstances, your use of the system is *not* affected by the File Access Security system. If you need to work directly with files by using VA FileMan options, however, you are affected.

VA FileMan options provide direct access to data files. [Figure 34](#) lists some sample VA FileMan options:

**Figure 34: Sample VA FileMan Menu Options**

```
Select VA FileMan Option: ?
Enter or Edit File Entries      [DIEDIT]
Print File Entries             [DIPRINT]
Search File Entries           [DISEARCH]
Inquire to File Entries       [DIINQUIRE]
```

If the File Access Security system is implemented, the only files you can access directly through VA FileMan options are those listed in your ACCESSIBLE FILE (#32) Multiple field in the NEW PERSON (#200) file. System administrators grant file access by using a submenu on the User Management menu [XUSER].

There are six levels of File Access Security properties (listed alphabetically):

- **AUDIT**
- **DATA DICTIONARY (“DD”)**
- **DELETE (“DEL”)**
- **LAYGO**
- **READ (“RD”)**
- **WRITE (“WR”)**

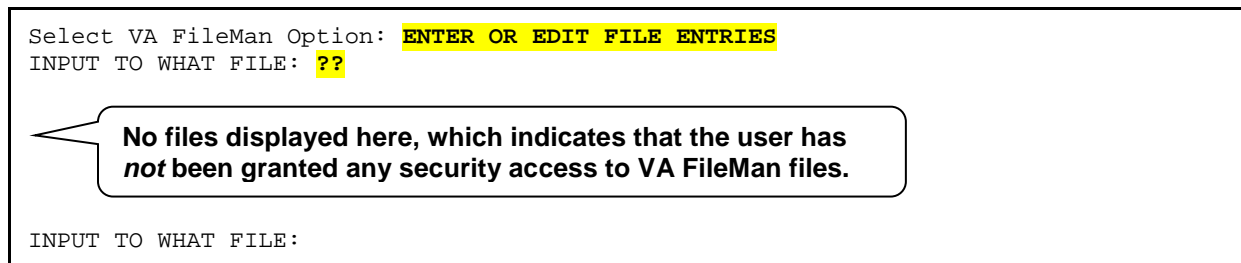


**REF:** These File Access Security level properties are described in [Table 8](#).

Each level of access is granted as **YES** or **NO**. If the File Access Security system is implemented, file access is controlled by these **YES/NO** flags, *not* by the matching of your FILE MANAGER ACCESS CODE (#3) field string in the NEW PERSON (#200) file with security placed on the file.

If you have *not* been granted any security access to VA FileMan files, entering two question marks (??) when prompted for a file name/number shows no files to access:

**Figure 35: User has *Not* been Granted Security Access to any VA FileMan Files—Sample User Dialogue**



In this case, you need to contact the system administrators to get access to the VA FileMan files you need.

File Access Security is also invoked when an option uses VA FileMan's Line Editor. In particular, the Transfer Lines from Another Document option on the Line Editor's Edit menu does *not* permit access to other word-processing documents in the current file or other files unless **READ** access to that file has been explicitly granted. If you need to transfer text from other files using the Line Editor, contact the system administrators to request access to those files.

## 4.2 System Management

Prior to introduction of the File Access Security system, user access to VA FileMan files through VA FileMan options was controlled by matching a character in a user's FILE MANAGER ACCESS CODE (#3) field [the **DUZ(0)** string] in the NEW PERSON (#200) file with a character in the file's top level file security fields.

Kernel's optional File Access Security system uses a different method. It allows you to control access to files for any user using VA FileMan options directly. Access is granted (or denied) by adding (or removing) a file from a user's ACCESSIBLE FILE (#32) Multiple field in their NEW PERSON (#200) file entry.

The File Access Security system does *not* affect access to files through *non-VA* FileMan options; security in this case is managed by controlling the availability of the option.



**REF:** For exceptions, see the "[When is File Access Security Checked?](#)" section.

If a user's **DUZ(0)** is set to the at-sign (@; Programmer access), VA FileMan options allow complete file access. If it is set to anything else (except the caret [^]), VA FileMan options use the ACCESSIBLE FILE (#32) Multiple field specifications in the NEW PERSON (#200) file to grant varying levels of file access.



**NOTE:** The caret (^) overrides the at-sign (@; Programmer access).

This higher degree of control over a user's file access comes at a price, because it requires more management on the system administrator's part to provide each user access to the files to which they need access. However, the payoff in using the File Access Security system is in enhanced control and security for VA FileMan files.

## 4.2.1 When is File Access Security Checked?

When using VA FileMan options, access to files through the File Access Security system is checked.

When initially accessing data in a file through software options (e.g., options using VA FileMan Application Program Interfaces [APIs]), File Access Security is *not* checked. File Access Security is checked, however, when calling the following VA FileMan APIs:

- **^DIC calls**—Adding an entry to the top level of a file (i.e., **LAYGO** access)
- **^DIE calls**—Deleting an entry at the top level of a file (i.e., **DELETE** access).

Developers can bypass these **LAYGO** and **DELETE** access checks using the following variables, respectively:

- **DLAYGO**
- **DIDEL**

When accessing data through software options, File Access Security is also checked when a file is navigated to from another file (i.e., **READ**, **WRITE**, **DELETE**, and **LAYGO** access). Currently, there is no way for developers to override access checks when navigating to a file from another file, so explicit access to files navigated to/from an application option *must* be granted by the system administrators.

## 4.2.2 What in VA FileMan is Still Protected by the File Manager Access Code?

When the File Access Security system is enabled, access to templates (e.g., **INPUT**, **PRINT**, **SORT**, etc.) is denied when using VA FileMan options; if the user's **DUZ(0)** string does *not* contain a matching character. Similarly, when editing fields via VA FileMan's Enter or Edit File Entries option [**DIEDIT**], the **DUZ(0)** matching process is invoked to permit or deny editing for protected fields. The **DUZ(0)** value is also checked by some *non-VA* FileMan applications. Finally, if a user's **DUZ(0)** is @, they are allowed complete access to all files.

## 4.2.3 Purpose for Granting File Access

System administrators are responsible for granting file access. The needs of each user *must* be determined and an appropriate degree of access authority assigned. Too much access may risk the security of your system, while too little may inhibit productive activity.

What is the purpose of File Access Security? Why bother specifying who has access to which files? The answer is threefold:

- To monitor the use of VA FileMan.
- To regulate the extent of VA FileMan access from among six levels of security that allow **AUDIT**, **DATA DICTIONARY** (“**DD**”), **DELETE** (“**DEL**”), **LAYGO**, **READ** (“**RD**”), or **WRITE** (“**WR**”) access.



**REF:** These File Access Security level properties are described in [Table 8](#).

- To reserve **DUZ(0)**, the FILE MANAGER ACCESS CODE (#3) field, as a security measure to protect just templates and fields, *not* files, from VA FileMan options.

With file access security, it is possible to know who has access to which files and what kind of access they have. This information can also be retrieved by user or by file. In addition, privileges can also be entirely restricted for an individual user or for a single file that may contain sensitive information.

## 4.2.4 Who Needs File Access?

You need to grant File Access Security in the following cases:

- A user needs to access files directly through VA FileMan options.
- Within an application option, VA FileMan is used to navigate from one file to another.
- Within an application option that calls the ^DIE API to edit a file entry; a user is unable to add or delete entries in a pointed-to file.
- Within an application option that calls the ^DIE or ^DIC APIs to edit a file entry; a user is unable to add or delete entries in the primary file (because the application did *not* set the **DLAYGO** or **DIDEL** variables).
- A user needs to use VA FileMan’s Line Editor’s Transfer Lines from Another Document option.

Application developers can document which files need to be granted to whom, or can modify their code or data dictionary (DD) specifications to allow access.

## 4.2.5 Levels of File Access Security


There are six file access security properties involved with File Access Security. If a file access security property is *not* defined (i.e., the value is **NULL**), the VA FileMan exported menu options for that property are *not* open to full access for users.




**REF:** [Table 8](#) is taken from the *VA FileMan (Version 22.0) and Kernel (Version 8.0) File Access Security* supplemental documentation located on the VA Software Document Library (VDL) at: <http://www.va.gov/vdl/application.asp?appid=5>

**Table 8: File Access—Security Level Properties**

Access	Security Property Description	Property Location (Classic VA FileMan)
<b>AUDIT</b>	<p>The <b>AUDIT</b> security property controls the setting of auditing characteristics and the deletion of audit trails. This property only deals with the auditing of data and <i>not</i> the auditing of data dictionary (DD) changes. To audit DD changes, users would enter <b>YES</b> at the “DD AUDIT? NO//” prompt when modifying a file’s File Security Access. Examples of the VA FileMan options that this property controls are as follows:</p> <ul style="list-style-type: none"> <li>• Fields Being Audited [DIAUDITED FIELDS]</li> <li>• Data Dictionaries Being Audited [DIAUDIT DD]</li> <li>• Purge Data Audits [DIAUDIT PURGE DATA]</li> <li>• Purge DD Audits [DIAUDIT PURGE DD]</li> </ul>	^DIC(<file number>,0,"AUDIT")=<value>

Access	Security Property Description	Property Location (Classic VA FileMan)
	<ul style="list-style-type: none"> <li>• Turn Data Audit On/Off [DIAUDIT TURN ON/OFF]</li> </ul>	
<b>DATA DICTIONARY (“DD”)</b>	<p>The <b>DATA DICTIONARY</b> security property controls who has access to modify the data dictionary. Examples of the VA FileMan options that this property controls are as follows:</p> <ul style="list-style-type: none"> <li>• Modify File Attributes [DIMODIFY]</li> <li>• Utility Functions [DIUTILITY]</li> <li>• Data Dictionary Utilities [DI DDU]</li> </ul> <p>For example, to use the Map Pointer Relations option [DI DDMAP], <b>DD</b> access is needed to the PACKAGE (#9.4) file and to the files one selects for mapping.</p>	^DIC(<file number>,0,"DD")=<value>
<b>DELETE (“DEL”)</b>	<p>The <b>DELETE</b> security property controls who can delete an existing record that is contained within the file. It does <i>not</i> permit deletion of the file or any of its attribute fields. Examples of the VA FileMan options that this property controls are as follows:</p> <ul style="list-style-type: none"> <li>• Enter or Edit File Entries [DIEDIT]</li> <li>• Transfer Entries [DITRANSFER]</li> </ul>	^DIC(<file number>,0,"DEL")=<value>
<b>LAYGO</b>	<p>The <b>LAYGO</b> (Learn As You Go) security property controls who can add a new record to the file. Examples of the VA FileMan options that this property controls are as follows:</p> <ul style="list-style-type: none"> <li>• Enter or Edit File Entries [DIEDIT]</li> </ul> <p> <b>NOTE:</b> You <i>must</i> have <b>LAYGO</b> and <b>WRITE</b> access to a file to add new entries. In addition, you <i>must</i> have <b>WRITE</b> access at the field level for all required identifier fields.</p>	^DIC(<file number>,0,"LAYGO")=<value>
<b>READ (“RD”)</b>	<p>The <b>READ</b> security property controls who has access to read data contained within a file. Examples of the VA FileMan options that this property controls are as follows:</p> <ul style="list-style-type: none"> <li>• Print File Entries [DIPRINT]</li> <li>• Search File Entries [DISEARCH]</li> <li>• Inquire to File Entries [DIINQUIRE]</li> <li>• Statistics [DISTATISTICS]</li> </ul>	^DIC(<file number>,0,"RD")=<value>

Access	Security Property Description	Property Location (Classic VA FileMan)
	<ul style="list-style-type: none"> <li>• List File Attributes [DILIST]</li> <li>• Transfer Entries [DITRANSFER]</li> </ul> <p>To transfer text, the user needs <b>READ</b> access to the file from which text is being transferred. Similarly, <b>WRITE</b> access is needed for the file to which entries are being transferred with this option.</p> <ul style="list-style-type: none"> <li>• Transfer File Entries (transfer-to file)</li> </ul> <p> <b>NOTE:</b> <b>READ</b> access is also required to use some of the Filegram and Audit options.</p>	
<b>WRITE</b> (“WR”)	<p>The <b>WRITE</b> security property controls who can alter data in an existing record that is contained within the file. It does <i>not</i> permit the adding of new entries to the file. Examples of the VA FileMan options that this property controls are as follows:</p> <ul style="list-style-type: none"> <li>• Enter or Edit File Entries [DIEDIT]</li> <li>• Transfer Entries [DITRANSFER]</li> </ul> <p>To transfer text, the user needs <b>READ</b> access to the file from which text is being transferred. Similarly, <b>WRITE</b> access is needed for the file to which entries are being transferred with this option.</p>	^DIC(<file number>,0,“WR”)=<value>

Any or all of these six levels of access can be enabled for each of the user’s accessible files. This is done by changing the field value from **NULL** to **YES**. This flag is overridden for developers whose **DUZ(0)=@**.

Granting the **READ**, **WRITE**, **DELETE**, and **LAYGO** levels of access permits adding and deleting file entries as well as editing their attribute field data values. This is true unless the attribute field has been protected. If so (i.e., if there is **READ**, **WRITE**, or **DELETE** protection within the data dictionary [DD] for a given field), the user’s FILE MANAGER ACCESS CODE (#3) field, **DUZ(0)**, is checked. Access is denied if the user’s **DUZ(0)** does *not* contain a character matching the field protection. Again, **DUZ(0)=@** overrides this restriction.

The **DATA DICTIONARY** (“**DD**”) and **AUDIT** levels of access pertain to the structure of the file itself. While this provides a generous scope for VA FileMan data dictionary (DD) modification, it falls short of, for example, deleting a field protected with the at-sign (@; Programmer access).

The same applies to templates. If the template is protected, the user who has access to the file does *not* have access to the template from VA FileMan options unless there is a match in the **DUZ(0)** character string.

## 4.2.6 Audit Access to Files

Audit privileges might be granted to advanced VA FileMan users who are interested in developing new audit capabilities. With **AUDIT** access, which *must* be accompanied by **DD** access, VA FileMan's Modify File Attributes option [DIMODIFY] can be used to set an audit flag for a particular field within a file. This access does *not* include setting audit conditions with M code, which is reserved for users with a FILE MANAGER ACCESS CODE (#3) field containing @.

The data values for attribute fields can be recorded in the AUDIT (#1.1) file by setting an audit flag in the data dictionary (DD) for that field. For example, the SSN field in the PATIENT (#2) file could be audited. There are two choices for the audit in the AUDIT (#1.1) file:

- An entry can be made when a value is entered or changed.
- An entry can be made *only* when the value is changed (i.e., edited or deleted).

The second method may be all that's needed. In the SSN example, you would monitor just the circumstances of the change, *not* of the initial SSN assignment.

To display the results of the audit, your **DUZ(0)** *must* equal the at-sign (@; Programmer access). Then, you can query the AUDIT (#1.1) file in the usual way with VA FileMan's Inquire to File Entries option [DIINQUIRE].

## 4.2.7 How to Grant File Access

System administrators specify the particular files and levels of access for users. The File Access Security menu [XUFILEACCESS], on the User Management menu [XUSER], provides options to grant file access security. These options edit the ACCESSIBLE FILE (#32) Multiple field in the NEW PERSON (#200) file.

The options for granting file access privileges fall into three functional categories:

- **EDITING**—To assign file access to an individual user or a group of users. One user's profile can also be duplicated or copied to another user or group of users. To simplify adding files, number ranges can be specified.
- **LISTING**—To display one user's profile, a name-sorted list of all user's profiles, or a file or range of files with associated users and the access levels of each.
- **RESTRICTING**—To entirely limit access by user or by file, or to delete a range of files for a user or group of users.

The options are designed to facilitate queries by user or by file. You can add or delete file access for one user or for many users. Or, you can begin with the file and list users with access or restrict access.



## 4.2.8 Using the File Access Options

Figure 36: File Access Security Menu Options

SYSTEMS MANAGER MENU ...	[EVE]
User Management ...	[XUSER]
File Access Security ...	[XUFILEACCESS]
Grant Users' Access to a Set of Files	[XUFILEGRANT]
Copy One User's File Access to Others	[XUFILECOPY]
Single file add/delete for a user	[XUFILESINGLEADD]
Inquiry to a User's File Access	[XUFILEINQUIRY]
List Access to Files by File number	[XUFILELIST]
Print Users Files	[XUFILEPRINT]
Delete Users' Access to a Set of Files	[XUFILESETDELETE]
Remove All Access from a Single User	[XUFILEREMOVEALL]
Take away All access to a File	[XUFILEDELETE]
Assign/Delete a File Range	[XUFILERANGEASSIGN]

When using options on the File Access Security menu [XUFILEACCESS], you may have the following questions:

- What is the **DUZ#** that appears next to the user's name?
- How is a range of file numbers specified?
- What are the queuing questions all about?

### 4.2.8.1 Understanding DUZ (User Number)

When listing the file accesses by user or by file, the user's name is followed by a number in parentheses. The heading indicates that this is the "User #," which is the same as the **DUZ#**.

Once the user enters an Access and Verify code, Kernel's Signon/Security uses the **DUZ** variable to identify an entry in the NEW PERSON (#200) file. It *must* be a unique identifier, so the user's name does *not* work. Instead, the Internal Entry Number (IEN) is used. That is what becomes the value of **DUZ**.



**NOTE:** Some users have low numbers while others have high ones. This simply indicates the order their names were entered into the NEW PERSON (#200) file. Users with low numbers are often people who began using the system some years ago, while users with high numbers tend to be recent entries in the file.

**DUZ** is a local variable array that identifies the user who has signed onto the system. It is the Internal Entry Number (IEN) for the user in the NEW PERSON (#200) file. Besides the unique IEN, this array contains other variables specific to the signed-on user:

Table 9: DUZ Array Variables

Variable	Description
<b>DUZ(0)</b>	This variable stores the level of Programmer access (i.e., VA FileMan Access Code) of the user at signon (e.g., @). This variable is derived from the value stored in the FILE MANAGER ACCESS CODE (#3) field in the NEW PERSON (#200) file.
<b>DUZ(1)</b>	This variable is obsolete; it is always set to <b>NULL</b> .
<b>DUZ(2)</b>	If a user is associated with more than one institution (division), the user is

Variable	Description
	prompted at signon to select a division. This variable is set to the appropriate value. This variable is derived from the values stored in the DIVISION (#16) Multiple field in the NEW PERSON (#200) file. This field points to the INSTITUTION (#4) file.
DUZ("AG")	This variable stores the agency code at signon (e.g., V = VA). This variable is derived from the value stored in the AGENCY CODE (#9) field in the KERNEL SYSTEM PARAMETERS (#8989.3) file. This value is a defined Set of Codes.
DUZ("AUTHENTICATION")	This variable stores the method used to authenticate the user. Examples include "ASHTOKEN", "AVCODES", "BSETOKEN", "CCOWTOKEN", "SSOI", "SSOE", "NHIN", "NONE", and "XUP".
DUZ("AUTO")	Menu Manager uses this variable to control whether all items on a menu are presented automatically after each cycle through the menu system. This variable stores the user's menu display preference at signon (e.g., 1 = Auto Generate Menus). This variable is derived from the value stored in the AUTO MENU (#.06) field in the NEW PERSON (#200) file.
DUZ("BUF")	This variable stores the user's type ahead (buffer) preference (e.g., 1 = Allowed). This variable is derived from the value stored in the TYPE-AHEAD (#.09) field in the NEW PERSON (#200) file.
DUZ("LANG")	<p>This variable stores the display language as it is stored in the LANGUAGE (#.01) field in the LANGUAGE (#.85) file. VA FileMan uses this setting to enable the display of language-specific dates and times, numeric formats, and dialogues. VA FileMan currently distributes only the English language entry for this file (entry number 1).</p> <p>The LANGUAGE (#.01) field in the LANGUAGE (#.85) file is pointed to by the following:</p> <ul style="list-style-type: none"> <li>• LANGUAGE (#.01) field of the TRANSLATION (#.847) subfield of the DIALOG (#.84) file.</li> <li>• LANGUAGE (#200.07) field in the NEW PERSON (#200) file.</li> <li>• DEFAULT LANGUAGE (#207) field in the KERNEL SYSTEM PARAMETERS (#8989.3) file, which overrides the setting of the LANGUAGE (#200.07) field.</li> </ul>
DUZ("LOA")	<p>This variable records the "Level of Assurance" (LOA) of the user's authentication and identity. Four levels are currently defined by National Institution of Standards and Technology Special Publication (NIST SP) 800-63-2 Electronic Authentication Guideline:</p> <ul style="list-style-type: none"> <li>• <b>Level 1</b>—No identity proofing requirement. This generally refers to a "self-asserted" user identity and is the lowest form of authentication. This form of authentication does <i>not</i> satisfy VA HANDBOOK 6500 security requirements. Application developers may choose to programmatically deny access to sensitive data if a user's LOA equals "1".</li> <li>• <b>Level 2</b>—Single factor authentication. This form of authentication includes username/password or, in the case of VistA, Access/Verify code authentication.</li> <li>• <b>Level 3</b>—Multi-factor authentication. This form of authentication includes VA 2-Factor Authentication (2FA) using smart cards (PKI certificates) and Personal Identification Number (PIN).</li> </ul>

Variable	Description
	<ul style="list-style-type: none"> <li><b>Level 4</b>—The highest practical authentication assurance. At this level, in-person identity proofing such as fingerprint or retinal scan is used to authenticate and identify the user.</li> </ul>
<b>DUZ("REMAPP")</b>	This variable is used to identify an external client application whenever possible. Examples include "BMS", "CAPRI", "MDWS", "NUMI", "VISTA IMAGING", and others. The information is currently obtained from the REMOTE APPLICATION (#8994.5) file, but plans are to obtain client application identity from the 2-Factor Authentication (2FA) token when fully implemented.
<b>DUZ("TEST")</b>	This variable is used during menu generation. It indicates to the user when they are in a Test account by inserting the phrase "<TEST ACCOUNT>" into the "Select..." main menu prompt. For example (see <a href="#">Figure 38</a> ):  Select VA FileMan <TEST ACCOUNT> Option:

**Figure 37: Displaying the DUZ Array for a Signed-on User at a Programmer Prompt**

```

KRN>ZW DUZ

```

**This Internal Entry Number (IEN) is always a unique number for each user entry in the NEW PERSON (#200) file.**

```

DUZ=8
DUZ(0)="@"
DUZ(1)=""
DUZ(2)=2
DUZ("AG")="V"
DUZ("AUTO")=1
DUZ("BUF")=1
DUZ("LANG")=1
DUZ("TEST")=" <TEST ACCOUNT>"

```

When you want to display/print the **DUZ**, VA FileMan recognizes that when you enter "NUMBER" as a print field that you want to display/print the **DUZ** for the user entry from the NEW PERSON (#200) file.

**Figure 38: Displaying the DUZ (Internal Entry Number) in a VA FileMan Report**

```
Select VA FileMan <TEST ACCOUNT> Option: PRINT <Enter> File Entries

OUTPUT FROM WHAT FILE: NEW PERSON// <Enter>
SORT BY: NAME// <Enter>
START WITH NAME: FIRST// <Enter>

FIRST PRINT FIELD: NUMBER

VA FileMan recognizes "NUMBER" as the Internal Entry Number for the
entry in the NEW PERSON (#200) file.

THEN PRINT FIELD: NAME
1 NAME
2 NAME COMPONENTS
CHOOSE 1-2: 1 <Enter> NAME
THEN PRINT FIELD: <Enter>
Heading (S/C): NEW PERSON LIST// <Enter>
DEVICE: <Enter> Network
NEW PERSON LIST APR 3,2013 09:55 PAGE 1
NUMBER NAME
-----
1000228 XUUSER,EIGHT
1000084 XUUSER,ELEVEN
52 XUUSER,FIFTEEN
74 XUUSER,FIVE
73 XUUSER,FOUR
21 XUUSER,FOURTEEN
150 XUUSER,NINE
1000182 XUUSER,ONE
1000166 XUUSER,SEVEN
1000108 XUUSER,SIX
1000039 XUUSER,SIXTEEN
151 XUUSER,TEN
8 XUUSER,THIRTEEN
164 XUUSER,THREE
71 XUUSER,TWELVE
183 XUUSER,TWO
```

#### 4.2.8.2 Using Ranges of File Numbers

Can files be specified by number ranges? Yes; it is useful to do this when granting several files at once. First, find out the number of the files. Typing a question mark (?) at the “to Files:” prompt displays the number and name of the files. Note the numbers and then put them together on one line. You can use hyphens to indicate a consecutive range and commas to separate the single numbers and hyphenated groups as follows:

2,3,4,6,7,8,125,236,799

OR

2-4,6-8,125,236,799

File numbers are also used when printing a group of consecutive files. The prompt asks for a place to start with a default file name presented. To print just this one file, respond to the next prompt by simply pressing the <Enter> key, thereby accepting the default of ending after printing that one file.

To print a consecutive range of files, the lowest number is entered as the starting point and the highest number as the ending point. All files that fall in this range are printed.

### 4.2.8.3 Queuing File Access Specifications

Most of the options provide the opportunity to queue, after specifying who is to be granted which files. Queuing sends the specifications to TaskMan to assign to users at a later time. TaskMan can work at an off-peak time (e.g., midnight) to avoid consuming system resources during the daytime. If the system is *not* busy, queuing is still a good idea since your terminal is otherwise tied up while the report is being printed.

## 4.3 Running the File Access Security Conversion

### 4.3.1 Advantages

To implement File Access Security you need to run a conversion. Some advantages of implementing File Access Security include:

- **Easier to identify levels of access**—Running the conversion makes it possible to identify the levels of access each individual user has to each file.
- **Enhanced system performance**—Checking file access by user is slightly faster in terms of global accesses and CPU time.

### 4.3.2 Advance Preparation for the Conversion

The File Access Security conversion is designed to allocate access privileges to all of your users according to their current FILE MANAGER ACCESS CODE (#3) field value in the NEW PERSON (#200) file, **DUZ(0)**, combined with information about their file access through options stored in the **^DISV** global. After the conversion you should get only a few user requests for file access. The File Access Security menu [XUFILEACCESS], an option on the User Management menu [XUSER], should then be used to add a file to a user's ACCESSIBLE FILE (#32) Multiple field in the NEW PERSON (#200) file.

The conversion uses the FILE MANAGER ACCESS CODE (#3) field [**DUZ(0)** string] to assign file access according to the characters in the string. If a file is protected with a particular character that matches one in the user's code, that file is entered into the user's ACCESSIBLE FILE (#32) Multiple field. Levels of access are granted according to the file's original security (field-level security continues to function the same, by checking the FILE MANAGER ACCESS CODE (#3) field).



**NOTE:** Users with Programmer-level access (FILE MANAGER ACCESS CODE [#3] field = @) does *not* need to have any files in their ACCESSIBLE FILE (#32) Multiple field, since they are able to access *all* files *without* restriction.

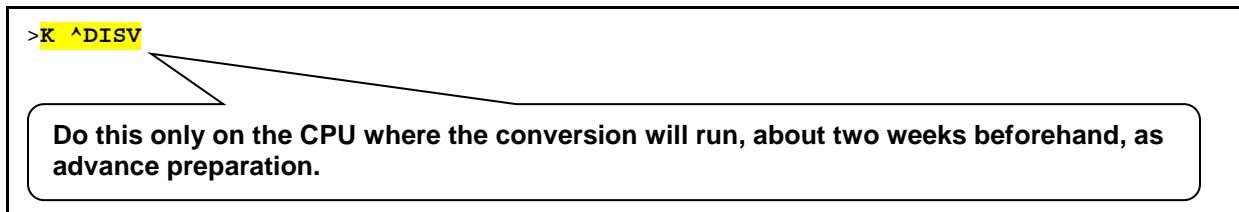
### 4.3.2.1 ^DISV Global

The File Access Security conversion process makes use of the ^DISV global to identify which files have recently been accessed by which users. The conversion adds all files that the user has been able to access (select from) to the user's ACCESSIBLE FILE (#32) Multiple field list. It grants **READ** access to these files.

Using the ^DISV global to grant file access has the benefit of permitting option usage “as usual” the day after the conversion is run. **KILLing** the ^DISV global just *before* the conversion is *not* advised, since many users suffer inappropriate access restrictions and need special attention by system administrators just after the conversion. **KILLing** the ^DISV global a week or two before the conversion, however, may be worthwhile as a way of purging obsolete user data. In multi-CPU environments, where each CPU has its own copy of the ^DISV global, you should choose the busiest user node upon which to run the conversion (in order to pick up the most comprehensive information from that node's ^DISV). Caché sites should run the conversion from their busiest user node.

It is assumed that ^DISV is *not* translated, so **K ^DISV** on the CPU where the conversion is run. Do this about two weeks before you perform the conversion, as advance preparation. ^DISV is reset as soon as a user responds to a “Select:” prompt.

Figure 39: KILLing ^DISV—Sample Code



### 4.3.2.2 Adding Explicit File Access for System Administrators

If there are any files that are neither protected nor accessed by users (e.g., the DOMAIN [#4.2] file) the conversion does *not* list them in any user's ACCESSIBLE FILE (#32) Multiple field. Before the conversion, these types of files are accessible to everyone, while after the conversion these files are only accessible to users with programmer-level access. Therefore, before the conversion, assign a unique symbol/character to otherwise unprotected files. This ensures that at least those users with that unique symbol (e.g., system administrators) are granted access. VA FileMan's Edit File option [DIEDFILE] can be used to edit the codes.



**NOTE:** In previous documentation and data dictionaries, it has been *implied* that the pound sign (“#”) symbol/character was reserved for File Access Security for system administrators; however, this is *not* true. It has merely been used as a *convention*.

**Figure 40: Updating File Access Settings (Before Conversion)**

```
Select OPTION: UTILITY FUNCTIONS
Select UTILITY OPTION: EDIT FILE

MODIFY WHAT FILE: USER// DOMAIN <Enter>          (227 entries)
Do you want to use the screen-mode version? YES// N <Enter> NO
NAME: DOMAIN// <Enter>
DESCRIPTION:
  No existing text
  Edit? NO// <Enter>
Select APPLICATION GROUP: <Enter>
DEVELOPER: <Enter>
```

**Enter a unique symbol/character for each level of access, so that those unprotected files are assigned to system administrators.**

```
DATA DICTIONARY ACCESS: <Enter>
READ ACCESS: <Enter>
WRITE ACCESS: <Enter>
DELETE ACCESS: <Enter>
LAYGO ACCESS: <Enter>
AUDIT ACCESS: <Enter>
```

### 4.3.3 Summary of the File Access Security Conversion

The File Access Security conversion prepares the NEW PERSON (#200) file for VA FileMan's method of file access (lookup into a user's record for file access). VA FileMan's ability to protect data within files on fields and templates remains the same. The summary steps that occur when the conversion is run are outlined below:

1. Setup structure. The structure for implementing the file access method is set up via the following:
  - a. Place the data dictionary (DD) for the ACCESSIBLE FILE (#32) Multiple field in the NEW PERSON (#200) file. This multiple is permanently put in place by running the File Access Security conversion.
  - b. Install menu options, help frames, and templates used for maintaining the user file access method (i.e., entries with the **XUFI** namespace).
2. Add protected files to the ACCESSIBLE FILE (#32) Multiple field. Each user's FILE MANAGER ACCESS CODE (#3) field is used to add entries to the ACCESSIBLE FILE (#32) Multiple field as follows:
  - a. Create a list of files to be processed by examining each file's protection codes. Files that meet *both* of the following requirements are temporarily stored in the ^UTILITY(\$J global:
    - Files that have protection defined.
    - Files with protection *not* equal to @.



**NOTE:** Files that lack any protection are bypassed. Such unprotected files are *not* later listed in anyone's ACCESSIBLE FILE (#32) Multiple field. Protection should therefore be applied *before* running the conversion so that at least some users (e.g., system administrators) are granted access.

- b. Examine each user in the NEW PERSON (#200) file. Each user meeting *all* of the following requirements is selected for further processing:
      - Users *not* terminated.
      - Users with an Access code.
      - Users with a VA FileMan Access code (i.e., FILE MANAGER ACCESS CODE [#3] field in the NEW PERSON [#200] file).
      - Users with a FILE MANAGER ACCESS CODE (#3) field in the NEW PERSON [#200] file *not* equal to @.

The user's FILE MANAGER ACCESS CODE (#3) field in the NEW PERSON [#200] file is parsed. Each symbol/character is compared with the list of files in the ^UTILITY(\$J global. All files that have a protection code matching this symbol/character are added to the user's ACCESSIBLE FILE (#32) Multiple field in the NEW PERSON [#200] file. If the symbol/character is used as the file's DATA DICTIONARY ("DD") file security, the user is granted **DD** access; if it is used as LAYGO, the user is granted **LAYGO** access, and so on.



3. Add files accessed by the user to the ACCESSIBLE FILE (#32) Multiple field. Files accessed by the user through options since the last time the ^DISV global was **KILLED** are added to the user's ACCESSIBLE FILE (#32) Multiple field by the processing of the ^DISV global. Entries in ^DISV that meet *both* of the following requirements are added to the ACCESSIBLE FILE (#32) Multiple field, with **READ** access:
  - The file *must not* be in VA FileMan's file number range (i.e., file number *must* be equal to or greater than 2).
  - The user does *not* already have access to this file.

#### 4.3.4 File Access Security Conversion Instructions

The steps that occur when the file access security conversion is run are described below:

1. Identify unprotected files and assign protection codes as desired (as described in the "[Advance Preparation for the Conversion](#)" section). For example, the DOMAIN (#4.2) file may need to be protected so that it is granted to users having a FILE MANAGER ACCESS CODE (#3) field containing the assigned symbol/character.



**NOTE:** In previous documentation and data dictionaries, it has been *implied* that the pound sign (“#”) symbol/character was reserved for File Access Security for system administrators; however, this is *not* true. It has merely been used as a *convention*.

2. Review the FILE MANAGER ACCESS CODE fields (#3) of VA FileMan users. The codes should contain symbols/characters matching those used to protect the files that these individuals use. Since the conversion automatically grants files to users according to previous privileges as indicated by the FILE MANAGER ACCESS CODE (#3) field, add any additional symbols/characters to their FILE MANAGER ACCESS CODE fields (#3) to take advantage of the conversion's automated file assignment according to levels of access.
3. Be ready to use the File Access Security menu [XUFILEACCESS], [Figure 36](#), to review and grant file access privileges *after* the conversion.
4. In the production account, enable File Access Security system features and options with ENABLE^XUFILE3, as illustrated below:

**Figure 41: Enabling File Access Security—Sample User Dialogue**

```

In VAH:
>D ENABLE^XUFILE3
>
```

5. In the production account, begin the conversion with ^XUINCON:

**Figure 42: ^XUINCON Conversion Routine—Sample User Dialogue**

```
In VAH:
>D ^XUINCON

Version 7 of the Kernel defined a new multiple-valued field
in the New Person File called Accessible File. This conversion
will store file access in this multiple in the following manner:

Those Users who have a FileMan Access Code (DUZ(0)) which
is not null, i.e., contains some character string,
will have their access string matched to the protection
currently on your files. For each match between the file
and the user, the file will be listed in the user's
Accessible File multiple as will the type of access
(dictionary, delete, laygo, read, write, audit).

NOTE: Files with no protection will NOT be assigned to any user.

Would you like to run the conversion now? NO//
```

6. If you are ready to run the conversion, answer **YES**:

**Figure 43: Running a Conversion—Sample User Dialogue**

```
Would you like to run the conversion now? NO// YES
56237,36565
Build Table.
Convert Users.
Give access from DISV file.
X-ref.
Done56237,36565.
>
```

7. Review the newly assigned access settings. Use the File Access Security menu [XUFILEACCESS], [Figure 36](#), located on the User Management Menu [XUSER], to display file access by user and by file.

### 4.3.5 After the File Access Security Conversion

After the file access security conversion, users may complain about *not* being able to add entries to files as they previously could. This typically results from use of an option that navigates from one file to another. To be able to add entries to the navigated-to file, the user needs **LAYGO** access to that file. System administrators can solve the problem by granting **LAYGO** access using the File Access Security menu options [XUFILEACCESS], [Figure 36](#).

If this form of security is implemented, system administrators should find that it provides a more accurate and precise knowledge of who has what level of access to which files. When the conversion is run, privileges are granted to existing users by making use of information stored in the VA FileMan record of file manipulation activity, the **^DISV** global. The file access conversion grants each user **READ** access to files that the user had recently accessed as indicated in the **^DISV** global. System administrators can grant file access privileges to new users by copying the profile of an existing user with similar duties (e.g., a laboratory application coordinator or admissions clerk).

To be sure that appropriate levels of access have been allocated, system administrators should determine who has what level of access to which files. Access to sensitive files (e.g., the NEW PERSON [#200] file) should be reviewed and readjusted for individual users as appropriate. All files on a system should be reviewed before and after running the File Access Security conversion.

[Figure 44](#) shows how to create a PRINT template to display a report on the current file access security:

**Figure 44: Creating a PRINT Template to Display File Access Security—Sample User Dialogue**

```

Select OPTION: PRINT FILE ENTRIES
OUTPUT FROM WHAT FILE: FILE
SORT BY: NAME// @NUMBER

```

**Enter the starting and ending file numbers.**

```

START WITH NUMBER: FIRST// 3
GO TO NUMBER: LAST// 4
  WITHIN NUMBER, SORT BY: <Enter>
FIRST PRINT ATTRIBUTE: NUMBER;L8;S;" "
FIRST PRINT ATTRIBUTE: NAME;L25;" "
THEN PRINT ATTRIBUTE: DD ACCESS;R6
THEN PRINT ATTRIBUTE: RD ACCESS;R6
THEN PRINT ATTRIBUTE: WR ACCESS;R6
THEN PRINT ATTRIBUTE: DEL ACCESS;R6
THEN PRINT ATTRIBUTE: LAYGO ACCESS;R6
THEN PRINT ATTRIBUTE: AUDIT ACCESS;R6
THEN PRINT ATTRIBUTE: <Enter>
HEADING: FILE LIST// FILE SECURITY
STORE PRINT LOGIC IN TEMPLATE: ZZFILE SECURITY

```

**Store in a local template for later use (e.g., ZZFILE SECURITY).**

Once the conversion has been run, you can use the File Access Security menu [XUFILEACCESS], [Figure 36](#), to print the accessible files for individual users. Thus, you can establish profiles that would be typical of groups of users (e.g., Nursing, Pharmacy, or other services). Then, when establishing an account for a new user or reactivating the access of a previously terminated user, the profile is available for copying to the new user.

## 5 Electronic Signatures

### 5.1 User Interface

An electronic signature is a security tool that software applications can use as an additional identification check. For example, software can require that an electronic signature be applied to a particular form or document before subsequent processing can continue.

Electronic signature codes are stored in the NEW PERSON (#200) file.

#### 5.1.1 Electronic Signature code Edit Option

If you need to create an electronic signature for yourself, you can choose the Electronic Signature code Edit option [XUSESIG], available from the User's Toolbox menu.

You can enter a new electronic signature code or change an existing code. The length of the code *must* be between 6 and 20 uppercase characters. Requiring all uppercase allows the code to be verified with either uppercase or lowercase input, since lowercase is converted to uppercase in the matching process. You should choose a code that other users are *not* likely to guess, as this code verifies that it is actually you who are signing off on some important action.

The Electronic Signature code Edit option [XUSESIG] also allows you to edit the following fields in the NEW PERSON (#200) file:

- INITIAL
- SIGNATURE BLOCK PRINTED NAME (#20.2)
- SIGNATURE BLOCK TITLE (#20.3)
- OFFICE PHONE (#.132)
- VOICE PAGER (#.137)
- DIGITAL PAGER (#.138)

Applications can print some or all of these fields when printing an electronically signed document. You should therefore ensure that the values entered in these fields are accurate.

### 5.2 System Management

Figure 45: User Edit Menu Options

```
SYSTEMS MANAGER MENU ...                               [EVE]
User Edit ...                                           [XUSER]
  Electronic Signature Block Edit                       [XUSESIG BLOCK]
  Clear Electronic signature code <locked: XUMGR>      [XUSESIG CLEAR]
```

#### 5.2.1 Electronic Signature Block Edit Option

The Electronic Signature Block Edit option [XUSESIG BLOCK] lets you edit the electronic signature code for any user on the system. When you create an electronic signature code for a user, the SIGNATURE BLOCK PRINTED NAME field is initially filled in by a cross-reference on the NAME (#.01) field (and is overwritten if the NAME [#.01] field is changed). Credentials (e.g., “**M.D.**”) can be added to customize the printed name. As a security feature, an input transform requires that the user's last

name (first comma piece of the NAME (#.01) field) be included in the printed name. (This field *cannot* be edited through VA FileMan since it is **WRITE**-protected with a caret [^].)

### **5.2.2 Clear Electronic signature code Option**

The Clear Electronic signature code option [XUSESIG CLEAR] is another option available to system administrators that allows the clearing (deleting) of an electronic signature code. This option is locked with the XUMGR security key. This option can be used to clear a user's electronic signature code if the user has forgotten the code. The user can then enter a new code with the Electronic Signature code Edit option [XUSESIG] in the User's Toolbox menu.

## 6 DEA ePCS Utility

### 6.1 Overview

Kernel patch XU\*8.0\*580 was created in support of the Drug Enforcement Agency (DEA) e-Prescribing of Controlled Substances (ePCS) Utility using Public Key Infrastructure (PKI). This section describes the modifications and enhancements to Kernel (and other VistA software) to meet the requirements proposed by the DEA Interim Final Rule (IFR) for Electronic Prescriptions for Controlled Substances effective as of June 1, 2010.



**NOTE:** This document only describes the changes made to Kernel in support of the DEA ePCS Utility.



**REF:** For more information on the DEA ePCS Utility software and other VistA applications, see the following:

- Computerized Patient Record System (CPRS) documentation on the VDL:  
<http://www.va.gov/vdl/application.asp?appid=61>
- Pharmacy: Controlled Substances documentation: on the VDL:  
<http://www.va.gov/vdl/application.asp?appid=86>

#### 6.1.1 History

The Veterans Health Administration (VHA) Patient Care Services Office Pharmacy Benefits Management Services (PBM) requested enhancements to Veterans Health Information Systems and Technology Architecture (VistA), specifically the following software applications:

- Computerized Patient Record System (CPRS)
- Outpatient Pharmacy
- Controlled Substances
- Kernel

The enhancements made to these applications is to ensure that prescriptions for Controlled Substances (i.e., drugs listed in federal Controlled Substance Schedules II through V) can be digitally signed by the Prescribers and electronically transmitted from Prescribers to a Department of Veterans Affairs (VA) Pharmacy. The request was aimed at filling in the difference between the Hines Drug Enforcement Agency (DEA) ePrescribing pilot project as it stood as of April 2014 and the proposed DEA ePrescribing of Controlled Substances as shown in the June 27, 2008 Federal Register. These regulations allowed the process and proof of concept that was demonstrated with the DEA pilot to be expanded beyond the Hines VA Hospital facility.

The Hines VA/DEA Public Key Infrastructure (PKI) project stems from a pilot initiated in 2002 to demonstrate the ability for CPRS to incorporate digital signatures for Schedule II Controlled Substance narcotic prescriptions. Hines VA Hospital was the pilot site and had previously been granted a waiver of regulations by the DEA to test the system.

The Pilot procedure was as follows:

1. Prescribers insert a “smart card” into a reader.
2. Prescribers enter an electronic prescription into CPRS.

3. System authenticates the Prescriber's PKI prescribing credentials on the smart card.
4. System digitally signs the prescription.
5. System delivers the order to the VA pharmacy electronically.

The initial pilot evaluation, which allowed approximately 50 users to prescribe electronically using "smart cards", was formally concluded in 2003. DEA authorized Hines VA Hospital to continue using the system in its current form until new regulations were published regarding electronic transmission of prescriptions using Personal Identity Verification (PIV) cards (aka smart cards). Subsequently, the VistA software was modified to meet the new standards.

Under the proposed DEA ePrescribing regulations, the CPRS system *must* authenticate the Prescriber's credentials on a hard token (e.g., PIV card) and then display a mandatory message with DEA-required intent language that the Prescriber *must* consent to. Only after the Prescriber consents to the DEA-required wording can the prescription be transmitted to the VA Pharmacy.

The PIV card to be used for the DEA ePrescribing is the VA-wide PIV Card program mandated by Homeland Security Presidential Directive #12 (HSPD-12).



**REF:** For information on validating PIV cards, see the "[PIV Card Validation—Revocation Server](#)" section.



**NOTE:** CPRS requested the original funding of this software upgrade as part of the CPRS v29 funding submission.

## 6.1.2 Requirements

Once the DEA ePrescribing regulations were enacted, system changes were required to bring the VA in compliance with DEA regulations. The majority of the changes needed for the DEA ePCS Utility are in the VistA CPRS and Outpatient Pharmacy applications; however, there were also some changes needed in Kernel:

- CPRS—Allows VA Prescribers to enter and digitally sign prescriptions.
- Outpatient Pharmacy—Notifies a VA pharmacy that a prescription order was made in CPRS.
- Kernel—Provides the Application Programming Interfaces (APIs) between the VistA Pharmacy and CPRS applications that allow the PKI credentials on the smart card to be verified. The PIV technology ensures that the Prescriber's credentials are vetted and emplaced on the PIV card according to the DEA regulations once they are enacted into law.

The DEA regulations governing the electronic prescribing and transmission of Controlled Substances pertain to the following conditions:

- VA Prescribers of DEA-regulated Controlled Substances (Schedules II through V).
- Patients using a VA pharmacy.
- VA Pharmacists who fill the Controlled Substance prescriptions.
- Pharmacy Benefits Management (PBM), who has the accountability to minimize the abuse of Control Substances.

### 6.1.3 Benefits

The benefits of the DEA EPCS Utility include the following:

- Concise ordering of the correct prescriptions.
- Increased security against abuse of Controlled Substances—Test results showed a **90%** reduction in the number of forged, tampered or altered Controlled Substances presented to the pharmacy.
- An electronic record of prescription history that can be monitored and reported.
- Increased patient safety—Test results showed a **75%** reduction in the number of Controlled Substance prescription fill errors caused by illegible handwriting.
- Decreased wait time for patients to receive their prescriptions—Test results showed a **50%** reduction in the average time from when a prescription is written to when it is process (finished) by pharmacy, primarily affected by the elimination of prescription transit time from remote clinics.

### 6.1.4 Intended Audience

The intended audience of this manual is all key stakeholders. The stakeholders for the DEA ePCS Utility include the following:

- **(Primary) DEA-registered Prescribers of Controlled Substances**—Users who do the following:
  - Create the prescription order in the system.
  - Digitally sign the prescription.
  - Submit the prescription electronically to the Pharmacy.

Under the proposed DEA regulations, these users also electronically reject or agree to DEA-mandated wording prior to electronically signing the prescription.

- **System Administrators**—System administrators at Department of Veterans Affairs (VA) sites who are responsible for computer management and system security on the VistA M Servers. These users are also responsible for the following:
  - Installing the necessary hardware and software for use of the smart card-based digital certificates.
  - Maintaining the server that runs the Certificate Revocation List (CRL) and other signature-checking processes.
  - Assisting in the maintenance of the database containing all valid DEA registrants within the VA. This database is an entity outside of VistA. The management of this database is shared by the VA and DEA.
- **Information Security Officer (ISO)**—The ISO is responsible for information security at each VA site.
- **Emerging Health Technologies (EHT)**—Users who identify, explore, pilot, and move into Production those technologies that can contribute to VA business needs. In this instance, the Public Key Infrastructure (PKI) technologies.
- **Personal Identification Verification (PIV) Project**—This VA project provides formatted smart cards for use with the system. The PIV project personnel ensure that the DEA PKI expansion for digitally signing and transmitting electronic prescriptions fits in with the scope and objectives of



the Veterans Health Administration (VHA)-wide Homeland Security Presidential Directive (HSPD)-12 mandated directives.

- **Drug Enforcement Agency (DEA)**—The Federal agency that:
  - Enforces the Controlled Substances laws and regulations of the United States.
  - Enforces provisions of the Controlled Substances Act as they pertain to the manufacture, distribution, and dispensing of legally produced Controlled Substances.
  - Assists in the maintenance of the database containing all valid DEA registrants within the VA. This database is an entity outside of VistA. The management of this database is shared by the VA and DEA.
- **Office of Information and Technology (OIT)**—VistA legacy development teams.
- **Product Support (PS).**

## 6.2 Processes

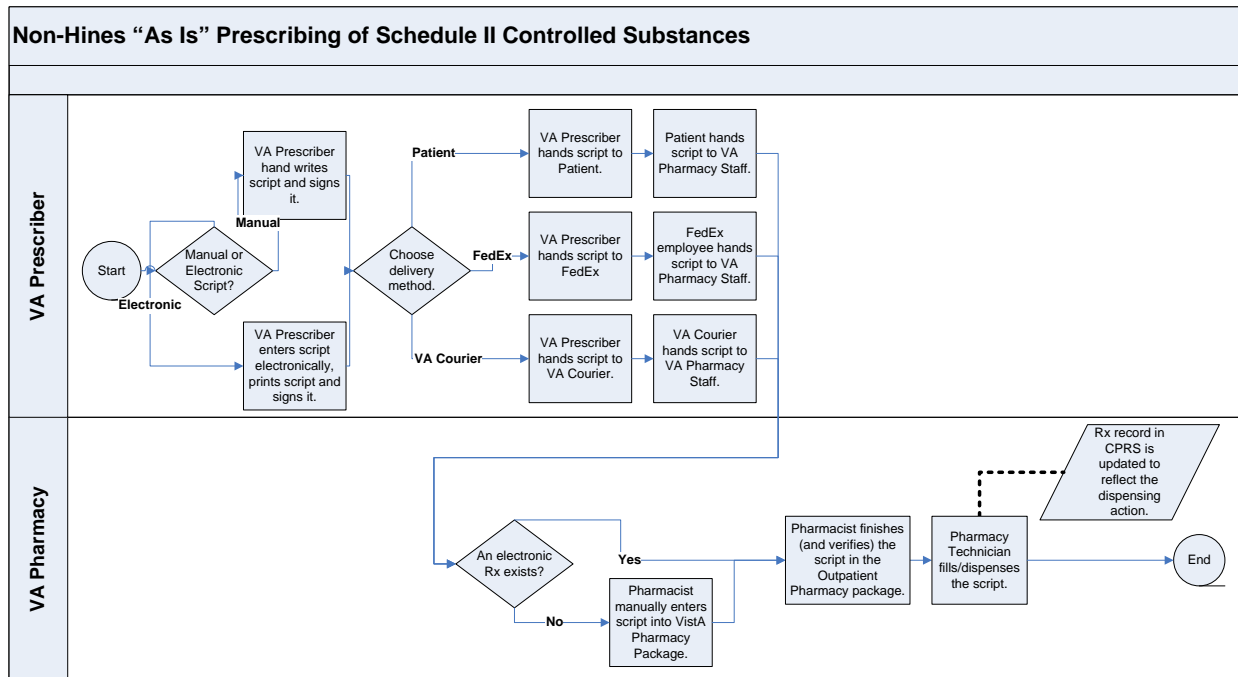
### 6.2.1 Manual Paper-based Process

For Schedule II Controlled Substance prescriptions within the VA using the manual paper-based process, the procedure is as follows:

1. VA Prescriber either hand-writes a prescription before signing it or prints off a prescription form and hand-signs it before giving it to the patient.
2. Patient or courier then hand-delivers the paper prescription form to the VA pharmacist.
3. VA Pharmacist manually enters the script into the VistA Pharmacy package.
4. After filling the prescription, the VistA Outpatient Pharmacy package updates CPRS with the record of the new fill.

With this method, CPRS has no way to verify the credentials of the Prescriber when a prescription order is hand written. Additionally, when the hand-written script is illegible, the VA Pharmacist either guesses at what the Prescriber intends, or *must* call the Prescriber to ascertain what the Prescriber intended on the handwritten script. In either of these cases, the prescription fill is delayed and the VA patient *must* wait for their medically necessary medication.

**Figure 46: DEA ePCS—Manual Paper-based Process to Prescribe Schedule II Controlled Substances**

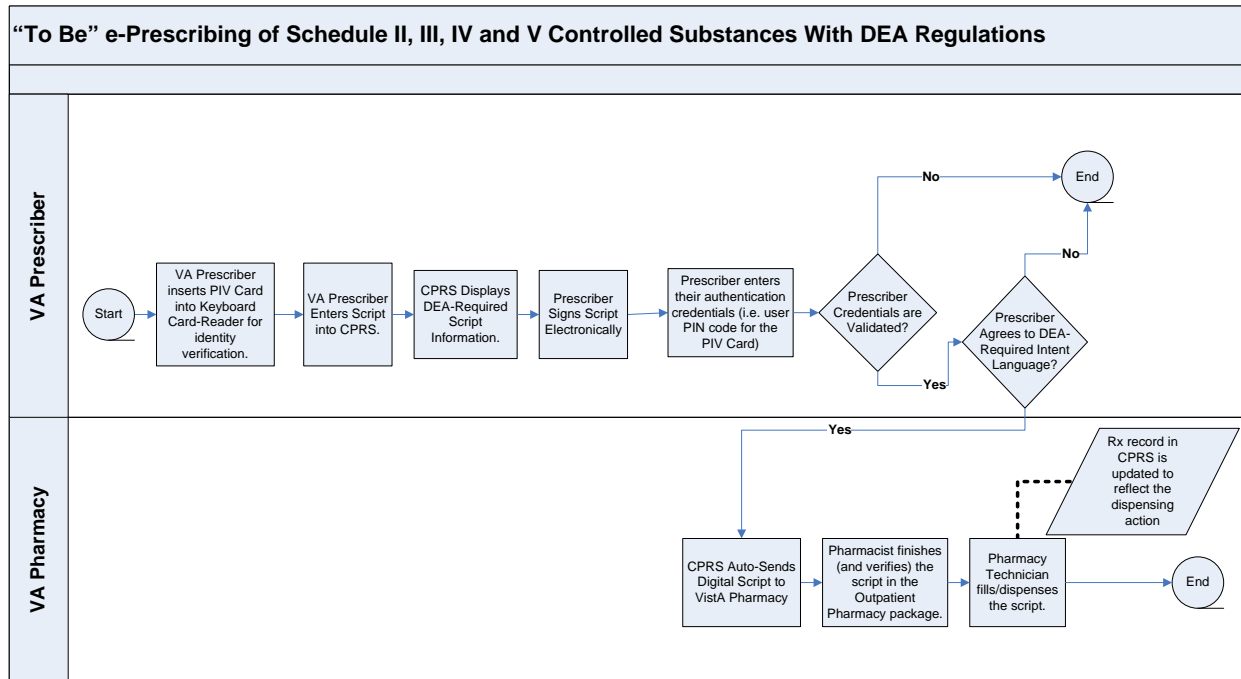


## 6.2.2 e-Prescribing Process

For Schedule II – V Controlled Substance prescriptions within the VA using the ePrescribing process (i.e., e-Prescribing of Controlled Substances [ePCS] Utility), the procedure is as follows:

1. VA Prescriber inserts a common access Personal Identity Verification (PIV) card (i.e., a smart card, which uniquely identifies the Prescriber) into a card reader attached to a computer keyboard.
2. VA Prescriber enters the prescription order into the Computerized Patient Record System (CPRS).
3. VA Prescriber signs the script electronically.
4. CPRS prompts the Prescriber to provide the credentials for the smart card (analogous to an Automated Teller Machine [ATM] card’s Personal Identification Number [PIN] code).
5. System verifies the PKI credentials.
6. System affixes a digital signature to the prescription (digitally signed).
7. CPRS sends the script order electronically to the VistA Pharmacy system.
8. VA Pharmacist fills the script in VistA Pharmacy.
9. VistA Pharmacy automatically sends a record of the prescription fill to CPRS.

**Figure 47: DEA ePCS—ePrescribing Process to Prescribe Schedule II - V Controlled Substances**



**REF:** For information on PIV and prescription validation processes, see the following sections:

- [PIV Card Validation—Revocation Server](#)
- [Prescription Validation and Verification Process—PKIServer.exe Application](#)

## 6.3 Configuring the DEA ePCS Utility

There are two steps to configure the DEA ePCS Utility:

1. [Set the XUEPCS REPORT DEVICE Parameter.](#)
2. [Add DEA ePCS Utility Users.](#)

### 6.3.1 Set the XUEPCS REPORT DEVICE Parameter

Set the XUEPCS REPORT DEVICE Parameter to the printer device. You can set this parameter by using either of the following methods:

- [General Parameter Tools Menu.](#)
- [XPAREDIT Routine.](#)

#### 6.3.1.1 General Parameter Tools Menu

Use the **General Parameter Tools** menu [XPAR MENU TOOLS] located under the CPRS Configuration (IRM) menu [OR PARAM IRM MENU] to update the XUEPCS REPORT DEVICE parameter.

To edit the DEA ePCS Utility parameter, perform the following procedure:

1. From the **CPRS Manager Menu** [ORMGR], select the **IR—CPRS Configuration (IRM)** option [OR PARAM IRM MENU].
2. At the “Select CPRS Configuration (IRM) Option:” prompt, select the **XX—General Parameter Tools** option [XPAR MENU TOOLS].
3. At the “Select General Parameter Tools Option:” prompt, select the **EP—Edit Parameter Values** option [XPAR EDIT PARAMETER].
4. At the “Select PARAMETER DEFINITION NAME:” prompt, enter **XUEPCS REPORT DEVICE**.
5. At the “Select device for ePCS reports: XXXXXXXX//” prompt, enter the printer device appropriate for your system.

**Figure 48: DEA ePCS: General Parameter Tools Menu [XPAR MENU TOOLS]—Editing DEA ePCS Site Parameter**

```

CL      Clinician Menu ...
NM      Nurse Menu ...
WC      Ward Clerk Menu ...
PE      CPRS Configuration (Clin Coord) ...
IR    CPRS Configuration (IRM) ...

Select CPRS Manager Menu Option: IR <Enter> CPRS Configuration (IRM)

OC      Order Check Expert System Main Menu ...
TI      ORMTIME Main Menu ...
UT      CPRS Clean-up Utilities ...
XX    General Parameter Tools ...
HD      HealthVet Desktop Configuration ...
RD      Remote Data Order Checking Parameters

Select CPRS Configuration (IRM) Option: GENERAL <Enter> Parameter Tools

LV      List Values for a Selected Parameter
LE      List Values for a Selected Entity
LP      List Values for a Selected Package
LT      List Values for a Selected Template
EP    Edit Parameter Values
ET      Edit Parameter Values with Template
EK      Edit Parameter Definition Keyword

Select General Parameter Tools Option: EP <Enter> Edit Parameter Values
      --- Edit Parameter Values ---

Select PARAMETER DEFINITION NAME: XUEPCS REPORT DEVICE <Enter>    ePCS Device
Definition for Reports

---- Setting XUEPCS REPORT DEVICE for System: XXXXXXXX.MED.VA.GOV ----
Select device for ePCS reports: XXXXXXXX// <Printer Device>

Enter the printer device appropriate for your site. The system echoes back the
device information after your selection.

Select PARAMETER DEFINITION NAME:

```

### 6.3.1.2 XPAREDIT Routine

Use the **XPAREDIT** routine to update the XUEPCS REPORT DEVICE parameter.

To edit the DEA ePCS Utility parameter, perform the following procedure:

1. From the programmer prompt, enter the following code:
 

```
D ^XPAREDIT
```
2. At the “Select PARAMETER DEFINITION NAME:” prompt, enter **XUEPCS REPORT DEVICE**.
3. At the “Select device for ePCS reports: XXXXXXXX//” prompt, enter the printer or other device appropriate for your system.

**Figure 49: DEA ePCS: XPAREdit Routine—Editing DEA ePCS Site Parameter: Test Account**

```

>D ^XPAREdit

      --- Edit Parameter Values ---

Select PARAMETER DEFINITION NAME: XUEPCS REPORT DEVICE <Enter>      ePCS Device
Definition for Reports

----- Setting XUEPCS REPORT DEVICE for System: ABC.FO-SITE.MED.VA.GOV
-----



Enter the printer device appropriate for your site.



Select device for ePCS reports: SDD DUPLEX P10 <Enter>
                                SDD DUPLEX PRINTER next to
One, Xuuser
  USER$: [TEMP]SDD_DN2$PRT.TXT
-----

Select PARAMETER DEFINITION NAME:

```

## 6.3.2 Add DEA ePCS Utility Users

There are three steps to give a user access to the DEA ePCS Utility:

1. [Assign the XUEPCSEdit Security Key.](#)
2. [Assign the XU EPCS EDIT DATA Option.](#)
3. [Assign the XUSSPKI UPN SET Option.](#)

### 6.3.2.1 Assign the XUEPCSEdit Security Key

To assign the XUEPCSEdit security key, perform the following procedure:

1. From the **Systems Manager Menu** [EVE], select the **Menu Management** menu [XUMAINT].
2. At the “Select Menu Management Option:” prompt, select the **Key Management** menu [XUKEYMGMT].
3. At the “Select Key Management Option:” prompt, select the **Allocation of Security Keys** option [XUKEYALL].
4. At the “Allocate key:” prompt, enter **XUEPCSEdit** security key.
5. At the “Another key:” prompt, press **Enter** to complete your entries.
6. At the “Holder of key:” prompt, enter the user’s name.
7. At the “Another holder:” prompt, enter any additional user names that need access to the DEA ePCS Utility. When complete, press **Enter**.
8. At the “You are allocating keys. Do you wish to proceed? YES//” prompt, press **Enter** to accept the **YES** default response.

**Figure 50: DEA ePCS: Adding DEA ePCS Utility Users by Assigning the XUEPCSEDIT Security Key**

```
Select Systems Manager Menu Option: MENU <Enter> Management

      Edit options
      Key Management ...
      Secure Menu Delegation ...
      Restrict Availability of Options
      Option Access By User
      List Options by Parents and Use
      Fix Option File Pointers
      Help Processor ...
OPEd  Screen-based Option Editor
      Display Menus and Options ...
      Edit a Protocol
      Menu Rebuild Menu ...
      Out-Of-Order Set Management ...
      See if a User Has Access to a Particular Option
      Show Users with a Selected primary Menu

Select Menu Management Option: KEY <Enter> Management

      Allocation of Security Keys
      De-allocation of Security Keys
      Enter/Edit of Security Keys
      All the Keys a User Needs
      Change user's allocated keys to delegated keys
      Delegate keys
      Keys For a Given Menu Tree
      List users holding a certain key
      Remove delegated keys
      Show the keys of a particular user

Select Key Management Option: ALLOC <Enter> ation of Security Keys

Allocate key: XUEPCSEDIT

Another key: <Enter>

Holder of key: XUUSER,ONE <Enter>      OX      TECHNICAL WRITER

Another holder: <Enter>

You've selected the following keys:

XUEPCSEDIT

You've selected the following holders:

XUUSER,ONE

You are allocating keys. Do you wish to proceed? YES// <Enter>

XUEPCSEDIT being assigned to:
      XUUSER,ONE
```

### 6.3.2.2 Assign the XU EPCS EDIT DATA Option

The ePCS Edit Prescriber Data option [XU EPCS EDIT DATA] is the context option the RPC Broker uses for the DEA ePCS Utility when making remote procedure calls.

To assign the ePCS Edit Prescriber Data option [XU EPCS EDIT DATA] for each user, perform the following procedure:

1. From the **Systems Manager Menu** [EVE], select the **User Management** menu [XUSER].
2. At the “Select User Management Option:” prompt, select the **Edit an Existing User** option [XUSEREDIT].
3. At the “Select NEW PERSON NAME:” prompt, enter the user’s name.
4. In the “Edit an Existing User” main screen, tab down to the “Select SECONDARY MENU OPTIONS:” prompt, enter the **XU EPCS EDIT DATA** option.
5. (Optional) In the “SECONDARY MENU OPTIONS” popup screen, tab to “SYNONYM:” prompt and enter a synonym for this context option.
6. Tab to the “COMMAND:” prompt, enter **Close**. The “SECONDARY MENU OPTIONS” popup screen closes.
7. Tab to the “COMMAND:” prompt, enter **Exit**. The “Edit an Existing User” main screen closes.



**Figure 51: DEA ePCS: Assigning the XU EPCS EDIT DATA Option—Sample User Entries (1 of 2)**

```

Select Systems Manager Menu Option: USER <Enter> Management

    Add a New User to the System
    Grant Access by Profile
    Edit an Existing User
    Deactivate a User
    Reactivate a User
    List users
    User Inquiry
    Switch Identities
    File Access Security ...
    Clear Electronic signature code
    OAA Trainee Registration Menu ...
    Electronic Signature Block Edit
    Manage User File ...
    Person Class Edit
    Reprint Access agreement letter

Select User Management Option: EDIT <Enter> an Existing User

Select NEW PERSON NAME: XUSER <Enter> XUSER,ONE      OX      TECHNICAL
WRITER

                                     Edit an Existing User
NAME: XUSER,ONE                                     Page 1 of 5
-----
NAME... XUSER,ONE                                INITIAL: OX
TITLE: TECHNICAL WRITER                          NICK NAME: ONE
SSN: 000123456                                    DOB:
DEGREE:                                            MAIL CODE:
DISUSER:                                          TERMINATION DATE:
Termination Reason:

PRIMARY MENU OPTION: EVE
Select SECONDARY MENU OPTIONS: XU EPCS EDIT DATA

Tab to this prompt and enter the context option.
-----
Want to edit ACCESS CODE (Y/N):                    FILE MANAGER ACCESS CODE: @
Want to edit VERIFY CODE (Y/N):

Select DIVISION: SAN FRANCISCO
SERVICE/SECTION: OIFO Field Office
-----
COMMAND:                                           Press <PF1>H for help Insert

```

**Figure 52: DEA ePCS: Assigning the XU EPCS EDIT DATA Option—Sample User Entries (2 of 2)**

```

                                Edit an Existing User
NAME: XUUSER,ONE                                     Page 1 of 5
-----
NAME... XUUSER,ONE                                INITIAL: OX
TITLE: TECHNICAL WRITER                          NICK NAME: ONE
SSN: 000123456                                    DOB:
DEGREE:                                            MAIL CODE:
DISUSER:                                          TERMINATION DATE:
Termination Reason:

      R,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,T
Select .                                          SECONDARY MENU OPTIONS .
Want to .
Want to . SECONDARY MENU OPTIONS: XU EPCS EDIT DATA .
      .                SYNONYM: EPCD .
      .
      F,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,G
-----
Close      Refresh

Enter a command or '^' followed by a caption to jump to a specific field.

COMMAND: Close                                     Press <PF1>H for help  Insert
-----
                                Edit an Existing User
NAME: XUUSER,ONE                                     Page 1 of 5
-----
NAME... XUUSER,ONE                                INITIAL: OX
TITLE: TECHNICAL WRITER                          NICK NAME: ONE
SSN: 000123456                                    DOB:
DEGREE:                                            MAIL CODE:
DISUSER:                                          TERMINATION DATE:
Termination Reason:

      PRIMARY MENU OPTION: EVE
Select SECONDARY MENU OPTIONS:
Want to edit ACCESS CODE (Y/N):                    FILE MANAGER ACCESS CODE: @
Want to edit VERIFY CODE (Y/N):

      Select DIVISION: SAN FRANCISCO
      SERVICE/SECTION: OIFO Field Office
-----
Exit      Save      Next Page      Refresh

Enter a command or '^' followed by a caption to jump to a specific field.

COMMAND: Exit                                     Press <PF1>H for help  Insert

```

### 6.3.2.3 Assign the XUSSPKI UPN SET Option

The ePCS Set SAN from PIV Card option [XUSSPKI UPN SET] is the context option the RPC Broker uses for the DEA ePCS Utility when making remote procedure calls.

To assign the ePCS Set SAN from PIV Card option [XUSSPKI UPN SET] for each user, perform the following procedure:

1. From the **Systems Manager Menu** [EVE], select the **User Management** menu [XUSER].
2. At the “Select User Management Option:” prompt, select the **Edit an Existing User** option [XUSEREDIT].
3. At the “Select NEW PERSON NAME:” prompt, enter the user’s name.
4. In the “Edit an Existing User” main screen, tab down to the “Select SECONDARY MENU OPTIONS:” prompt, enter the **XUSSPKI UPN SET** option.
5. (Optional) In the “SECONDARY MENU OPTIONS” popup screen, tab to “SYNONYM:” prompt and enter a synonym for this context option.
6. Tab to the “COMMAND:” prompt, enter **Close**. The “SECONDARY MENU OPTIONS” popup screen closes.
7. Tab to the “COMMAND:” prompt, enter **Exit**. The “Edit an Existing User” main screen closes.

**Figure 53: DEA ePCS: Assigning the XUSSPKI UPN SET Option—Sample User Entries (1 of 2)**

```
Select Systems Manager Menu Option: USER <Enter> Management

      Add a New User to the System
      Grant Access by Profile
      Edit an Existing User
      Deactivate a User
      Reactivate a User
      List users
      User Inquiry
      Switch Identities
      File Access Security ...
      Clear Electronic signature code
OAA   OAA Trainee Registration Menu ...
      Electronic Signature Block Edit
      Manage User File ...
      Person Class Edit
      Reprint Access agreement letter

Select User Management Option: EDIT <Enter> an Existing User

Select NEW PERSON NAME: XUUSER <Enter> XUUSER,ONE      OX      TECHNICAL
WRITER

                                     Edit an Existing User
NAME: XUUSER,ONE                                     Page 1 of 5
-----
NAME... XUUSER,ONE                                INITIAL: OX
TITLE: TECHNICAL WRITER                          NICK NAME: ONE
SSN: 000123456                                    DOB:
DEGREE:                                            MAIL CODE:
DISUSER:                                          TERMINATION DATE:
Termination Reason:

      PRIMARY MENU OPTION: EVE
Select SECONDARY MENU OPTIONS: XUSSPKI UPN SET

Tab to this prompt and enter the context option.



Want to edit ACCESS CODE (Y/N):      FILE MANAGER ACCESS CODE: @
Want to edit VERIFY CODE (Y/N):

      Select DIVISION: SAN FRANCISCO
      SERVICE/SECTION: OIFO Field Office
-----
COMMAND:                                     Press <PF1>H for help Insert
```

**Figure 54: DEA ePCS: Assigning the XUSSPKI UPN SET Option—Sample User Entries (2 of 2)**

```

                                Edit an Existing User
NAME: XUUSER,ONE                                     Page 1 of 5
-----
NAME... XUUSER,ONE                                INITIAL: OX
TITLE: TECHNICAL WRITER                          NICK NAME: ONE
SSN: 000123456                                    DOB:
DEGREE:                                           MAIL CODE:
DISUSER:                                          TERMINATION DATE:
Termination Reason:

      R,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,T
Select .                                         SECONDARY MENU OPTIONS .
Want to .                                       .
Want to . SECONDARY MENU OPTIONS: XUSSPKI UPN SET .
      .                                       SYNONYM: EPCP .
      .                                       .
      F,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,G
-----
Close      Refresh

Enter a command or '^' followed by a caption to jump to a specific field.

COMMAND: Close                                     Press <PF1>H for help Insert

                                Edit an Existing User
NAME: XUUSER,ONE                                     Page 1 of 5
-----
NAME... XUUSER,ONE                                INITIAL: OX
TITLE: TECHNICAL WRITER                          NICK NAME: ONE
SSN: 000123456                                    DOB:
DEGREE:                                           MAIL CODE:
DISUSER:                                          TERMINATION DATE:
Termination Reason:

      PRIMARY MENU OPTION: EVE
Select SECONDARY MENU OPTIONS:
Want to edit ACCESS CODE (Y/N):                   FILE MANAGER ACCESS CODE: @
Want to edit VERIFY CODE (Y/N):

      Select DIVISION: SAN FRANCISCO
      SERVICE/SECTION: OIFO Field Office
-----
Exit      Save      Next Page      Refresh

Enter a command or '^' followed by a caption to jump to a specific field.

COMMAND: Exit                                     Press <PF1>H for help Insert

```

## 6.4 Using the DEA ePCS Utility

The DEA ePCS Utility consists of the following standalone menu and options, which are described in detail in the sections that follow:

- [DEA ePCS Utility Functions Main Menu](#) [XU EPCS UTILITY FUNCTIONS]
- [Edit Facility DEA# and Expiration Date Option](#) [XU EPCS EDIT DEA# AND XDATE]
- [ePCS Edit Prescriber Data Option](#) [XU EPCS EDIT DATA]
- [ePCS Set SAN from PIV Card Option](#) [XUSSPKI UPN SET]

### 6.4.1 DEA ePCS Utility Functions Main Menu

Released with Kernel patch XU\*8.0\*580, the DEA ePCS Utility Functions main menu [XU EPCS UTILITY FUNCTIONS] is a standalone menu that is *not* linked to any other Kernel menus. It includes the following options:

**Figure 55: DEA ePCS: DEA ePCS Utility Functions Main Menu [XU EPCS UTILITY FUNCTIONS]**

```
Select Systems Manager Menu Option:

 1      Print DEA Expiration Date Null
 2      Print DISUSER DEA Expiration Date Null
 3      Print DEA Expiration Date Expires 30 days
 4      Print DISUSER DEA Expiration Date Expires 30 days
 5      Print Prescribers with Privileges
 6      Print DISUSER Prescribers with Privileges
 7      Print PSDRPH Key Holders
 8      Print Setting Parameters Privileges
 9      Print Audits for Prescriber Editing
10      Task Changes to DEA Prescribing Privileges Report
11      Task Allocation Audit of PSDRPH Key Report
12      Allocate/De-Allocate of PSDRPH Key
13      Edit Facility DEA# and Expiration Date

Select ePCS DEA Utility Functions Option:
```

**Table 10: DEA ePCS Utility—Main Menu Options**

Option Name	Option Menu Text	Description
XU EPCS UTILITY FUNCTIONS	ePCS DEA Utility Functions	<p>This is the main menu for the DEA ePCS Utility. It includes the following options:</p> <ul style="list-style-type: none"> <li>• XU EPCS EXP DATE</li> <li>• XU EPCS DISUSER EXP DATE</li> <li>• XU EPCS XDATE EXPIRES</li> <li>• XU EPCS DISUSER XDATE EXPIRES</li> <li>• XU EPCS PRIVS</li> <li>• XU EPCS DISUSER PRIVS</li> <li>• XU EPCS PSDRPH</li> <li>• XU EPCS SET PARMS</li> <li>• XU EPCS PRINT EDIT AUDIT</li> <li>• XU EPCS LOGICAL ACCESS</li> <li>• XU EPCS PSDRPH AUDIT</li> <li>• XU EPCS PSDRPH KEY</li> <li>• XU EPCS EDIT DEA# AND XDATE</li> </ul>
XU EPCS EXP DATE (See Section <a href="#">6.4.2.</a> )	Print DEA Expiration Date Null	<p>This option prints all active users with an unpopulated DEA# and DEA EXPIRATION DATE. This option prints the following data:</p> <ul style="list-style-type: none"> <li>• NAME</li> <li>• DEA#</li> <li>• DEA EXPIRATION DATE</li> </ul>
XU EPCS DISUSER EXP DATE (See Section <a href="#">6.4.3.</a> )	Print DISUSER DEA Expiration Date Null	<p>This option prints all DISUSERed users with an unpopulated DEA# and DEA EXPIRATION DATE. This option prints the following data:</p> <ul style="list-style-type: none"> <li>• NAME</li> <li>• DEA#</li> <li>• TERMINATION DATE</li> <li>• DEA EXPIRATION DATE</li> </ul>
XU EPCS XDATE EXPIRES (See Section <a href="#">6.4.4.</a> )	Print DEA Expiration Date Expires 30 days	<p>This option prints all active users with DEA # and where the DEA EXPIRATION DATE expires within 30 days. This option prints the following data:</p> <ul style="list-style-type: none"> <li>• NAME</li> <li>• DEA#</li> <li>• DEA EXPIRATION DATE</li> </ul>
XU EPCS DISUSER XDATE EXPIRES (See Section <a href="#">6.4.5.</a> )	Print DISUSER DEA Expiration Date Expires 30 days	<p>This option prints all DISUSERed users with DEA # and where the DEA EXPIRATION DATE expires within 30 days. This option prints the following data:</p> <ul style="list-style-type: none"> <li>• NAME</li> </ul>

Option Name	Option Menu Text	Description
		<ul style="list-style-type: none"> <li>• DEA#</li> <li>• DEA EXPIRATION DATE</li> </ul>
XU EPCS PRIVS (See Section <a href="#">6.4.6.</a> )	Print Prescribers with Privileges	<p>This option prints all active users who have privileges to any of the SCHEDULEs II through V and who have a DEA# or VA#.</p> <p>This option prints the following data:</p> <ul style="list-style-type: none"> <li>• NAME</li> <li>• <b>DUZ</b></li> <li>• DEA#</li> <li>• VA#</li> <li>• SCHEDULEs</li> </ul>
XU EPCS DISUSER PRIVS (See Section <a href="#">6.4.7.</a> )	Print DISUSER Prescribers with Privileges	<p>This option prints all DISUSERed users who have privileges to any of the SCHEDULEs II through V and who have a DEA# or VA#.</p> <p>This option prints the following data:</p> <ul style="list-style-type: none"> <li>• NAME</li> <li>• <b>DUZ</b></li> <li>• DEA#</li> <li>• TERMINATION DATE</li> <li>• VA#</li> <li>• SCHEDULEs</li> </ul>
XU EPCS PSDRPH (See Section <a href="#">6.4.8.</a> )	Print PSDRPH Key Holders	<p>This option prints all active users holding the PSDRPH security key. This report sorts by Division, and within DIVISION, it sorts by NAME. This option prints the following data:</p> <ul style="list-style-type: none"> <li>• NAME</li> <li>• <b>DUZ</b></li> <li>• GIVEN BY (Person Who Assigned Key)</li> <li>• DATE GIVEN (Date Assigned)</li> </ul>
XU EPCS SET PARMS (See Section <a href="#">6.4.9.</a> )	Print Setting Parameters Privileges	<p>This option prints all active users holding the XUEPCSEEDIT security key. This option identifies individuals responsible for setting the parameters.</p>
XU EPCS PRINT EDIT AUDIT (See Section <a href="#">6.4.10.</a> )	Print Audits for Prescriber Editing	<p>This option prints information related to the editing of prescriber information.</p>
XU EPCS LOGICAL ACCESS (See Section <a href="#">6.4.11.</a> )	Task Changes to DEA Prescribing Privileges Report	<p>This tasked option prints the setting or change to DEA prescribing privileges related to issuance of a controlled substance prescription.</p> <p>This option only prints data from the previous day and with data that has been modified. The data is retrieved from the XUEPCS DATA (#8991.6) file.</p>



Option Name	Option Menu Text	Description
		This option should be scheduled to run on a daily basis.
XU EPCS PSDRPH AUDIT (See Section <a href="#">6.4.12.</a> )	Task Allocation Audit of PSDRPH Key Report	This tasked option prints the allocation of the PSDRPH security key.  This option only prints data from the previous day and with data that has been modified. The report prints data for the archive XUEPCS PSDRPH AUDIT (#8991.7) file.  This option should be scheduled to run on a daily basis.
XU EPCS PSDRPH KEY (See Section <a href="#">6.4.13.</a> )	Allocate/De-Allocate of PSDRPH Key	This option allocates or de-allocates the PSDRPH security key.
XU EPCS EDIT DEA# AND XDATE (See Section <a href="#">6.4.14.</a> )	Edit Facility DEA# and Expiration Date	This option edits the FACILITY DEA NUMBER (#52) and FACILITY DEA EXPIRATION DATE (#52.1) fields in the INSTITUTION (#4) file.

## 6.4.2 Print DEA Expiration Date Null Option

The Print DEA Expiration Date Null option [XU EPCS EXP DATE] prints all active users from the NEW PERSON (#200) file with the following field values:

- DEA# (#53.2) field—**NULL** (*unpopulated*).
- DEA EXPIRATION DATE (#747.44)—Not **NULL** (*populated*).

This option prints the following data from the NEW PERSON (#200) file:

- NAME (#.01)
- DEA# (#53.2)
- DEA EXPIRATION DATE (#747.44)



**NOTE:** This option was released with Kernel patch XU\*8.0\*580.

**Figure 56: DEA ePCS: Print DEA Expiration Date Null Option—Sample User Entries and Report**

```

Select Systems Manager Menu Option: EPCS <Enter> ePCS DEA Utility Functions

1 Print DEA Expiration Date Null
2 Print DISUSER DEA Expiration Date Null
3 Print DEA Expiration Date Expires 30 days
4 Print DISUSER DEA Expiration Date Expires 30 days
5 Print Prescribers with Privileges
6 Print DISUSER Prescribers with Privileges
7 Print PSDRPH Key Holders
8 Print Setting Parameters Privileges
9 Print Audits for Prescriber Editing
10 Task Changes to DEA Prescribing Privileges Report
11 Task Allocation Audit of PSDRPH Key Report
12 Allocate/De-Allocate of PSDRPH Key
13 Edit Facility DEA# and Expiration Date

Select ePCS DEA Utility Functions Option: 1 <Enter> Print DEA Expiration Date Null
START WITH NAME: FIRST// <Enter>
DEVICE: <Enter> HOME (CRT) Right Margin: 80// <Enter>
NULL 'DEA EXPIRATION DATE' APR 15,2013 16:53 PAGE 1
DEA
EXPIRATION
NAME DEA# DATE
-----
XUSER,EIGHT AK1662673
XUSER,ELEVEN MT0300777
XUSER,FIVE BH2942628
XUSER,FOUR AK2984082
XUSER,FOURTEEN AG5333745
XUSER,NINE BB1770773
XUSER,ONE SF0963226
XUSER,SEVEN AP8348458
XUSER,SIX AM7446001
XUSER,TEN BD9270911
XUSER,THIRTEEN FC2158548
XUSER,THREE FS2138572
XUSER,TWELVE AR3287946
XUSER,TWO BG4740850
.
.
.

```

**6.4.3 Print DISUSER DEA Expiration Date Null Option**

The Print DISUSER DEA Expiration Date Null option [XU EPCS DISUSER EXP DATE] prints all DISUSERed users from the NEW PERSON (#200) file with the following field values:

- DEA# (#53.2)— **NULL** (*unpopulated*).
- DEA EXPIRATION DATE (#747.44)—Not **NULL** (*populated*).

This option prints the following data from the NEW PERSON (#200) file:

- NAME (#.01)
- DEA# (#53.2)
- TERMINATION DATE (#9.2)
- DEA EXPIRATION DATE (#747.44)



**NOTE:** This option was released with Kernel patch XU\*8.0\*580.

**Figure 57: DEA ePCS: Print DISUSER DEA Expiration Date Null Option—Sample User Entries and Report**

```
1      Print DEA Expiration Date Null
2      Print DISUSER DEA Expiration Date Null
3      Print DEA Expiration Date Expires 30 days
4      Print DISUSER DEA Expiration Date Expires 30 days
5      Print Prescribers with Privileges
6      Print DISUSER Prescribers with Privileges
7      Print PSDRPH Key Holders
8      Print Setting Parameters Privileges
9      Print Audits for Prescriber Editing
10     Task Changes to DEA Prescribing Privileges Report
11     Task Allocation Audit of PSDRPH Key Report
12     Allocate/De-Allocate of PSDRPH Key
13     Edit Facility DEA# and Expiration Date

Select ePCS DEA Utility Functions Option: 2 <Enter> Print DISUSER DEA Expiration
Date Null

DEVICE: <Enter> HOME (CRT)      Right Margin: 80// <Enter>
DISUSER NULL 'DEA EXPIRATION DATE'      APR 15,2013  16:55      PAGE 1
TERMINATION
DATE          NAME          DEA#
-----
AUG 16,2010  XUUSER,SEVENTY          BC6840614
MAR 31,2010  XUUSER,EIGHTY           AC7045796
MAR 18,2010  XUUSER,NINETY           AL6010968
FEB  1,2010  XUUSER,ONE HUNDRED      AM8823191
JAN 29,2010  XUUSER,FORTY            AJ1103910
JUN 11,2009  XUUSER,THIRTY           BM2745315
MAY  4,2009  XUUSER,FIFTEEN          AP9587570
MAY  4,2009  XUUSER,SIXTEEN          BB2243854
MAY  4,2009  XUUSER,SIXTY            AK4751815
MAY  4,2009  XUUSER,FIFTY            BN7729847
APR 20,2009  XUUSER,TWENTY           AD6477865
APR 20,2009  XUUSER,TWO HUNDRED      BM4942517
APR 20,2009  XUUSER,THREE HUNDRED    AA1662673
JAN  1,2009  XUUSER,FOUR HUNDRED     FK0178132
AUG 30,2008  XUUSER,FIVE HUNDRED     BJ9947081
```

## 6.4.4 Print DEA Expiration Date Expires 30 days Option

The Print DEA Expiration Date Expires 30 days option [XU EPCS XDATE EXPIRES] prints all active users from the NEW PERSON (#200) file with the following field values:

- DEA# (#53.2) field—Not **NULL** (*populated*).
- DEA EXPIRATION DATE (#747.44) field—Date expires within **30** days.

This option prints the following data from the NEW PERSON (#200) file:

- NAME (#.01)
- DEA# (#53.2)
- DEA EXPIRATION DATE (#747.44)



**NOTE:** This option was released with Kernel patch XU\*8.0\*580.

**Figure 58: DEA ePCS: Print DEA Expiration Date Expires 30 days Option—Sample User Entries and Report**

```
1      Print DEA Expiration Date Null
2      Print DISUSER DEA Expiration Date Null
3      Print DEA Expiration Date Expires 30 days
4      Print DISUSER DEA Expiration Date Expires 30 days
5      Print Prescribers with Privileges
6      Print DISUSER Prescribers with Privileges
7      Print PSDRPH Key Holders
8      Print Setting Parameters Privileges
9      Print Audits for Prescriber Editing
10     Task Changes to DEA Prescribing Privileges Report
11     Task Allocation Audit of PSDRPH Key Report
12     Allocate/De-Allocate of PSDRPH Key
13     Edit Facility DEA# and Expiration Date

Select ePCS DEA Utility Functions Option: 3 <Enter> Print DEA Expiration Date
Expires 30 days
START WITH NAME: FIRST// <Enter>
DEVICE: <Enter> HOME (CRT) Right Margin: 80// <Enter>
EXPIRATION DATE EXPIRES IN 30 DAYS          APR 15,2013 16:59 PAGE 1
                                             DEA
                                             EXPIRATION
NAME                                         DEA#      DATE
-----
*** NO RECORDS TO PRINT ***
```

## 6.4.5 Print DISUSER DEA Expiration Date Expires 30 days Option

The Print DISUSER DEA Expiration Date Expires 30 days option [XU EPCS DISUSER XDATE EXPIRES] prints all DISUSERed users from the NEW PERSON (#200) file with the following field values:

- DEA# (#53.2) field—Not NULL (*populated*).
- DEA EXPIRATION DATE (#747.44) field—Date expires within **30** days.

This option prints the following data from the NEW PERSON (#200) file:

- NAME (#.01)
- DEA# (#53.2)
- DEA EXPIRATION DATE (#747.44)



**NOTE:** This option was released with Kernel patch XU\*8.0\*580.

**Figure 59: DEA ePCS: Print DISUSER DEA Expiration Date Expires 30 days Option—Sample User Entries and Report**

```
1      Print DEA Expiration Date Null
2      Print DISUSER DEA Expiration Date Null
3      Print DEA Expiration Date Expires 30 days
4      Print DISUSER DEA Expiration Date Expires 30 days
5      Print Prescribers with Privileges
6      Print DISUSER Prescribers with Privileges
7      Print PSDRPH Key Holders
8      Print Setting Parameters Privileges
9      Print Audits for Prescriber Editing
10     Task Changes to DEA Prescribing Privileges Report
11     Task Allocation Audit of PSDRPH Key Report
12     Allocate/De-Allocate of PSDRPH Key
13     Edit Facility DEA# and Expiration Date

Select ePCS DEA Utility Functions Option: 4 <Enter> Print DISUSER DEA Expiration
Date Expires 30 days
DEVICE: <Enter> HOME (CRT)      Right Margin: 80// <Enter>
DISUSER EXPIRATION DATE EXPIRES IN 30 DAYS      APR 15,2013  17:08      PAGE 1
DEA
EXPIRATION
DATE
-----
*** NO RECORDS TO PRINT ***
```

## 6.4.6 Print Prescribers with Privileges Option

The Print Prescribers with Privileges option [XU EPCS PRIVS] prints all active users from the NEW PERSON (#200) file who have privileges to any of the SCHEDULEs **II** through **V** and who have a DEA# or VA#.

This option prints the following data from the NEW PERSON (#200) file:

- NAME (#.01)
- **DUZ**—Internal Entry Number (IEN) for the user in the NEW PERSON (#200) file
- DEA# (#53.2)
- VA# (#53.3)
- SCHEDULEs:
  - SCHEDULE II NARCOTIC (#55.1)
  - SCHEDULE II NON-NARCOTIC (#55.2)
  - SCHEDULE III NARCOTIC (#55.3)
  - SCHEDULE III NON-NARCOTIC (#55.4)
  - SCHEDULE IV (#55.5)
  - SCHEDULE V (#55.6)



**NOTE:** This option was released with Kernel patch XU\*8.0\*580.

**Figure 60: DEA ePCS: Print Prescribers with Privileges Option—Sample User Entries and Report**

```
1      Print DEA Expiration Date Null
2      Print DISUSER DEA Expiration Date Null
3      Print DEA Expiration Date Expires 30 days
4      Print DISUSER DEA Expiration Date Expires 30 days
5      Print Prescribers with Privileges
6      Print DISUSER Prescribers with Privileges
7      Print PSDRPH Key Holders
8      Print Setting Parameters Privileges
9      Print Audits for Prescriber Editing
10     Task Changes to DEA Prescribing Privileges Report
11     Task Allocation Audit of PSDRPH Key Report
12     Allocate/De-Allocate of PSDRPH Key
13     Edit Facility DEA# and Expiration Date

Select ePCS DEA Utility Functions Option: 5 <Enter> Print Prescribers with
Privileges
DEVICE: <Enter> HOME (CRT)      Right Margin: 80// <Enter>
PRESCRIBERS WITH PRIVILEGES          APR 15,2013 17:13    PAGE 1
NAME                                DUZ                DEA#              VA#
-----
      DIVISION: ALBANY, NY VAMC
XUSER,ONE                          520736424          AA1234563
      SCHEDULE II:
      SCHEDULE II NON:
      SCHEDULE III:
      SCHEDULE III NON:      Yes
      SCHEDULE IV:          Yes
      SCHEDULE V:
      DIVISION: CHEYENNE VAMC
XUSER,TWO                          520629114          AV4538419
      SCHEDULE II:
      SCHEDULE II NON:
      SCHEDULE III:
      SCHEDULE III NON:
      SCHEDULE IV:
      SCHEDULE V:
.
.
.
```

## 6.4.7 Print DISUSER Prescribers with Privileges Option

The Print DISUSER Prescribers with Privileges option [XU EPCS DISUSER PRIVS] prints all DISUSERed users who have privileges to any of the SCHEDULEs II through V and who have a DEA# or VA#.

This option prints the following data from the NEW PERSON (#200) file:

- NAME (#.01)
- **DUZ**—Internal Entry Number (IEN) for the user in the NEW PERSON (#200) file
- DEA# (#53.2)
- TERMINATION DATE (#9.2)
- VA# (#53.3) (DIVISION)
- SCHEDULEs:
  - SCHEDULE II NARCOTIC (#55.1)
  - SCHEDULE II NON-NARCOTIC (#55.2)
  - SCHEDULE III NARCOTIC (#55.3)
  - SCHEDULE III NON-NARCOTIC (#55.4)
  - SCHEDULE IV (#55.5)
  - SCHEDULE V (#55.6)



**NOTE:** This option was released with Kernel patch XU\*8.0\*580.



**Figure 61: DEA ePCS: Print DISUSER Prescribers with Privileges Option—Sample User Entries and Report**

```

1      Print DEA Expiration Date Null
2      Print DISUSER DEA Expiration Date Null
3      Print DEA Expiration Date Expires 30 days
4      Print DISUSER DEA Expiration Date Expires 30 days
5      Print Prescribers with Privileges
6      Print DISUSER Prescribers with Privileges
7      Print PSDRPH Key Holders
8      Print Setting Parameters Privileges
9      Print Audits for Prescriber Editing
10     Task Changes to DEA Prescribing Privileges Report
11     Task Allocation Audit of PSDRPH Key Report
12     Allocate/De-Allocate of PSDRPH Key
13     Edit Facility DEA# and Expiration Date

Select ePCS DEA Utility Functions Option: 6 <Enter> Print DISUSER Prescribers with
Privileges
DEVICE: <Enter> HOME (CRT)      Right Margin: 80// <Enter>
DISUSER PRESCRIBERS WITH PRIVILEGES      APR 15,2013  17:16      PAGE 1
                                           TERMINATION
NAME                                     DUZ          DEA#         DATE
-----
      DIVISION:  EMPTY
XUUSER,FIFTEEN                          2890         AP9587570    MAY  4,2009
      SCHEDULE II:
      SCHEDULE II NON:
      SCHEDULE III:
      SCHEDULE III NON:
      SCHEDULE IV:
      SCHEDULE V:
XUUSER,SIXTEEN                          520629429   BB2243854    MAY  4,2009
      SCHEDULE II:
      SCHEDULE II NON:
      SCHEDULE III:
      SCHEDULE III NON:
      SCHEDULE IV:
      SCHEDULE V:
.
.
.
      DIVISION:  CHEYENNE VAMC
XUUSER,FIFTY                             1000203
      SCHEDULE II:          Yes
      SCHEDULE II NON:
      SCHEDULE III:        Yes
      SCHEDULE III NON:
      SCHEDULE IV:
      SCHEDULE V:
.
.
.
      DIVISION:  DENVER-RO
XUUSER,SIXTY                             520628843   BT1199125    FEB  2,2007
      SCHEDULE II:
      SCHEDULE II NON:
      SCHEDULE III:

```

```

SCHEDULE III NON:
SCHEDULE IV:
SCHEDULE V:
XUUSER, SEVENTY          520628775      AH9494852      FEB 12,1999
SCHEDULE II:
SCHEDULE II NON:
SCHEDULE III:
SCHEDULE III NON:
SCHEDULE IV:
SCHEDULE V:
XUUSER, EIGHTY          520628129      BA4578893      OCT 12,1990
SCHEDULE II:           Yes
SCHEDULE II NON:       Yes
SCHEDULE III:          Yes
SCHEDULE III NON:      Yes
SCHEDULE IV:           Yes
SCHEDULE V:            Yes
.
.
.

```

### 6.4.8 Print PSDRPH Key Holders Option

The Print PSDRPH Key Holders option [XU EPCS PSDRPH] prints all active users holding the PSDRPH security key. This report sorts by Division, and within Division, it sorts by Name.

This option prints the following data from the NEW PERSON (#200) file:

- NAME (#.01)
- **DUZ**—Internal Entry Number (IEN) for the user in the NEW PERSON (#200) file
- GIVEN BY (#1) subfield of the KEYS (#51) Multiple: Person who assigned the PSDRPH security key
- DATE GIVEN (#2) subfield of the KEYS (#51) Multiple: Date assigned



**NOTE:** This option was released with Kernel patch XU\*8.0\*580.

**Figure 62: DEA ePCS: Print PSDRPH Key Holders Option—Sample User Entries and Report**

```

1      Print DEA Expiration Date Null
2      Print DISUSER DEA Expiration Date Null
3      Print DEA Expiration Date Expires 30 days
4      Print DISUSER DEA Expiration Date Expires 30 days
5      Print Prescribers with Privileges
6      Print DISUSER Prescribers with Privileges
7      Print PSDRPH Key Holders
8      Print Setting Parameters Privileges
9      Print Audits for Prescriber Editing
10     Task Changes to DEA Prescribing Privileges Report
11     Task Allocation Audit of PSDRPH Key Report
12     Allocate/De-Allocate of PSDRPH Key
13     Edit Facility DEA# and Expiration Date

Select ePCS DEA Utility Functions Option: 7 <Enter> Print PSDRPH Key Holders
DEVICE: <Enter> HOME (CRT)      Right Margin: 80// <Enter>
  PSDRPH KEY HOLDERS                APR 15,2013  17:26    PAGE 1
NAME                                DUZ                GIVEN BY          DATE GIVEN
-----
      DIVISION:      EMPTY
XUUSER,SIX                520736417         XUUSER,SIX        SEP 20,2012
XUUSER,ONE                520736423         XUUSER,ONE        MAR 27,2012
XUUSER,THREE              520736427         XUUSER,THREE      MAR  4,2013
XUUSER,FIVE               520736422         XUUSER,FIVE       JAN 23,2013
XUUSER,SEVEN              520736428         XUUSER,SEVEN      MAR  2,2012
XUUSER,EIGHT              520736430         XUUSER,EIGHT      MAR 30,2012
      DIVISION: ALBANY, NY VAMC
XUUSER,NINE                520736424         XUUSER,NINE       JAN 29,2013
  
```

### 6.4.9 Print Setting Parameters Privileges Option

The Print Setting Parameters Privileges option [XU EPCS SET PARMS] prints all active users holding the XUEPCSEEDIT security key.

This option identifies individuals responsible for setting the parameters. It prints the following data from the NEW PERSON (#200) file:

- NAME (#.01)
- **DUZ**—Internal Entry Number (IEN) for the user in the NEW PERSON (#200) file
- **GIVEN BY** (#1) subfield of the KEYS (#51) Multiple: Person who assigned the PSDRPH security key
- **DATE GIVEN** (#2) subfield of the KEYS (#51) Multiple: Date assigned



**NOTE:** This option was released with Kernel patch XU\*8.0\*580.

**Figure 63: DEA ePCS: Print Setting Parameters Privileges Option—Sample User Entries and Report**

```

1      Print DEA Expiration Date Null
2      Print DISUSER DEA Expiration Date Null
3      Print DEA Expiration Date Expires 30 days
4      Print DISUSER DEA Expiration Date Expires 30 days
5      Print Prescribers with Privileges
6      Print DISUSER Prescribers with Privileges
7      Print PSDRPH Key Holders
8      Print Setting Parameters Privileges
9      Print Audits for Prescriber Editing
10     Task Changes to DEA Prescribing Privileges Report
11     Task Allocation Audit of PSDRPH Key Report
12     Allocate/De-Allocate of PSDRPH Key
13     Edit Facility DEA# and Expiration Date

Select ePCS DEA Utility Functions Option: 8 <Enter> Print Setting Parameters
Privileges
DEVICE: <Enter> HOME (CRT)      Right Margin: 80// <Enter>
  USERS RESPONSIBLE FOR SETTING PARAMETERS      APR 15,2013  17:28  PAGE 1
NAME              DUZ              GIVEN BY              DATE GIVEN
-----
XUUSER,ONE        520736423    XUUSER,ONE            AUG 22,2012
XUUSER,TWO        520736419    XUUSER,TWO            APR  3,2012
XUUSER,THREE      520736427    XUUSER,THREE          JUL 16,2012
XUUSER,FOUR       520736431    XUUSER,FOUR           MAR 19,2012
XUUSER,FIVE       520736422    XUUSER,FIVE           JUL 17,2012

```

### 6.4.10 Print Audits for Prescriber Editing Option

The Print Audits for Prescriber Editing option [XU EPCS PRINT EDIT AUDIT] prints information related to the editing of prescriber information.

The data for this report is retrieved from the XUEPCS DATA (#8991.6) file. It prints the following data:

- DATE/TIME EDITED (#.06)
- NAME (#.01)—This is the name of user edited.
- EDITED BY (#.02)—This is the name of user who edited the data.
- FIELD EDITED (#.03)
- ORIGINAL DATA (#.04)
- EDITED DATA (#.05)

You can sort the data by any of the following data:

- Edited By then Date/Time
- Edited By then User Edited
- Date/Time then Edited By
- Date/Time then User Edited
- User Edited then Edited By
- User Edited then Date



**NOTE:** This option was released with Kernel patch XU\*8.0\*580.

**Figure 64: DEA ePCS: Print Audits for Prescriber Editing Option: Sort by Edited By then Date/time—Sample User Entries and Report**

```

1      Print DEA Expiration Date Null
2      Print DISUSER DEA Expiration Date Null
3      Print DEA Expiration Date Expires 30 days
4      Print DISUSER DEA Expiration Date Expires 30 days
5      Print Prescribers with Privileges
6      Print DISUSER Prescribers with Privileges
7      Print PSDRPH Key Holders
8      Print Setting Parameters Privileges
9      Print Audits for Prescriber Editing
10     Task Changes to DEA Prescribing Privileges Report
11     Task Allocation Audit of PSDRPH Key Report
12     Allocate/De-Allocate of PSDRPH Key
13     Edit Facility DEA# and Expiration Date

Select ePCS DEA Utility Functions Option: 9 <Enter> Print Audits for Prescriber
Editing

      Select one of the following:

          1      Sort by Edited By then Date/time
          2      Sort by Edited By then User Edited
          3      Sort by Date/time then Edited By
          4      Sort by Date/time then User Edited
          5      Sort by User Edited then Edited By
          6      Sort by User Edited then Date

SORT BY: 1 <Enter> Sort by Edited By then Date/time
START WITH EDITED BY: FIRST// <Enter>
START WITH DATE/TIME EDITED: FIRST// <Enter>
START WITH NAME: FIRST// <Enter>
DEVICE: <Enter> HOME (CRT)      Right Margin: 80// <Enter>

...HMMM, I'M WORKING AS FAST AS I CAN...

XUEPCS DATA LIST                                APR 15,2013  17:33      PAGE 1
DATE/TIME EDITED      NAME
EDITED BY              FIELD EDITED
ORIGINAL DATA
EDITED DATA
-----
MAR 28,2012  11:35  XUUSER,TWO
XUUSER,ONE          SCHEDULE II NARCOTIC
1
0
MAR 28,2012  11:41  XUUSER,THREE
XUUSER,ONE          SCHEDULE II NARCOTIC
0
1
MAR 28,2012  14:15  XUUSER,FOUR
XUUSER,ONE          DEA#
OX4215895

```

**Figure 65: DEA ePCS: Print Audits for Prescriber Editing Option: Sort by *User Edited then Edited By*—Sample User Entries and Report**

```

SORT BY: 5 <Enter> Sort by User Edited then Edited By
START WITH NAME: FIRST// <Enter>
START WITH EDITED BY: FIRST// <Enter>
START WITH DATE/TIME EDITED: FIRST// <Enter>
DEVICE: <Enter> HOME (CRT) Right Margin: 80// <Enter>

...HMMM, HOLD ON...

XUEPCS DATA LIST                                APR 15,2013 17:36 PAGE 1
DATE/TIME EDITED   NAME
EDITED BY          FIELD EDITED
ORIGINAL DATA
EDITED DATA
-----
MAR 28,2012 11:35 XUUSER,TWO
XUUSER,ONE        SCHEDULE II NARCOTIC
1
0
MAR 28,2012 11:41 XUUSER,THREE
XUUSER,ONE        SCHEDULE II NARCOTIC
0
1
MAR 28,2012 14:15 XUUSER,FOUR
XUUSER,ONE        DEA#
OX4215895

```

### 6.4.11 Task Changes to DEA Prescribing Privileges Report Option



**CAUTION:** Verify that the XUEPCS REPORT DEVICE parameter has been set before using this option.

To set the parameter, see the [“Set the XUEPCS REPORT DEVICE Parameter”](#) section.

The Task Changes to DEA Prescribing Privileges Report option [XU EPCS LOGICAL ACCESS] prints the setting or change to DEA prescribing privileges related to issuance of a controlled substance prescription.

The option only prints data from the previous day and with data that has been modified. The data is retrieved from the XUEPCS DATA (#8991.6) file.

This option should be scheduled to run on a daily basis via TaskMan. The option only prints data from the *previous* day and with *data that has been modified*. The data is retrieved from the XUEPCS DATA (#8991.6) file.



**NOTE:** No data is displayed to the screen; the data is printed to the device indicated by the XUEPCS REPORT DEVICE parameter.



**NOTE:** This option was released with Kernel patch XU\*8.0\*580.

To schedule the option to run daily using TaskMan, perform the following procedure:

1. From the **Systems Manager Menu** [EVE], select the **Taskman Management** option [XUTM MGR].
2. At the “Select Taskman Management Option:” prompt, select the Schedule/Unschedule Options option [XUTM SCHEDULE].
3. At the “Select OPTION to schedule or reschedule:” prompt, enter **XU EPCS LOGICAL ACCESS**.
4. At the “...OK? Yes//” prompt, enter **YES**. A ScreenMan dialogue is displayed.
5. Tab down to the following fields and enter the values shown:
  - **QUEUED TO RUN AT WHAT TIME: T+1@001** (which means start running it tomorrow at 12:01)
  - **RESCHEDULING FREQUENCY: 1D** (which means run it daily)
6. At the “COMMAND:” prompt, enter **Save**.
7. At the “COMMAND:” prompt, enter **Exit**.

**Figure 66: DEA ePCS: Task Changes to DEA Prescribing Privileges Report Option: TaskMan schedule setup—Sample User Entries**

```

Device Management ...
Programmer Options ...
Operations Management ...
Spool Management ...
Information Security Officer Menu ...
Taskman Management ...
User Management ...
FM1 VA FileMan ...
JL Consolidated Practitioner's Menu ...
Application Utilities ...
Capacity Planning ...
Manage Mailman ...
Menu Management ...
Verifier Tools Menu ...

Select Systems Manager Menu Option: TASK <Enter> man Management

Schedule/Unschedule Options
One-time Option Queue
Taskman Management Utilities ...
List Tasks
Dequeue Tasks
Requeue Tasks
Delete Tasks
Print Options that are Scheduled to run
TU TASK UTILITY
VPD Cleanup Task List
Print Options Recommended for Queuing

Select Taskman Management Option: SCHED <Enter> ular/Unschedule Options

Select OPTION to schedule or reschedule: XU EPCS LOGICAL ACCESS <Enter> Task
Changes to DEA Prescribing Privileges Report
...OK? Yes// <Enter> (Yes)
(R)
Edit Option Schedule
Option Name: XU EPCS LOGICAL ACCESS
Menu Text: Task Changes to DEA Prescribing TASK ID:

```

---

**Tab to the fields indicated, and enter the values shown.**

```

QUEUED TO RUN AT WHAT TIME: T+1@001
DEVICE FOR QUEUED JOB OUTPUT:
QUEUED TO RUN ON VOLUME SET:
RESCHEDULING FREQUENCY: 1D
TASK PARAMETERS:
SPECIAL QUEUEING:

```

---

Exit    Save    Next Page    Refresh



Enter a command or '^' followed by a caption to jump to a specific field.

COMMAND: **SAVE**

Press <PF1>H for help

**Insert**

.  
.  
.

---

Exit      Save      Next Page      Refresh

Enter a command or '^' followed by a caption to jump to a specific field.

COMMAND: **EXIT**

Press <PF1>H for help

**Insert**

Select OPTION to schedule or reschedule:

**Figure 67: DEA ePCS: Task Changes to DEA Prescribing Privileges Report Option—Sample User Entries (No Report Displays)**

- 1      Print DEA Expiration Date Null
- 2      Print DISUSER DEA Expiration Date Null
- 3      Print DEA Expiration Date Expires 30 days
- 4      Print DISUSER DEA Expiration Date Expires 30 days
- 5      Print Prescribers with Privileges
- 6      Print DISUSER Prescribers with Privileges
- 7      Print PSDRPH Key Holders
- 8      Print Setting Parameters Privileges
- 9      Print Audits for Prescriber Editing
- 10     Task Changes to DEA Prescribing Privileges Report**
- 11     Task Allocation Audit of PSDRPH Key Report
- 12     Allocate/De-Allocate of PSDRPH Key
- 13     Edit Facility DEA# and Expiration Date

Select ePCS DEA Utility Functions Option: **10 <Enter>** Task Changes to DEA Prescribing Privileges Report

**No data is displayed to the screen; the data is printed to the device indicated by the XUEPCS REPORT DEVICE parameter.**

## 6.4.12 Task Allocation Audit of PSDRPH Key Report Option



**CAUTION:** Verify that the XUEPCS REPORT DEVICE parameter has been set before using this option.

To set the parameter, see the [“Set the XUEPCS REPORT DEVICE Parameter”](#) section.

The Task Allocation Audit of PSDRPH Key Report option [XU EPCS PSDRPH AUDIT] prints the allocation of the PSDRPH security key audit report to a device previously selected during setup (i.e., XUEPCS REPORT DEVICE parameter).

This option should be scheduled to run on a daily basis via TaskMan. The option only prints data from the *previous* day and with *data that has been modified*. The data is retrieved from the XUEPCS PSDRPH AUDIT (#8991.7) file.



**NOTE:** No data is displayed to the screen; the data is printed to the device indicated by the XUEPCS REPORT DEVICE parameter.



**NOTE:** This option was released with Kernel patch XU\*8.0\*580.

To schedule the option to run daily using TaskMan, perform the following procedure:

1. From the **Systems Manager Menu** [EVE], select the **Taskman Management** option [XUTM MGR].
2. At the “Select Taskman Management Option:” prompt, select the Schedule/Unschedule Options option [XUTM SCHEDULE].
3. At the “Select OPTION to schedule or reschedule:” prompt, enter **XU EPCS PSDRPH AUDIT**.
4. At the “...OK? Yes//” prompt, enter **YES**. A ScreenMan dialogue is displayed.
5. Tab down to the following fields and enter the values shown:
  - QUEUED TO RUN AT WHAT TIME: **T+1@001** (which means start running it tomorrow at 12:01)
  - RESCHEDULING FREQUENCY: **1D** (which means run it daily)
6. At the “COMMAND:” prompt, enter **Save**.
7. At the “COMMAND:” prompt, enter **Exit**.

**Figure 68: DEA ePCS: Task Allocation Audit of PSDRPH Key Report Option: TaskMan Schedule Setup—Sample User Entries**

```

Device Management ...
Programmer Options ...
Operations Management ...
Spool Management ...
Information Security Officer Menu ...
Taskman Management ...
User Management ...
FM1 VA FileMan ...
JL Consolidated Practitioner's Menu ...
Application Utilities ...
Capacity Planning ...
Manage Mailman ...
Menu Management ...
Verifier Tools Menu ...

Select Systems Manager Menu Option: TASK <Enter> man Management

Schedule/Unschedule Options
One-time Option Queue
Taskman Management Utilities ...
List Tasks
Dequeue Tasks
Requeue Tasks
Delete Tasks
Print Options that are Scheduled to run
TU TASK UTILITY
VPD Cleanup Task List
Print Options Recommended for Queuing

Select Taskman Management Option: SCHED <Enter> ule/Unschedule Options

Select OPTION to schedule or reschedule: XU EPCS PSDRPH AUDIT <Enter> Task
Allocation Audit of PSDRPH Key Report
...OK? Yes// <Enter> (Yes)
(R)

Edit Option Schedule
Option Name: XU EPCS PSDRPH AUDIT
Menu Text: Task Allocation Audit of PSDRPH TASK ID:

```

---

**Tab to the fields indicated, and enter the values shown.**

```

QUEUED TO RUN AT WHAT TIME: T+1@001

DEVICE FOR QUEUED JOB OUTPUT:

QUEUED TO RUN ON VOLUME SET:

RESCHEDULING FREQUENCY: 1D

TASK PARAMETERS:

SPECIAL QUEUEING:

```

---

Exit    Save    Next Page    Refresh

Enter a command or '^' followed by a caption to jump to a specific field.

```

COMMAND: SAVE                                Press <PF1>H for help Insert
.
.
.
-----
Exit      Save      Next Page      Refresh

Enter a command or ``^`` followed by a caption to jump to a specific field.

COMMAND: EXIT                                Press <PF1>H for help Insert

Select OPTION to schedule or reschedule:

```

**Figure 69: DEA ePCS: Task Allocation Audit of PSDRPH Key Report Option—Sample User Entries (No Report Displays)**

```

1      Print DEA Expiration Date Null
2      Print DISUSER DEA Expiration Date Null
3      Print DEA Expiration Date Expires 30 days
4      Print DISUSER DEA Expiration Date Expires 30 days
5      Print Prescribers with Privileges
6      Print DISUSER Prescribers with Privileges
7      Print PSDRPH Key Holders
8      Print Setting Parameters Privileges
9      Print Audits for Prescriber Editing
10     Task Changes to DEA Prescribing Privileges Report
11    Task Allocation Audit of PSDRPH Key Report
12     Allocate/De-Allocate of PSDRPH Key
13     Edit Facility DEA# and Expiration Date

Select ePCS DEA Utility Functions Option: 11 <Enter> Task Allocation Audit of
PSDRPH Key Report

```

**No data is displayed to the screen; the data is printed to the device indicated by the XUEPCS REPORT DEVICE parameter.**

**Figure 70: DEA ePCS: Task Allocation Audit of PSDRPH Key Report Option—Sample Report Printed to Device Entered into the XUEPCS REPORT DEVICE Parameter**

```

PSDRPHKEY AUDIT LIST                                APR 16,2013   16:32   PAGE 1
NAME

```

	EDITED BY	ALLOCATION STATUS	DATE/TIME	EDITED
XUUSER, ONE	XUUSER, TWO	ALLOCATED	APR 15, 2013	15:33
XUUSER, ONE	XUUSER, TWO	DE-ALLOCATED	APR 15, 2013	16:33

## 6.4.13 Allocate/De-Allocate of PSDRPH Key Option

The Allocate/De-Allocate of PSDRPH Key option [XU EPCS PSDRPH KEY] allocates or de-allocates the PSDRPH security key.



**NOTE:** All user security keys are stored in the KEYS (#51) Multiple field in the NEW PERSON (#200) file.



**NOTE:** This option was released with Kernel patch XU\*8.0\*580.

**Figure 71: DEA ePCS: Allocate/De-Allocate of PSDRPH Key Option: *Allocating* PSDRPH—Sample User Entries**

```
1      Print DEA Expiration Date Null
2      Print DISUSER DEA Expiration Date Null
3      Print DEA Expiration Date Expires 30 days
4      Print DISUSER DEA Expiration Date Expires 30 days
5      Print Prescribers with Privileges
6      Print DISUSER Prescribers with Privileges
7      Print PSDRPH Key Holders
8      Print Setting Parameters Privileges
9      Print Audits for Prescriber Editing
10     Task Changes to DEA Prescribing Privileges Report
11     Task Allocation Audit of PSDRPH Key Report
12     Allocate/De-Allocate of PSDRPH Key
13     Edit Facility DEA# and Expiration Date

Select ePCS DEA Utility Functions Option: 12 <Enter> Allocate/De-Allocate of PSDRPH
Key
Enter User Name: XUSER
1      XUUSER,ONE          OX
2      XUUSER,TWO         TX      192      SYSTEMS ANALYST
3      XUUSER,THREE B    TBX
4      XUUSER,FOUR       FX
5      XUUSER,FIVE A     FAX

Press <RETURN> to see more, '^' to exit this list, OR
CHOOSE 1-5: 2 <Enter> XUUSER,TWO      TX      192      SYSTEMS ANALYST
Allocate PSDRPH for XUUSER,TWO? YES// <Enter>
```

**Figure 72: DEA ePCS: Allocate/De-Allocate of PSDRPH Key Option: *De-allocating* PSDRPH—Sample User Entries**

```
Select ePCS DEA Utility Functions Option: 12 <Enter> Allocate/De-Allocate of PSDRPH
Key
Enter User Name: XUUSER,TWO <Enter> XUUSER,TWO      TX      192      SYSTEMS ANALYST
De-allocate PSDRPH for XUUSER,TWO? YES// <Enter>
```



**REF:** To review the audit history of the allocation and de-allocation of the PSDRPH security key, see the sample report generated from the Task Allocation Audit of PSDRPH Key Report option [XU EPCS PSDRPH AUDIT RAULTST] in [Figure 70](#).

## 6.4.14 Edit Facility DEA# and Expiration Date Option

The Edit Facility DEA# and Expiration Date option [XU EPCS EDIT DEA# AND XDATE] edits the FACILITY DEA NUMBER (#52) and FACILITY DEA EXPIRATION DATE (#52.1) fields in the INSTITUTION (#4) file.



**NOTE:** This option was released with Kernel patch XU\*8.0\*580.

**Figure 73: DEA ePCS: Edit Facility DEA# and Expiration Date Option—Sample User Entries**

```
1      Print DEA Expiration Date Null
2      Print DISUSER DEA Expiration Date Null
3      Print DEA Expiration Date Expires 30 days
4      Print DISUSER DEA Expiration Date Expires 30 days
5      Print Prescribers with Privileges
6      Print DISUSER Prescribers with Privileges
7      Print PSDRPH Key Holders
8      Print Setting Parameters Privileges
9      Print Audits for Prescriber Editing
10     Task Changes to DEA Prescribing Privileges Report
11     Task Allocation Audit of PSDRPH Key Report
12     Allocate/De-Allocate of PSDRPH Key
13     Edit Facility DEA# and Expiration Date

Select ePCS DEA Utility Functions Option: 13 <Enter> Edit Facility DEA# and
Expiration Date

Select INSTITUTION NAME: SAN FRANCISCO
  1  SAN FRANCISCO      CA  VAMC      662
  2  SAN FRANCISCO      CA  VCSFO     782
  3  SAN FRANCISCO      CA  NC       903
  4  SAN FRANCISCO-OPT  CA
  5  SAN FRANCISCO-RO   CA  RO       343
Press <RETURN> to see more, ^^ to exit this list, OR
CHOOSE 1-5: 1 <Enter> SAN FRANCISCO  CA  VAMC      662
FACILITY DEA NUMBER: BB1234563// ?
  Answer with a DEA ID, must be 9 characters in length
FACILITY DEA NUMBER: BB1234563// <Enter>
FACILITY DEA EXPIRATION DATE: SEP 9,2011// <Enter>

Select INSTITUTION NAME:
```

## 6.4.15 ePCS Edit Prescriber Data Option

The ePCS Edit Prescriber Data option [XU EPCS EDIT DATA] is a Broker-type context option that is given to those individuals who are permitted to edit the data related to e-prescribing of controlled substances.

This option is locked with the XUEPCSEEDIT security key.



**NOTE:** This option was released with Kernel patch XU\*8.0\*580.

## 6.4.16 ePCS Set SAN from PIV Card Option

The ePCS Set SAN from PIV Card option [XUSSPKI UPN SET] is a Broker-type context option that sets the SUBJECT ALTERNATIVE NAME (#501.2) field (a.k.a. SAN field or USER PRINCIPLE NAME) in the NEW PERSON (#200) file from the Personal Identification Verification (PIV) Smart Card. This is used with the DEA ePCS electronic signature (e-sig) to be sure the correct certificate is selected from the PIV card.



**NOTE:** This option only needs to be run once for a user at a site.



**NOTE:** This option was released with Kernel patch XU\*8.0\*580.

### 6.4.16.1 XUSSPKI SAN Bulletin

Released with Kernel patch XU\*8.0\*580, the XUSSPKI SAN bulletin is sent when the SUBJECT ALTERNATIVE NAME (#501.2) field in the NEW PERSON (#200) file has been changed or deleted. The bulletin is sent to users holding the PSDMGR security key.

- **Subject:** “Subject Alternative Name” field
- **Message:** The “Subject Alternative Name” field in New Person File (#200) has been changed or deleted for: |3|

**Before:** |1|

**After:** |2|



**NOTE:** If this value is **NULL**, the field was deleted!

- Parameters:
  - |1|—Old value before changed or deleted.
  - |2|—New value. If **NULL**, value was deleted.
  - |3|—Name of the user.

## 6.5 Prescription Validation and Verification Process—PKIServer.exe Application

The PKIServer.exe is an application that runs as a service application to handle verification of prescriptions that have been entered using the electronic prescribing of controlled substances (ePCS) in the Computerized Patient Record System (CPRS) application. The PKIServer.exe application itself is written in the Delphi language and uses the cryptographic APIs within the Windows operating system.



**REF:** For more information on cryptographic functions, see the “[Windows Authentication and Cryptographic Operations](#)” section.



**NOTE:** The VA was the original test site (at the Hines VAMC) for ePCS for the DEA starting in 2002 with code in CPRS for this purpose. That test site has continued to use this functionality (and the functionality has been in CPRS) until the current time. The DEA has now come up with the final rules for the use of ePCS and the version of CPRS that is currently in testing moves the functionality to meet the final regulations and expands its use to all sites instead of the single Hines site.

There is code within CPRS that handles the following:

- Cryptographic functionalities involved in verifying the provider’s pin value for the PIV card (the original testing used cards provided by DEA).



**REF:** For more information on cryptographic functions, see the “[Windows Authentication and Cryptographic Operations](#)” section.

- Validation of the PIV card with respect to expiration or revocation.



**REF:** For more information on revoked VA PIV cards, see the “[PIV Card Validation—Revocation Server](#)” section.

- Creation of the hash for the aggregate prescription data and signing of that hash. The signed hash is created so that it contains a copy of the signing certificate as well.

At the time that the pharmacist goes to fill the prescription there are requirements that the prescription be validated to insure that there have been no changes to the data associated with the prescription before it is filled. The pharmacist works within the VistA roll-and-scroll environment, which does *not* offer the capabilities required to provide the cryptographic checks necessary.

To validate the prescription using cryptographic checks, the system performs the following procedure:

1. VistA Pharmacy code passes the current data associated with the prescription and the signed hash value via Kernel utilities to a server location identified by the PKI SERVER (#53.1) field in the KERNEL SYSTEM PARAMETERS (#8989.3) file. There can be up to three IP addresses separated by caret characters (^) in this field. This connects the VistA server to the PKIServer service (identified in the services functionality as PKI\_Verify\_Service).
2. PKIServer takes the input data and extracts the signing certificate and original hash from the signed hash.
3. PKIServer creates a hash of the current data passed in for the prescription.



4. PKIServer compares the two hashes:
  - **Hashes match**—If the two hashes match, indicating no change in the data, the PKIServer then checks whether the certificate has been revoked (see Step 5).
  - **Hashes do *not* match**—If any changes have occurred in the data currently associated with the prescription, the two hashes differ:
    - a. PKIServer returns a value indicating prescription is returned.
    - b. Prescription is voided.
5. PKIServer checks whether the certificate has been revoked:
  - **Active Certificate**—If the hashes match and there is confirmation that the certificate has *not* been revoked, the prescription is approved.
  - **Revoked Certificate**—If the provider’s certificate has been revoked, the prescription is voided as well.
  - **Pending Certificate Check**—There may be cases where there are problems in checking the certificate and a return value in this case may indicate that they should wait and check the prescription later.

To meet the DEA requirements, newer, higher level cryptographic methods are required than were previously used in the original Hines testing, and these may require that older server systems be patched to insure that capabilities (e.g., SHA-2) are available. Also, the VA has been moving to use functionality (e.g., Tumbleweed Desktop Validator) to assist in checking certificate statuses, etc. The PKIServer.exe application does *not* call these directly; however, if they are available, they are called by the Windows operating system via the cryptographic APIs.



**REF:** For more information on the PKIServer.exe application, see the *DEA e-Prescribing Installation and Setup Guide* located under CPRS on the VDL:  
<http://www.va.gov/vdl/application.asp?appid=61>

## 6.6 PIV Card Validation—Revocation Server

The Revocation Server contains a Certificate Revocation List (CRL), which is a list of all revoked VA PIV cards. The distinction is that if a physician prescribes a drug, and then the physician’s certificate expires *before* the prescription is filled, it can still be filled, since it was written *before* it expired. If, however, the physician’s certificate is revoked, then any orders that have *not* been filled are cancelled and *cannot* be filled. In many cases, certificates are revoked due to a change in affiliation.

To check the CRL to see if a PIV card has been revoked, perform the following procedure:

1. Insert the **PIV card**.
2. Double click on the **ActivClient Agent** to open it.
3. Click on the **My Certificates** icon.
4. Select and double click on one of the certificates.
5. Click on the **Advanced** tab.
6. Scroll down to find and select the **CRL Distribution Points** entry. The CRL is the Certificate Revocation List.

7. Scroll down and see the contents for this entry. You should probably find an entry for the following:
  - one **http:** entry
  - one **ldap:** entry. For example:  
URL=http://cdp1.ssp-strong-id.net/CDP/vauser.crl
8. Copy the **http://** URL address and paste it into a Web browser. It brings up a long list of all of the certificates that have been revoked (as opposed to expired, cancelled, etc.). You should get approximately 30 Megabytes for the Web page.

The Tumbleweed Desktop Validator is supposed to assist with this if it is on the desktop, and updates itself at intervals, so that the call does *not* have to be made to the site for each individual request.

## 6.7 Windows Authentication and Cryptographic Operations

### 6.7.1 History

The VA's attempt to use Microsoft® Windows-level authentication to access VistA accounts using a secure intermediary authentication server was set to be released in the late 1990's via the Enterprise Single Sign-On (ESSO) patch. During that time the Office of Cyber Security informed the VA that they had a better way and would implement it within six months. Subsequently, the VA stopped the release of the ESSO patch, but nothing more happened with regard to Microsoft® Windows level authentication.

In 2015, the VA began development of Single Sign-On Internal (SSOi) using Identity and Access Management (IAM) Secure Token Service (STS) to enable 2-Factor Authentication (2FA) of VA employees into VistA. Kernel patches XU\*8.0\*655 and XU\*8.0\*659 enable authentication into VistA using a STS token obtained from IAM. Single Sign-On External (SSOe) authentication of veterans and *non-VA* VistA users is currently in development.

### 6.7.2 Current Capabilities

VistA Kernel provides the mechanism to authenticate a user with a STS token obtained from IAM. VistA does *not* do direct authentication of a user via a PIV card or similar means. Authentication via PIV card is delegated to IAM. VistA validates a PKI certificate and digital signature from IAM to secure the delegated authentication process. This process is currently enabled for Remote Procedure Call (RPC) Broker and VistALink applications.

CPRS v30 is capable of handling the electronic prescribing of controlled substances, but all of the cryptographic operations are handled via the client workstation (for the signing of the prescription). This is before the data is passed to the VistA server, along with a copy of the signed hash generated based on the data for the prescription. At the time of filling of the prescription by the VA pharmacist, the data for the prescription along with a copy of the signed hash is transferred by VistA to a PKIService application. This PKIService application runs on a separate server or workstation for verification that the data associated with the prescription has *not* changed. It compares the original hash value with one created based on the current data.



**REF:** For more information on the PKIService verification process, see the "[Prescription Validation and Verification Process—PKIServer.exe Application](#)" section.

### 6.7.3 Future Capabilities

Terminal access (roll-and-scroll) VistA 2-Factor Authentication (2FA) is currently in development. This process will require a script within the terminal emulator software to call IAM to authenticate the user via PIV or similar means, and then send the returned STS token to VistA for authentication and identification of the user. Single Sign-On External (SSOe) is currently in development to use 2-Factor Authentication (2FA) to authenticate and identify external (*non-VistA*) users to obtain or edit data within VistA. External users include:

- Veterans
- Department of Defense (DoD) users
- *Non-VA* providers who require access to veteran data.

External users will be required to authenticate with IAM and use the returned STS token to authenticate and identify the user within VistA. Since these users might *not* be currently “known” to VistA, a means of role-based authorization is required to provision the users on-the-fly and restrict their access to specific data based upon their role. Role-based authorization for external VistA users has yet to be developed.

## II. Menu Manager

### 7 Menu Manager: User Interface

Kernel's menu system presents menu options within VistA software in a standard fashion. Once you become familiar with using the menu system in one application, using other applications is easier, since the same rules apply.

#### 7.1 Navigating Kernel's Menus

When you successfully sign into the computer system, Menu Manager presents your primary menu options. Your primary menu is the top-level menu assigned to you by the system administrators. Most options that are available to you are available from your primary menu, or from a submenu attached to your primary menu.

The menu system prompts you with a "Select (menu name) Option:" prompt. For example, in a menu named Billing, Menu Manager would prompt you with "Select Billing Option:". You can navigate through the menu system by responding to this prompt in different ways, which are described in this chapter.

You can enter question marks to see option choices and obtain online help. You can enter an option's synonym or the first few letters of its menu text, using upper or lowercase, to select the option. You can also enter a caret (^) along with the option specification (option menu text or synonym) to jump to the destination option rather than traversing the menu pathways step-by-step.

##### 7.1.1 Choosing Options

You can choose an option from your current menu at the select prompt. Choosing the option launches the software application associated with the option. To choose an option, type in the first few letters of the option as it is displayed and press the **<Enter>** key. If multiple options match those first few characters you are presented with a list of matching options from which you can choose the specific option you want to run. If the option is another menu, indicated by trailing ellipses (...), it becomes the current menu, and so on down the menu pathway.

To come back up the menu pathway, press **<Enter>** at the select prompt. Each time you press **<Enter>**, Menu Manager returns you to the next higher menu level, until you reach your highest menu, the primary menu. If you press **<Enter>** at the primary menu, Menu Manager asks if you want to halt your session. If you answer **YES**, your Kernel session is ended.

## 7.1.2 Listing Options

When you enter a menu, the items may or may *not* be displayed automatically, based on whether you have AUTO MENU turned on. The AUTO MENU feature, as described in the “[Signon/Security: User Interface](#)” section, is a flag that controls the menu display. If you do *not* have a setting specified for AUTO MENU, the site parameter default is used. Often, to save system resources, the site parameter can be set to disable automatic display. In this case, to display menu items, simply enter a single question mark (?), as shown below:

**Figure 74: One Question Mark (?) Help—Sample User Dialogue**

```
Select Any Level Menu Option: ?

    First Item
    Second Item
    Third Item of Menu Choices ...
    Fourth Item

Enter ?? for more options, ??? for brief descriptions, ?OPTION for help text.

Select Any Level Menu Option:
```

## 7.1.3 Displaying Option Help

To obtain a lengthier description of an individual option, enter a single question mark (?), and the first few letters of the option name. If there is an extended description of the option, or a help frame describing the option, they are displayed.

**Figure 75: Using ?Option to Get Help on a Named Option—Sample User Dialogue**

```
Select User's Toolbox Option: ?

    Display User Characteristics
    Edit User Characteristics
    Electronic Signature Code Edit
    Menu Templates...
    Spooler Menu...
    TaskMan User
    User Help

Select User's Toolbox Option: ?DISPLAY

'Display User Characteristics'      Option name: XUUSERDISP
  Display the user's name, location, and characteristics

**> Press 'RETURN' to continue, '^' to stop: <Enter>

Select User's Toolbox Option:
```

## 7.1.4 Listing Secondary and Common Options

At any select prompt you can enter two question marks (??) to see options on the Secondary and Common menus, as well as options available on the current branch of your menu tree.

The Secondary menu and the Common menu contain options that you can select at any location in the menu system. Options on the Secondary menu are typically created by your system manager. Options on

the Common menu are standard Kernel options available from anywhere in the menu system. Options on the current menu, on the other hand, can only be directly selected while that menu is the current menu.

The two-question-mark display shows the option's synonym (a short abbreviation), if one exists. You can select an option by its synonym as well as by its full name. On the same line, it lists the option's full name followed by the formal option name in capital letters enclosed in square brackets. (The name is the .01 field of the OPTION [#19] file.) It also shows any option restrictions such as:

- Out-of-Order
- Locked
- Prohibited times

**Figure 76: Two Question Marks (??) Help—Listing Primary, Secondary, and Common Menu Options**

```
Select Systems Manager Menu Option: ??

FM      VA FileMan ...                               [DIUSER]
        Core Applications ...                       [XUCORE]
        Device Management ...                      [XUTIO]
        **> Locked with XUPROG
        Information Security Officer Menu ...      [XUSPY]
        Manage Mailman ...                         [XMMGR]
        Menu Management ...                        [XUMAINT]
        Operations Management ...                  [XUSITEMGR]
        Programmer Options ...                    [XUPROG]
        **> Locked with XUPROG
        Spool Management ...                       [XU-SPL-MGR]
        Taskman Management ...                     [XUTM MGR]
        User Management ...                        [XUSER]

You can also select a secondary option:

OUT     Equipment Checked Out to Myself           [A6A EQUIP USER]
PAID    SIGN INTO MARTINEZ VIA TELNET, TYPE DUSER [A6A USE PAID]
RUM     Capacity Planning ...                     [XTCM MAIN]
        ISC OFFICE MENU OPTIONS ...              [ISCSTAFF]

Or a Common Option:

KNF     Kernel New Features Help                  [XUVERSIONEW-HELP]
        Halt                                     [XUHALT]
        Continue                                 [XUCONTINUE]
        Restart Session                          [XURELOG]
MM      MailMan Menu ...                          [XMUSER]
NPI     PROVIDER NPI SELF ENTRY                   [XUS NPI PROVIDER SELF ENTRY]
TBOX    User's Toolbox ...                        [XUSERTOOLS]
VA      View Alerts                              [XQALERT]
        Time                                     [XUTIME]
        Where am I?                             [XUSERWHERE]
```

## 7.1.5 Displaying Option Descriptions

Entering three question marks (???) at any select prompt displays option descriptions (from a word-processing-type field in the OPTION [#19] file). If entered at the select prompt for a menu within the primary tree, the top-level options are described; then you are prompted whether you want to see descriptions for Secondary or Common options.

**Figure 77: Three Question Marks (???) Help—Sample User Dialogue**

```
Select Spooler Menu Option: ???

'Allow other users access to spool documents'      Option name: XU-SPL-ALLOW
  This option edits the 'OTHER AUTHORIZED USERS' field of the SPOOL
  DOCUMENT file to allow other users access to a spool document.

'Delete A Spool Document'      Option name: XU-SPL-DELETE
  **> Extended help available.  Type "?Delete" to see it.
  Delete a spool document from the spool document file and delete the
  associated message if they are still linked.

'List Spool Documents'      Option name: XU-SPL-LIST
  **> Extended help available.  Type "?List" to see it.
  This option lists entries in the spool document file.

'Make spool document into a mail message'      Option name: XU-SPL-MAIL
  **> Extended help available.  Type "?Make" to see it.
  This option will take a spool document and post it as a mailman
  message to the user's IN basket.  This doesn't move the data at all
  but does decrease the number of lines charged to the user.

  **> Press 'RETURN' to continue, '^' to stop, or '?[option text]' for more
  help: <Enter>

'Print A Spool Document'      Option name: XU-SPL-PRINT
  **> Extended help available.  Type "?Print" to see it.
  This allows the printing of a document that has been spooled.

Shall I show you your secondary menus too? No// <Enter>
Would you like to see the Common Options? No// <Enter>

Select Spooler Menu Option:
```

You should be ready to use three question marks (???) to learn more about unfamiliar options (e.g., options distributed in a new software release).

## 7.1.6 Jumping to Options—“Up-arrow Jump”

The pathways of the Primary, Secondary, and Common menus have tree-like structures. You can step up or down the pathways to reach your destination, or invoke the menu system’s “Up-arrow Jump” feature as a shortcut. To jump to an option, enter a caret (^) before the option specification (the option’s menu text or synonym in upper- or lowercase letters). You only need to enter the first few characters needed to uniquely identify the option. You can use the option’s synonym to limit ambiguity, especially if the synonym is distinct from other synonyms or menu texts.

**Figure 78: Using the “Up-arrow Jump”—Sample User Dialogue**

```
Select Systems Manager Menu Option: ^INTRO <Enter> ductory text edit
```

The menu system carries out the necessary footwork to reach the desired option. If, along the way, there are pathway restrictions (e.g., locks or prohibited times), access to the option is denied, just as when stepping to an option. If a match is found within the primary or secondary menus, that option is executed (the menu system does *not* search the Common menu if it can find a match in the primary or secondary menus).

If the menu system finds *more than one* matching option on the Primary, Secondary, or Common menu tree, the menu system presents a list of matching choices. Entering a caret (^) followed by a question mark (?) displays all of the options available to you.

**Figure 79: List of Choices—Sample User Dialogue**

```
Select Systems Manager Menu Option: ^LIST NAMES

 1 List Namespaces [XUZ NAMESPACES]
 2 List Namespaces [ZZ NAMESPACE LIST]

Type ^^ to stop, or choose a number from 1 to 2 :
```

System administrators should assign “shallow” secondary menus to facilitate menu jumping. When a jump is requested, the menu system searches all the way through the primary as well as the secondary, looking for a match. Users are inconvenienced and system resources are consumed if secondary menus are “deep” in terms of their hierarchical tree-like structure.

You may occasionally find jumping disabled; when you try to jump, you may get a message that quick access is temporarily disabled. Jumping stays disabled until the needed menu trees are rebuilt.

## 7.1.7 Jumping to Options—“Rubber-band Jump”

The menu system’s jump feature includes the ability to jump out to a destination option and then back again, something like the motion of a rubber band. The syntax for the “Rubber-band Jump” request is the use of a double caret (^) followed by the usual option specification. For example:

**Figure 80: “Rubber-band Jump”—Sample User Dialogue**

```
Select Systems Manager Menu Option: ^^TASKMAN USER
```

As with the single “Up-arrow Jump” (^), restrictions along the menu pathways are checked.

If you enter two carets (^) without a following option specification/name, you are returned to the primary menu. This technique is a quick way for you to “go home” to the menu that is displayed at signon, and is called the “Go-home Jump.”





**CAUTION:** It is important to note that when you invoke the “Rubber-band Jump,” there is no attempt to protect variables that can be SET or KILLED, via Entry or Exit Actions, as you jump through the menu tree. Thus, the “Rubber-band Jump” can be inappropriate under certain circumstances, since it could cause significant alteration of your environment.

## 7.1.8 Common Menu

The Common menu is designed as a collection of options that are available to all users. The standard Common menu items are:

- **User’s Toolbox:** As described in the “[User’s Toolbox Menu](#)” section in the “[Signon/Security: User Interface](#)” section, the User’s Toolbox is a menu containing options that allow users to control some aspects of their computing environment.
- **Halt, Continue, Restart Session:** As described in the “[Signon/Security: User Interface](#)” chapter, these options are three different ways to log out of the system.
- **View Alerts:** As described in the “[Alerts](#)” and “[Signon/Security: User Interface](#)” sections, the View Alerts option [XQALERT] lets you process alerts.
- **Time:** The Time option simply displays the date and time.
- **Where am I?:** This option lists information identifying what computer system you are signed into (e.g., UCI, Volume Set, Node, and Device).

### 7.1.8.1 Selecting Common Options with the Double Quote

Since Common options are intended to be readily accessible, there is a shortcut method to reach them. While you could use an “Up-arrow Jump,” it is quicker to enter a quotation mark followed by the option specification (e.g., name, synonym). [Figure 81](#) selects the User’s Toolbox menu from the Common menu via its synonym, TBOX:

**Figure 81: Selecting Common Options via the Double Quote—User’s Toolbox Menu Option**

```
Select Sample Menu Option: "TBOX"

    Display User Characteristics
    Edit User Characteristics
    Electronic Signature code Edit
    Menu Templates ...
    Spooler Menu ...
    TaskMan User
    User Help

Select User’s Toolbox Option:
```

## 7.2 Menu Templates Option

Menu templates are like scripts. You can use them to execute a fixed series of options, in sequence. Tools for creating, deleting, listing, and renaming templates are options on the Menu Templates menu, part of the User's Toolbox (TBOX) menu:

**Figure 82: Menu Templates Option**

```
Select Menu Templates Option: ?
    Create a new menu template
    Delete a Menu Template
    List all Menu Templates
    Rename a menu template
    Show all options in a Menu Template
Select Menu Templates Option:
```

When you create a MENU template, you are prompted for a series of options that lead to a final non-menu (i.e., executable) destination option. Once you choose one non-menu option to be executed, you can navigate to other options and choose them to be executed as well, if you wish. When you have selected each executable option to be part of the template, enter a plus sign (“+”) to store the sequence of options. You are asked to confirm the sequence of options in the template, and then to give the template a name.

To invoke the template, simply enter a left square bracket followed by the template name:

**Figure 83: Invoking a Template—Sample User Dialogue**

```
Select Option: [MYTEMPLATE
Loading MYTEMPLATE...
```

The template then executes each option that is part of the template, in the same order as the options were selected for the template.

MENU templates are stored in the MENU TEMPLATE Multiple field of the NEW PERSON (#200) file, so you can use any name for MENU templates. If your MENU template points to options that are subsequently removed from the OPTION (#19) file, you receive a message that the MENU template no longer functions properly and needs to be deleted or rebuilt.

Use menu jumping (i.e., the “Up-arrow Jump”) when you want to jump immediately to an option. Use MENU templates when you have a series of options that you need to run in the same order repeatedly, over a period of time.

### 7.2.1 LOGIN Menu Template

Beginning with Kernel 8.0, you can have a MENU template execute automatically, on your first signon of the day. If you have a MENU template named LOGIN (all uppercase), the MENU template is executed on your first signon of the day. So if you have a series of options you execute on your first signon every day, an easy way to execute them is to create a MENU template; store the series of options in the template; and name the template LOGIN.

## 7.3 Summary

Once you learn how to navigate Kernel's menu tree, you can use some of Menu Manager's additional features to help increase your productivity in the VistA computer system. These features include the "Up-arrow Jump," the "Rubber-band Jump," using three question marks (???) to obtain online option help, and using MENU templates as scripts.

## 8 Menu Manager: System Management

Menu Manager is built around options, which are entries in the OPTION (#19) file. There are several types of options:

- Menus—Options with subentries in the MENU (item) Multiple field.
- Multiples—Options that point back to the OPTION (#19) file itself.
- Plugins—Options that are designed as items that plug into the MENU (item) Multiple field of a menu-type option.

Kernel provides a number of tools to create and manage menus and options.

### 8.1 Creating Menus and Options

Figure 84: Edit Options Option

SYSTEMS MANAGER MENU ...	[ EVE ]
Menu Management ...	[ XUMAIN ]
Edit options	[ XUEDITOPT ]

One task system administrators perform frequently is defining local primary menus that are appropriate for their users. This task of menu creation is accomplished by grouping exported menus from various software applications together on a new master menu. You can use Edit options[XUEDITOPT], on the Menu Management menu [XUMAIN], to define a new menu if **READ**, **WRITE**, and **LAYGO** access to the OPTION (#19) file has been granted (either through the FILE MANAGER ACCESS CODE [#3] field or through the File Access Security system if that is enabled). Only a few fields need to be defined, as shown in [Figure 85](#). The new menu can then be assigned to a user, as described in the “[Signon/Security: User Interface](#)” section, with one of several options on the User Edit menu.

**Figure 85: Defining Local Primary Menus (System Administrators)—Sample User Dialogue**

```
Select OPTION to edit: ZZSTAFF MENU
  Located in the Z (Local) namespace.
  ARE YOU ADDING 'ZZSTAFF MENU' AS A NEW OPTION (THE 721ST)? Y <Enter> (YES)
  OPTION MENU TEXT: STAFF MENU
NAME: ZZSTAFF MENU// <Enter>
MENU TEXT: Staff Menu// <Enter>
PACKAGE: <Enter>
OUT OF ORDER MESSAGE: <Enter>
LOCK: <Enter>
REVERSE/NEGATIVE LOCK: <Enter>
DESCRIPTION:
  1>This is the primary menu for staff members.
  2><Enter>
EDIT Option: <Enter>
TYPE: MENU
Select ITEM: XUCORE <Enter>      Core Applications
  ARE YOU ADDING 'XUCORE' AS A NEW MENU (THE 1ST FOR THIS OPTION)? Y <Enter> (YES)
  MENU SYNONYM: <Enter>
  SYNONYM: <Enter>
  DISPLAY ORDER: 10
Select ITEM: XUSPY <Enter>      System Security
  ARE YOU ADDING 'XUSPY' AS A NEW MENU (THE 2ND FOR THIS OPTION)? Y <Enter> (YES)
  MENU SYNONYM: <Enter>
  SYNONYM: <Enter>
  DISPLAY ORDER: 20
Select ITEM: XT-KERMIT MENU <Enter>      Kermit menu
  ARE YOU ADDING 'XT-KERMIT MENU' AS A NEW MENU (THE 3RD FOR THIS OPTION)?
YES <Enter> (YES)
  MENU SYNONYM: <Enter>
  SYNONYM: <Enter>
  DISPLAY ORDER: 30
Select ITEM: <Enter>
CREATOR: SITE,MANAGER// <Enter>
HELP FRAME: <Enter>
PRIORITY: <Enter>
Select TIMES PROHIBITED: <Enter>
Select TIME PERIOD: <Enter>
RESTRICT DEVICES?: <Enter>
Select PERMITTED DEVICE: <Enter>
```

### 8.1.1 Option Name and Menu Text

By convention, the formal option name is usually entered in all capital letters. According to namespacing conventions, it *must* begin with a namespace that identifies the associated software. It is the NAME (#.01) field of the OPTION (#19) file. The menu text is what is displayed to the user at the select prompt. Like the words of a heading or title, initial capitalization is used for all words except prepositions and articles, all of which are presented in lowercase. To minimize the number of keystrokes needed to select an option, different first letters should be used for the text of each menu item. Menus should be limited to about seven items so they all appear together on one screen. The most frequently used items should be presented first.

## 8.1.2 Synonyms and Display Order

By default, the items on the menu are displayed in alphabetical order by menu text. If any of the items is assigned a synonym, those items are displayed before others lacking synonyms. To facilitate menu jumping, synonyms should ideally be unique; numbers are *not* good choices for synonyms.

To customize the order of the display, each item on the menu can be assigned a Display Order. This field is an option attribute that is presented when using Edit options. When first assigning a number for the display order, you may want to use **10**, **20**, and **30** rather than **1**, **2**, and **3** to permit easier modification in the future if another item needs to be inserted.

## 8.1.3 PRIORITY

You can set an option's PRIORITY field to set a run priority for an option. Experimentation is needed to determine the effect of priority settings.

## 8.1.4 HELP FRAME

You can specify a help frame for an option. The help frame is displayed if, at the "Select..." menu prompt, the user enters ?OPTION (where OPTION is the name of an option).

## 8.1.5 DISPLAY OPTION

If AUTO MENU (#200.06) is in effect for a user, the items on that user's current menu are always displayed. A problem can arise when, if an option displays output and then quits, AUTO MENU's automatic display of menu options scrolls the output off the screen. Since the AUTO MENU display usually scrolls the option's output off the screen faster than the user can read the output, it can effectively render the option unusable. You can avoid this problem by setting the option's DISPLAY OPTION (#11) field in the OPTION (#19) file to **YES**. If set to **YES** and the user has AUTO MENU turned on, Menu Manager prompts "Press RETURN to continue..." after the option completes, but before displaying the list of menu options. The user then has a chance to review the output before returning to their menu.



**REF:** For information on other fields in the OPTION (#19) file, including how to create options of a type other than Menu, see the "Menu Manager: Developer Tools" chapter in the *Kernel 8.0 & Kernel Toolkit 7.3 Developer's Guide*.

## 8.1.6 If the Option Invokes Non-Vista Applications

If you create an option that invokes non-Vista applications (e.g., WordMan or CalcMan) include a call to the Device Handler with the code **D HOME^%ZIS** in the EXIT ACTION field of the OPTION (#19) file so that the required **IO** variables is present when leaving these options. Do the same for any other utility that is known to **KILL IO** variables upon exit.

## 8.1.7 If the Option Should Be Regularly Scheduled

If an option should be regularly scheduled to run through TaskMan, you *must* set its SCHEDULING RECOMMENDED (#209) field in the OPTION (#19) file to **YES**. You are *not* able to use Schedule/Unschedule Options to schedule an option unless this field is set to **YES** for the option.

## 8.1.8 Auditing Option Use

Figure 86: Auditing Menu Options

SYSTEM MANAGER MENU...	[EVE]
System Security...	[XUSPY]
Audit Features ...	[XUAUDIT MENU]
Maintain System Audit Options ...	[XUAUDIT MAINT]
Establish System Audit Parameters	[XUAUDIT]
Audited Options Purge	[XUOPTPURGE]
Audit Display ...	[XUADISP]
Option Audit Display	[XUOPTDISP]

You can establish an audit on options to record every time an option is used. You can do this with the Establish System Audit Parameters option [XUAUDIT], which is in the Audit Features [XUAUDIT MENU] menu tree. Simply enter a time to initiate audit and a time to terminate audit. Then enter the specific options you want to audit (you can also choose all options).

Each time a user uses an audited option, an entry is made in the AUDIT LOG FOR OPTIONS (#19.081) file. You can display these entries using the Option Audit Display option [XUOPTDISP]. You can purge the AUDIT LOG FOR OPTIONS (#19.081) file with the Audited Options Purge option [XUOPTPURGE].

If Kernel Toolkit is installed at your site, you can also use its Alpha/Beta Test Option Usage menu to count the number of times an option is invoked.



**REF:** For more information, see the Kernel Toolkit documentation and the *Kernel Security Tools Manual*.

## 8.2 Display Menus and Options Menu

**Figure 87: Display Menus and Options Menu**

SYSTEMS MANAGER MENU ...	[EVE]
Menu Management ...	[XUMAIN]
List Options by Parents and Use	[XUXREF]
Display Menus and Options	[XQDISPLAY OPTIONS]
Abbreviated Menu Diagrams	[XUSERACC2]
Diagram Menus	[XUSERACC]
Inquire	[XINQUIRE]
Menu Diagrams (with Entry/Exit Actions)	[XUSERACC1]
Print Option File	[XUPRINT]

Kernel provides a number of options to display and diagram menus and options on the Display Menus and Options menu [XQDISPLAY OPTIONS].

### 8.2.1 Diagramming Options

To discover the menu tree roots of other software applications and how options and suboptions are related, you can use the following menu diagramming options:

**Table 11: Menu Diagramming Options to Discover Tree Roots and Relationships between Options/Suboptions**

Menu	Description
Abbreviated Menu Diagrams	Outlines the menu tree.
Diagram Menus	Outlines the menu tree, and shows option attributes (e.g., locks and prohibited times).
Menu Diagrams (with Entry/Exit Actions)	Outlines the menu tree, shows option attributes, and shows entry/exit and header actions as well.

Also, the List Options by Parents and Use option [XUXREF] identifies which options have “no parents,” and thus, are standalone roots. It also indicates whether options are used as primary menus, secondary menus, or as regularly scheduled tasks.



## 8.2.2 Option Descriptions

To learn more about the options included in a software application, you can use the Print Option File option [XUPRINT] (from the Display Menus and Options menu [XQDISPLAY OPTIONS]) to print the option description, type, and other information. This listing can be sorted by namespace. For example, to print all the VA FileMan options, you can sort from DD to DI.

## 8.2.3 Displaying Options

To display an option, use the Inquire option:

**Figure 88: Inquire Option—Sample User Dialogue**

```
Select Display Menus and Options Option: INQUIRE

Which OPTIONS item to display: XT-KERMIT MENU <Enter>      Kermit menu

NAME: XT-KERMIT MENU                MENU TEXT: Kermit menu
TYPE: menu                          CREATOR: POSTMASTER
PACKAGE: KERNEL                      E ACTION PRESENT: YES
X ACTION PRESENT: YES
DESCRIPTION: This is the top level menu for kermit functions. It gives access
to the send, receive, and edit options.
ITEM: XT-KERMIT RECEIVE              SYNONYM: R
ITEM: XT-KERMIT SEND                SYNONYM: S
ITEM: XT-KERMIT EDIT                SYNONYM: E
EXIT ACTION: D CLEAN^XTKERM4        ENTRY ACTION: D INIT^XTKERM4
UPPERCASE MENU TEXT: KERMIT MENU
```

## 8.2.4 Option Access by User Option

**Figure 89: Option Access by User Option**

```
Menu Management ... [XUMAINT]
  Show Users with Selected Primary Menu [XUXREF-2]
  Option Access By User [XUOPTWHO]
```

Use the Show Users with Selected Primary Menu option [XUXREF-2] to show which users have been assigned a particular option as a primary or secondary menu. The Option Access by User option [XUOPTWHO] is another cross-referencing tool.

## 8.3 Managing Menus and Options

### 8.3.1 Managing Primary Menus

When system administrators receive new software applications, existing primary menus should be modified to include the new menus. It is *not* wise to create a new primary menu for every new or unusual circumstance. This would lead to a tremendous variety of menus that would be difficult to sort out and use in the future. Primary menus can be customized with security keys.



**REF:** For more information on security keys, see the “[Security Keys](#)” section.

If there are a few menu options that require special privilege, they can be locked and the security keys assigned to the appropriate users. In this way, a smaller number of primary menus can serve the needs of a larger number of users.

Also, while putting new master menus onto users’ secondary menus can be a quick fix, it is *not* a good idea to do this. Too many options on a user’s secondary menu can be cumbersome for the user. In addition, in the long run, it is easier for system administrators to manage access to a menu reached from a few well-defined primary menus than to manage access to a menu reached from a large number of users’ secondary menus.

### 8.3.2 Assigning Secondary Menus

An easy way to allocate menu options is to assign them to users individually as SECONDARY MENU OPTIONS. Secondary options are unique for each user and are stored in a multiple in the user’s NEW PERSON (#200) file entry. Assignment of SECONDARY MENU OPTIONS should be limited to the essential few, and should *not* involve deep structures with multiple levels. Instead, new primary menus should be built or existing ones modified. During menu jumping, all branches of both the primary and secondary menu trees are searched each time a jump request is received by the menu system. Greater efficiency and user convenience results if the depth of the secondary menu trees is confined.

### 8.3.3 ALWAYS SHOW SECONDARIES Field

You can set the ALWAYS SHOW SECONDARIES field in a user’s NEW PERSON (#200) file entry. If set to **YES** for a user, that user always has their secondary and common options listed when options on their primary menu are listed (which occurs either by the user entering two question marks [??] at the “Select...” menu prompt, or when AUTO MENU is turned on).

### 8.3.4 Redefining the Common Menu

All users automatically have access to the options on the Common menu [XUCOMMAND]) by virtue of the menu system’s design. As described earlier, entering two question marks (??) at any select prompt displays the Common menu. The only way to deny access to a particular user is to lock the Common menu option with a reverse key and then allocate the security key to the same user.



**REF:** For more information on security keys, see the “[Security Keys](#)” section.

The items on the Common menu can be left as they are distributed by Kernel, or modified locally as desired. For example, an item can be added to display online help about local computer access policies. This is accomplished by using Edit options to edit the XUCOMMAND menu option. The Item multiple lists the existing menu choices; other locally namespaced options can be added.

If options are locally added to the standard XUCOMMAND menu set, new installations of Kernel do *not* overwrite the changes. During installation, items on the local XUCOMMAND menu are compared with

the exported items. Any previously exported items that were removed by the site are *not* added back. Brand new items, however, are added and any matching items are updated. Other items that the site may have added are left in place.

### 8.3.5 Altering Exported Menus

Generally speaking, exported menu structures should stay intact. If local modifications to exported menus are made, great care *must* be taken to preserve any logic that may exist in the exported structure. For example, the entry action of one option can set up key variables that are then assumed to exist when another option, one further down on the menu tree, is invoked. Although each one of a software's options should be able to be invoked independently once the steps described in the *Kernel 8.0 & Kernel Toolkit 7.3 Technical Manual* for creating and **KILL**ing software-wide variables have been taken (according to the Programming Standards and Conventions [SAC]), this is *not* always the case and *cannot* be assumed.

If an option cannot be invoked independently, the developer can set that option's INDEPENDENTLY INVOCABLE field to **NO**, as an alert that some other option or action *must* be done before the option can be called.

To give users the options associated with new software applications, system administrators should try to allocate the menus as whole entities. If dissection appears necessary, the "Internal Relations" section of the software documentation should be consulted before rearranging any of the items.

### 8.3.6 Delete Unreferenced Options Option

Figure 90: Delete Unreferenced Options Option

```
Programmer Options ... <locked: XUPROG> [XUPROG]
Delete Unreferenced Options [XQ UNREF'D OPTIONS]
```

All options for interactive use (*not* designed exclusively as queueable tasks) should normally be tied to a menu that is used as a primary menu or at least as a secondary menu. Standalone options that have no parents and are *not* menu-type options should be reviewed. They may be obsolete software options or local test options and could be candidates for deletion. Use the Delete Unreferenced Options option [XQ UNREF'D OPTIONS] to delete unreferenced options. It can be used to cycle through the entire OPTION (#19) file and delete non-menu options that are *not* referenced by other options. Deletion should obviously be done with care. Use of this option is limited to those who hold the XUPROG security key.

### 8.3.7 Fix Option File Pointers Option

Figure 91: Fix Option File Pointers Option

```
Menu Management ... [XUMAINT]
Fix Option File Pointers [XQOPTFIX]
```

After performing maintenance work on the OPTION (#19) file (e.g., deleting obsolete options that may have been items on a menu), you can use the Fix Option File Pointers option [XQOPTFIX] (see [Figure 92](#)) to remove any dangling pointers that may have been left in the Item multiple. Running this option is an alternative to having VA FileMan update the pointers each time an individual option is deleted.

**Figure 92: Fix Option File Pointers Option—Sample User Dialogue**

```
Select OPTION NAME: ZZTEST3 <Enter>          Test Option
NAME: ZZTEST3// @
    SURE YOU WANT TO DELETE THE ENTIRE `ZZTEST3` OPTION? Y <Enter> (YES)
SINCE THE DELETED ENTRY MAY HAVE BEEN `POINTED TO`
BY ENTRIES IN THE `USER` FILE, ETC.,
DO YOU WANT THOSE POINTERS UPDATED (WHICH COULD TAKE QUITE A WHILE)? NO// <Enter>
```

### 8.3.8 Testing a User's Menus

**Figure 93: Switch Identities Option**

```
User Management... [XUSER]
Switch Identities [XUTESTUSER]
```

You can test a user's menus using the Switch Identities option [XUTESTUSER]. It lets you test the user's menus and security keys. It does *not* allow you to execute any bottom-level menu options, however; it only lets you navigate menu trees. You are reminded at each prompt whose menu it is that you are testing. To exit this mode and return to your own menus, simply enter an asterisk (\*).

### 8.3.9 Managing Out-Of-Order Option Sets

**Figure 94: Out-Of-Order Set Management Menu Options**

```
Menu Management ... [XUMAINT]
Out-Of-Order Set Management... [XQOOMAIN]
  Create a Set of Options To Mark Out-Of-Order [XQOOMAKE]
  List Defined Option Sets [XQOOSHOW]
  Mark Option Set Out-Of-Order [XQOOFF]
  Options in the Option File that are Out-of-Order [XQOOSHOFIL]
  Protocols Marked Out-of-Order in Protocol File [XQOOSHOPRO]
  Recover Deleted Option Set [XQOOREDO]
  Remove Out-Of-Order Messages from a Set of Options [XQOON]
  Toggle options/protocols on and off [XQOOTOG]
```

Menu Manager, starting with Kernel 8.0, provides a mechanism for defining sets of options and protocols, and a way to disable and enable access for these pre-defined option and protocol sets via options on the Out-Of-Order Set Management menu [XQOOMAIN]. This can be handy when you need to repeatedly disable and enable sets of options and protocols.

Use the Create a Set of Options to Mark Out-Of-Order option [XQOOMAKE] to define a set of options. You are prompted first to select options, and then to select protocols.

For both options and protocols, you can use the following to:

- Add a group of options to the set—Use the wildcard asterisk (\*) with or without a namespace.
- Add a range of options to a set—Use **NAM1-NAM2** to add a range of options from NAM1 to NAM2 to the set, where “NAM” represents a namespace.
- Subtract/Remove a group of options from a set—Use the minus sign (i.e., hyphen, -) followed by a namespace.

Use the Mark Option Set Out-Of-Order option [XQOOFF] to disable access to a set of options. You are asked to enter the message used to place all options in the set out-of-order. The option then places the message in each option's OUT OF ORDER MESSAGE (#2) field.

Use the Remove Out-Of-Order Messages from a Set of Options option [XQOON] to enable access to an option set.

To toggle the status of an individual option only, use the Toggle Options/Protocols On and Off option [XQOOTOG].

Out-of-Order Option sets are stored in the **^XTMP** global, with a purge date set for **seven** days in the future. If you place a set of options out of order, but the option set is purged from **^XTMP** before you enable access to it, you can rebuild the out-of-order option set using the Recover Deleted Option Set option [XQOORED]. It asks you to specify the exact text of the message used to place the set of options out of order; it then recreates an out-of-order option set containing all options currently placed out of order with the specified message



**NOTE:** Make sure the message you specify is unique to the set of options you are re-enabling.

You can then enable access to the rebuilt option set with the Remove Out-Of-Order Messages from a Set of Options option [XQOON].

To see what sets of options have been grouped in sets on the system, use the List the Defined Options Sets option [XQOOSHOW]. To show all options and protocols currently marked out of order, use the Options in the Option File that are Out-of-Order option [XQOOSHOFIL] and the Protocols Marked Out-of-Order in Protocol File option [XQOOSHOPRO].

## 8.4 Restricting Option Usage

**Figure 95: Restrict Availability of Options Option**

Menu Management ...	[XUMAIN]
Restrict Availability of Options	[XQRESTRICT]

Options can be restricted in terms of when users can select them and when devices can be used to invoke them. Many of the option restrictions are included in the Restrict Availability of Options option [XQRESTRICT].

### 8.4.1 Setting Options Out of Order

To completely restrict access, you can mark an option to be out-of-order. Do this by entering text in an option's OUT OF ORDER MESSAGE (#2) field in the OPTION (#19) file. If a user attempts to invoke the option, the Out of Order Message is displayed.

### 8.4.2 Locks

Both the normal lock, and also the Reverse/Negative lock can be associated with options (as described in the "[Security Keys](#)" section). Also, M code can be entered in the HEADER, ENTRY ACTION, or EXIT ACTION fields to restrict the use of an option given certain conditions.

### 8.4.3 Prohibited Times

You can prohibit the use of an option at certain times during the day by assigning a set of prohibited time periods at the “Select TIMES PROHIBITED” prompt. Options scheduled to run through TaskMan will also be prohibited from running during these prohibited times.

### 8.4.4 Permitted Devices

If the RESTRICT DEVICES flag is set to **YES**, the option can only be invoked on one of the devices listed in the PERMITTED DEVICES Multiple field. Thus, the running of an option can be restricted. This flag does *not* affect the choice of devices used for the output from options. It instead controls the processing involved in the use of the option itself.

### 8.4.5 QUEUING REQUIRED Flag

Using the option Edit options, you can allow users to invoke an option, but force any output to be queued outside of certain times of day, by editing the option’s QUEUING REQUIRED Multiple field. In this multiple’s TIME PERIOD (#.01) and DAY(S) FOR TIME PERIOD (#.02) fields enter the time periods and days in which you do *not* want the option’s output to be produced. During these time periods, the output of the options can only be queued. When a user requests a time for queuing, the menu system determines the next permissible day and time for output. Thus, users can invoke the option and use it to define the parameters for the subsequent processing, but the actual work is done during a later time period, presumably when the system is less busy.

## 8.5 Menu Manager Options that Should Be Scheduled

This section describes the two Menu Manager options that should be regularly scheduled.

Kernel exports a number of other options that should be scheduled to run at regular intervals. Most of these are located on the PARENT OF QUEUABLE OPTIONS menu.



**REF:** For a complete list, along with suggested scheduling frequencies, see the *Kernel Installation Guide*.

### 8.5.1 Clean Old Job Nodes in XUTL Option

The Clean old Job Nodes in the XUTL option [XQ XUTL \$J NODES] is Kernel’s purge option for Kernel globals. This option purges the following globals:

- ^XUTL
- ^UTILITY
- ^TMP
- ^XTMP
- ^XUSEC

**Figure 96: Clean old Job Nodes in XUTL Option**

```
Operations Management ... [XUSITEMGR]
Clean old Job Nodes in XUTL [XQ XUTL $J NODES]
```

User stacks for each user’s job are stored in the ^XUTL global.



**REF:** For more information, see the “[^XUTL Global: Structure and Function](#)” section.

This is also called the compiled menu system. If a job ends abnormally (e.g., upon error, UCI switching, or developer exits that bypass ^XUS), the entries remain in the global (this explains why developers are advised to halt out of programmer mode with **D** ^XUSCLEAN rather than simply halting.)

The purge routine sets a purge date of seven days in the past. Any user stack in ^XUTL older than seven days is purged. Any entries with a matching \$J at the top level of ^UTILITY and ^TMP are also **KILLED**.

Next, after cleaning out the user stacks in ^XUTL, the purge routine checks ^UTILITY and ^TMP. Any entry at subscript (\$J) or (namespace, \$J) that does *not* have a matching entry in the user stacks in ^XUTL is **KILLED**.

Next, the purge routine checks ^XTMP. Any entry in ^XTMP at subscript (namespace) lacking a header node at (namespace,0), or with a purge date in the header node less than the purge date determined by the purge routine is **KILLED**.

Finally, the purge routine goes through the signon nodes stored at ^XUSEC(0,“CUR”,DUZ,DATE). Any nodes older than the purge date are **KILLED**.

The XQ XUTL \$J NODES option should be queued to run on a regular basis. If separate copies of ^XUTL are maintained on different CPUs, separate entries should be made in the OPTION SCHEDULING file for each CPU so that a separate job purges each CPU’s XUTL global. Because this option deletes any user stacks that are time-stamped with a date earlier than the purge date determined by this option (seven days) you need to take care how frequently you schedule it (in the unusual event of a seven-day long job, this option should obviously *not* be run).

## 8.5.2 Rebuilding Primary Menu Trees

**Figure 97: Building Primary Menu Trees Options**

PARENT OF QUEUABLE OPTIONS	[ ZTMQUEUABLE OPTIONS ]
Non-interactive Build Primary Menu Trees	[ XQBUILDTREEQUE ]
Menu Management ...	[ XUMAINT ]
Build Primary Menu Trees	[ XQBUILDTREE ]

The menu system uses local menu trees to process requests. When changes are made to the menu structure, the local menu trees are rebuilt (a process also known as microsurgery). If a user attempts an “Up-arrow Jump” when the local trees need to be rebuilt or are being rebuilt, a message is issued about quick access being temporarily disabled; the user is *not* able to jump to reach the option. Microsurgery is triggered in the following situations:

- The option Edit options is used.
- An Out-of-Order option set is enabled or disabled.
- A sufficiently large number of changes have been made to a menu tree.

It is also recommended to rebuild all primary menu trees every other day during non-peak hours, using the XQBUILDTREEQUE option. If separate copies of ^XUTL are maintained on different CPUs, separate entries should be made in the OPTION SCHEDULING (#19.2) file for each CPU so that a separate job rebuilds each CPU’s ^XUTL global.

Primary menu trees can also be built/repared immediately using the Build Primary Menu Trees option. In particular, if menu jumping has stopped working and microsurgery is *not* fixing the menus, use the Build Primary Menu Trees option to force a menu rebuild to fix the problem.

## 8.6 Error Messages during Menu Jumping

There are some conditions under which a menu jump may *not* be completed. In these cases the user sees one of the following error messages:

**Figure 98: Menu Jump Error Message (1 of 6)**

```
I NEED TO REBUILD MENUS .... QUICK ACCESS IS TEMPORARILY DISABLED Please proceed
to {target option's menu text}
```

This means that the time stamps on the OPTION (#19) file and the **^XUTL** global indicate that the OPTION (#19) file has been modified since the menus were compiled in **^XUTL** and the global is therefore locked until **XQ8** can recompile the modified menus. This error message can be generated by both user-generated jumps and phantom jumps.

**Figure 99: Menu Jump Error Message (2 of 6)**

```
*** WARNING ***
Illegal jump requested to option '{option's menu text}' Jump pathway locked at
option '{locked option's menu text}'
```

This indicates that a locked option for which the user does *not* possess the security key has been encountered in the tree between the option where the jump was requested and the target option to which the jump was requested. This error message can be generated by both user-generated jumps and phantom jumps.

**Figure 100: Menu Jump Error Message (3 of 6)**

```
*** WARNING ***
Illegal jump was requested to option '{option menu text}' Jump path out of order
from '{option's menu text}' with message '{out of order message}'
```

This means that an option on the tree between the option where the phantom jump was requested and the target option has been marked as out of order (OUT OF ORDER MESSAGE [#2] Field of the OPTION [#19] file). This error message can be generated by both user-generated jumps and phantom jumps.

**Figure 101: Menu Jump Error Message (4 of 6)**

```
*** WARNING ***
Illegal jump was requested to option '{option menu text}' Variable XQUIT
encountered at option '{option name}'
```

This means that the jump logic has encountered the variable **XQUIT** (detected with a **\$DATA** statement). This variable is usually set by an Entry Action (Field #20 of the OPTION [#19] file) and causes the menu system to refuse to run or jump past that option. This error message can be generated by both user-generated jumps and phantom jumps.



**Figure 102: Menu Jump Error Message (5 of 6)**

```
*** WARNING ***
Background jump requested to option '{value in XQMM("J")}' but this option does
not exist on your system.
```

A VA FileMan lookup was attempted for the option set in the variable **XQMM("J")** but no such option was found in the **OPTION (#19)** file. This error message can only be generated from a phantom jump.

**Figure 103: Menu Jump Error Message (6 of 6)**

```
*** WARNING ***
Background jump requested to option '{option's menu text}' but you do not have
access to this option. See your computer representative.
```

This means that the target option requested by **XQMM("J")** is *not* in the tree of options to which this user has access (that is, the target option was neither in the user's primary menu tree nor specifically listed as a secondary menu for that user). This error message can only be generated from a phantom jump.



**REF:** For more information on phantom jumps, see the “Menu Manger: Developer Tools” chapter in the *Kernel 8.0 & Kernel Toolkit 7.3 Developer's Guide*.

## 8.7 ^XUTL Global: Structure and Function

The **^XUTL** global is an account-specific global. It should exist in each production account on your system. This global is created primarily from information in the **OPTION** file [ **^DIC(19)** ] and is therefore sometimes referred to as “the compiled menu system.”

**^XUTL** is divided into three main sections:

- **User Stacks**
  - ^XUTL("XQ",\$J)**
  - ^XUTL("XQT",\$J)** (MENU templates only)
- **Display Nodes**
  - ^XUTL("XQO",ien)**
- **Jump Nodes**
  - ^XUTL("XQO","P" \_ien)**

### 8.7.1 User Stacks

User stacks are stored in nodes in **^XUTL("XQ",\$J)** and **^XUTL("XQT",\$J)**.

The example illustrated in [Figure 104](#) shows a typical user stack. In this case the **\$J** is **541065826**.

The “**XQ**” nodes can be divided into meaningful sets according to what is contained in the third subscript. The numeric third subscripts begin with the **zero** node, which is set to the date and time in VA FileMan format by the program **^XUS1** when the user logs on or **^%XUCI** when the user is changing UCIs.

The other numeric, third subscripts (in this case the numbers **1** to **3**) reflect the user's progression through the menu system. Each time a new option is invoked, a new node is created which contains the option number, concatenated with a **P**, the number of the option whose compiled menu tree contains the current

option, a caret (^), and the **zero**-node of the OPTION (#19) file for that option. A different format is used for options in a user's secondary menu tree.

A pointer in the node **^XUTL("XQ", \$J, "T")** indicates which option in this list of numbered nodes the menu driver is currently using. This pointer is set and reset by the menu driver as the user moves up and down the menu tree. In the example, XUPROGMODE is the option that the menu driver is currently using.

Other **"XQ"** nodes of the global that have a non-numeric third subscript are used to store various pieces of Kernel information that are set up at signon. **^XUTL("XQ", \$J, "XQM")** points to the user's primary menu.

In the following example ([Figure 104](#)), the user's primary menu is OPTION (#19) file entry #29.

**Figure 104: User Stack Example**

```

^XUTL("XQ",541065826,0) = 2920113.081624
^XUTL("XQ",541065826,1) = 29P29^EVE^Systems Manager
                          Menu^^M^.5^^192^^^n^1^^
^XUTL("XQ",541065826,2) = 31P29^XUPROG^Programmer Options^^M^^
                          XUPROG^^^n^^
^XUTL("XQ",541065826,3) = 49P29^XUPROGMODE^Programmer mode^^R
                          ^^XUPROGMODE^^^n^^
^XUTL("XQ",541065826,"DUZ") = 63
^XUTL("XQ",541065826,"DUZ(0)") = LlPp
^XUTL("XQ",541065826,"DUZ(2)") = 16000
^XUTL("XQ",541065826,"IO") = _TNA5103:
^XUTL("XQ",541065826,"IOBS") = $(8)
^XUTL("XQ",541065826,"IOF") = #,$C(27,91,50,74,27,91,72)
^XUTL("XQ",541065826,"ION") = LAT DEVICE
^XUTL("XQ",541065826,"IOS") = 158
^XUTL("XQ",541065826,"IOSL") = 24
^XUTL("XQ",541065826,"IOST") = C-VT100HIGH
^XUTL("XQ",541065826,"IOST(0)") = 149
^XUTL("XQ",541065826,"IOT") = VTRM
^XUTL("XQ",541065826,"IOXY") = W $C(27,91)_((DY+1))_$C(59)_((DX+1))_$C(72)
^XUTL("XQ",541065826,"T") = 3
^XUTL("XQ",541065826,"XQM") = 29

```

### 8.7.2 XQT Nodes (MENU Templates)

The **"XQT"** nodes are used to create a stack of options similar to the **"XQ"** stack when a MENU template is invoked. These nodes are translated from the **^VA(200,DUZ,19.8)** Multiple when a user precedes an option selection with a left square bracket character, **"["**, much like a PRINT template is invoked in VA FileMan. For example, if the user has defined a MENU template named **"DOIT"** using the Menu Template options of the User's Tool Box, typing **"[DOIT"** loads that sequence of options into the **"XQT"** nodes and begins executing them. When a MENU template is requested by the user, the option tree of that template is loaded into the **"XQT"** nodes and remains loaded as long as the user is logged on. Further requests for **"[DOIT"** uses that same stack.

### 8.7.3 Display Nodes

Display nodes are stored in **^XUTL("XQO", internal number)**.

The first example below ([Figure 105](#)) shows the display nodes for EVE, the System Manager's Menu. The internal number of EVE in this particular OPTION (#19) file is 29. In the first part of the example the option names and menu texts, along with a limited number of fields for that option compiled from the

OPTION (#19) file, are concatenated together. It is from this part that **XQ2** (the menu display program) gets the information it needs.

In the second part, all the menu texts and synonyms are listed in order in uppercase. It is here that **XQ** tries to match what the user entered at the terminal with the correct option. The third part of the example, the **0th** node of the options, is listed by number and provides the remaining information that the Menu System may need to make the option work. To understand what the various ^ pieces mean, look at a VA FileMan global format data dictionary listing of the OPTION (#19) file.

Illustrated in the second example (Figure 106) is the display node for the SECONDARY MENU OPTIONS of a user whose **DUZ** is equal to **66**. Here, the user has only a single secondary menu called “Secondary Menu” (with an internal number of **580** in the OPTION [#19] file). The various parts of this example are identical to those of the Display Nodes for the EVE menu example above.



**NOTE:** The second subscript, instead of pointing to a menu in the OPTION (#19) file, is a “U” concatenated with the user’s **DUZ** which points to the NEW PERSON (#200) file entry. This is because secondary menu options are stored in the SECONDARY MENU OPTIONS field in the NEW PERSON (#200) file entry for each user.

**Figure 105: Display Nodes for EVE Example**

```

^XUTL("XQO",29,0) = 2^55048,38923
^XUTL("XQO",29,0,1) = ^XUCORE^Core Applications ...^NOT
                        AVAILABLE^^^^^^XUTIO^Device Handler
                        ...^^^n^^FM^DIUSER^VA FileMan ...^^^n^^XMMGR^
                        Manage Mailman ...^^^^^^XUMAIN^Menu Management
                        ...^^^n^^XUPROG^Programmer Options ...^^XUPROG^^^
                        ...^
^XUTL("XQO",29,0,2) = ^XUSITEMGR^Operations Management ...^^^^^^XU-SPL-MGR
                        ^Spool Management ...^^^^^^XUSPY^System Security
                        ...^^^^^^ZTMMGR^Task Manager ...^^^n^^XUSER^User
                        Edit ...^^^^^^
^XUTL("XQO",29,"CORE APPLICATIONS") = 40^1
^XUTL("XQO",29,"DEVICE HANDLER") = 32^1
^XUTL("XQO",29,"FM") = 19^0
^XUTL("XQO",29,"MANAGE MAILMAN") = 30^1
^XUTL("XQO",29,"MENU MANAGEMENT") = 9^1
^XUTL("XQO",29,"OPERATIONS MANAGEMENT") = 174^1
^XUTL("XQO",29,"PROGRAMMER OPTIONS") = 31^1
^XUTL("XQO",29,"SPOOL MANAGEMENT") = 415^1
^XUTL("XQO",29,"SYSTEM SECURITY") = 226^1
^XUTL("XQO",29,"TASK MANAGER") = 83^1
^XUTL("XQO",29,"USER EDIT") = 39^1
^XUTL("XQO",29,"VA FILEMAN") = 19^1
^XUTL("XQO",29,"",9) = ^XUMAIN^Menu Management^^M^^105^^^n^^n^^^
^XUTL("XQO",29,"",19) = FM^DIUSER^VA FileMan^^M^^^n^^n^^1^^
^XUTL("XQO",29,"",30) = ^XMMGR^Manage Mailman^^M^^299^^^54^^1^1^^
^XUTL("XQO",29,"",31) = ^XUPROG^Programmer Options^^M^^XUPROG^^^n^^
^XUTL("XQO",29,"",32) = ^XUTIO^Device Handler^^M^^413^^^n^^20^^
^XUTL("XQO",29,"",39) = ^XUSER^User Edit^^M^^153^^^n^^
^XUTL("XQO",29,"",40) = ^XUCORE^Core Applications^1^M^^^n^^
^XUTL("XQO",29,"",83) = ^ZTMMGR^Task Manager^^M^^^n^^50^^1^^
^XUTL("XQO",29,"",174) = ^XUSITEMGR^Operations Management^^M^^^y^^n^^
^XUTL("XQO",29,"",226) = ^XUSPY^System Security^^M^^^119^^n^^
^XUTL("XQO",29,"",415) = ^XU-SPL-MGR^Spool Management^^M^^419^^^20^^

```

**Figure 106: Display Nodes for a Secondary Menu**

```
^XUTL("XQO","U66",0) = 1^54927,30758
^XUTL("XQO","U66",0,1) = ^ZZTSTSM^Secondary Menu ...^^^n^^
^XUTL("XQO","U66","SECONDARY MENU") = 580^1
^XUTL("XQO","U66","^",580) = ^ZZTSTSM^Secondary Menu^^M^^^n^^^1^1^1
```

## 8.7.4 Jump Nodes

Jump nodes are stored in `^XUTL("XQO","P" internal number)`, where there is one "P..." entry in `^XUTL("XQO")` for each primary menu that exists. The jump nodes, for each primary menu, store the pathways to all options that can be jumped to.

The jump nodes are created in the **XQ8\*** series of programs. They are very similar to display nodes, except that:

- They have a **P** concatenated on the front of the primary option's number in the second subscript.
- These nodes describe the entire primary menu tree rather than just the single level tree.

Examples of the jump nodes for a single primary menu are shown in [Figure 107](#) and [Figure 108](#). Since these nodes can be very extensive in number, some nodes have been removed from the examples to save space.

In the first example ([Figure 107](#)) are the "lookup" nodes, where the jump software tries to match a menu text or synonym with what the user has entered at the terminal. Each node is set to its internal number in the OPTION (#19) file and, in the second ^ piece, a:

- **0**—If it is a synonym.
- **1**—If it is menu text.

In the second example ([Figure 108](#)), the "menu pathway" entries below the "**P580**" node show all of the options that can be jumped to from the primary menu whose internal entry number (IEN) is **580**. Each entry contains lists of the series of options that *must* be navigated through in a jump from the primary menu. In the case of the option DILIST (# 17), the list of options that have to be processed is **520,519,518,411,17**. If, as in the case of ZZTEST4 (# 318), there is more than one possible pathway, then each is listed along with various other necessary pieces of information (e.g., locks, time restraint, etc.).

**Figure 107: Jump Nodes Example—Lookup Nodes**

```
^XUTL("XQO","P580",0) = 55165,28536
^XUTL("XQO","P580","19^") = 394^0
^XUTL("XQO","P580","2ND SECOND LEVEL MENU TEST^") = 575^1
^XUTL("XQO","P580","3^") = 518^0
^XUTL("XQO","P580","ACTN^") = 391^0
^XUTL("XQO","P580","ALL^") = 420^0
```

**Figure 108: Jump Nodes Example—Menu Pathways**

```

^XUTL("XQO","P580","LIST FILE ATTRIBUTES^") = 17^1
^XUTL("XQO","P580","TEST 4^") = 318^1
...
^XUTL("XQO","P580","TOOL^") = 581^0
^XUTL("XQO","P580","X-TYPE OPTION TEST^") = 576^1
^XUTL("XQO","P580","X^") = 576^0
^XUTL("XQO","P580","ZDAVE^") = 411^1
^XUTL("XQO","P580","^",5) = ^XUEDITOPT^Edit
                        options^^E^581,5,^^106^^^^^20^n^^^^
^XUTL("XQO","P580","^",17) = ^DILIST^List File Attributes^^A^
                        520,519,518,411,17,^^^^^n,^y^^n^1^^^
...
^XUTL("XQO","P580","^",318) = ^ZZTEST4^Test
                        4^^O^520,575,397,318,^^^^^n,^^^^^^
^XUTL("XQO","P580","^",318,0) = 2
^XUTL("XQO","P580","^",318,0,1) = 520,575,578,397,318,^^^n,^
^XUTL("XQO","P580","^",318,0,2) = 520,575,578,318,^^^n,^
...
^XUTL("XQO","P580","^",579) = ^ZZLEVEL3B^Phantom
                        Mother^^M^520,575,579,^^^^^n,^^^^1^1^^1
^XUTL("XQO","P580","^",580) = ^ZZTSTPM^Primary Menu^^M^^^^^^n^^^^1^1^^1
^XUTL("XQO","P580","^",581) = ^ZZLUKTOOLS^Luke's
                        Tools^^M^581,^^^^^^^^^^1^1^^1

```

## 8.8 Menu Startup Parameter

The XQ MENUMANAGER PROMPT parameter was provided with Kernel patch XU\*8.0\*614. This parameter is checked during menu startup. It allows sites to change the default <TEST ACCOUNT> prompt to another value (e.g., <LEGACY SYSTEM>) in menu prompts of *non*-production VistA systems. The text defined by this parameter is inserted in the Menu Manager prompts. If no text is defined, the hard-coded default is “<TEST ACCOUNT>”. Alternatives could be:

- “<LEGACY SYSTEM>”
- “<CONTINGENCY>”
- “<READ ONLY>”
- Any other value from 3 to 20 characters, depending upon the purpose of the non-production VistA system.

To change the value on a non-production system, use the General Parameter Tools option [XPAR MENU TOOLS] and select “EP Edit Parameter Values.” You have to log off and log back into VistA to see the changed menu prompt.



**NOTE:** The prompt can be set in advance on a production system before it is mirrored to a non-production system, and the prompt only appears on the *non*-production system.

## 8.9 Menu Manager Variables (Troubleshooting)

There is a group of Menu Manager variables that is always defined. It may be useful for system administrators to know what these variables signify when investigating errors. If an error is reported in VA FileMan's **DIP** routine, for example, knowing the value of **XQY** at the time of the error indicates which option was invoking the **DIP** routine. The option can then be reviewed to discover the name of the routine that was calling **DIP**.

**Table 12: Menu Manger Variables (Always Defined)**

Variable	Description
<b>XQABTST</b>	Flag that signals whether alpha-beta testing is in effect.
<b>XQDIC</b>	Internal entry number (IEN) of the option's parent (which <i>must</i> be a menu) in the OPTION (#19) file, if an option is executing. If the user is in a menu, <b>XQDIC</b> is set to the IEN of the current menu's parent (unless they are in their primary menu, in which case <b>XQDIC</b> is set to the IEN of the primary menu).  The value of <b>XQDIC</b> also corresponds to the second subscript in the display nodes portion of the <b>^XUTL</b> global, <b>^XUTL("XQO",)</b> for the menu in question.
<b>XQPSM</b>	Like <b>XQDIC</b> , a lookup value into the second subscript of <b>^XUTL</b> , the compiled menu global. <b>XQPSM</b> points to the tree of the target option in the jump. It resulted from the ability to jump to any option, <i>not</i> just ones on the primary menu tree. It can help identify jumps from a primary, secondary, or Common option.
<b>XQT</b>	Current option's type (e.g., <b>M</b> for menu, <b>A</b> for action).
<b>XQUR</b>	User's response to the menu prompt (replaces <b>A</b> ).
<b>XQUSER</b>	User's name in the form SEVEN A. XUUSER.
<b>XQY</b>	Internal entry number (IEN) of the current option or menu (replaces <b>Y</b> ).
<b>XQY0</b>	First node (subscript of <b>zero</b> ) of the current option [replaces <b>Y(0)</b> ].
<b>XQXFLG</b>	Contains several flags, including whether capacity management testing is active.

## 8.10 Security Keys

## 8.11 User Interface

Security keys are primarily used to allow access to specially protected options. If a software application exports a menu that has one or two options that require a secured level of access, they can use security keys to lock those special options. When an option is locked, you can only use the locked option if you hold the security key matching the key with which the option was locked.

Entering two question marks (??) at the menu system's select prompt displays the current options. If any of the options are locked, that fact is listed also, along with the names of any associated security keys. In the following example, the option Programmer Options is locked with a security key named XUPROG:

**Figure 109: Sample Locked Menu Options Showing Required Security Key—Entering Two Question Marks (??)**

```
Select Systems Manager Menu Option: ??
  Device Handler ... [XUTIO]
  Menu Management ... [XUMAINT]
  Programmer Options ... [XUPROG]
  **> Locked with XUPROG
```

You can list which security keys you currently hold by using the Display User Characteristics option on the Common menu. It displays a list of all security keys you hold, similar to the following:

**Figure 110: Display User Characteristics Option—Sample Output**

```
KEYS HELD
-----
XUPROG      XUMGR      XUPROGMODE  XUAUTHOR    ZTMQ
```

The security keys you need to carry out computing activities should be assigned by system administrators when your computer account is first added to the system. Other keys can be allocated at a later time by system administrators or designee (e.g., an application coordinator) with the use of the Secure Menu Delegation menu utilities.

## 8.12 System Management

### 8.12.1 Identifying Locked Options

System administrators can list which security keys lock what options by using Menu Management's Diagram Menus option. The following example (Figure 111) shows that the Programmer Options menu is locked with the XUPROG security key. It also shows that one of its options, Programmer mode, is locked with the XUPROGMODE security key:

Figure 111: Diagram Menus Option—Sample User Dialogue

```
Select Menu Management Option: DIAGRAM MENUS
Select USER (U.xxxxx) or OPTION (O.xxxxx) name: O.XUPROG
Programmer Options (XUPROG)
**LOCKED: XUPROG**
-----PG Programmer mode
[XUPROGMODE]
**LOCKED: XUPROGMODE**
```

Security keys are stored in the SECURITY KEY (#19.1) file. Security keys given to users are stored in the users' NEW PERSON (#200) file entries, in the KEYS Multiple field.

Options are locked by a given security key when the name of that key is entered into the LOCK (#3) field of the OPTION (#19) file. If an option is locked, users need to be given the security key in order to invoke the option.

### 8.12.2 Key Management

Keys are defined and allocated to users with options on the Key Management menu.

Figure 112: Key Management Menu Options

```
SYSTEMS MANAGER MENU ... [EVE]
Menu Management ... [XUMAIN]
Key Management ... [XUKEYMGMT]
Allocation of Security Keys [XUKEYALL]
De-allocation of Security Keys [XUKEYDEALL]
Enter/Edit of Security Keys [XUKEYEDIT]
All keys a user needs [XQLOCK1]
Change user's allocated keys to delegated keys [XQKEYALTODEL]
Keys for a given menu tree [XQLOCK2]
Delegate keys [XQKEYDEL]
List users holding a certain key [XQSHOKEY]
Remove delegated keys [XQKEYRDEL]
Show the keys of a particular user [XQLISTKEY]
```

### 8.12.3 Allocating and De-allocating Security Keys

The main option to assign security keys to a user or users is the Allocation of Security Keys option [XUKEYALL]. Allocating a security key to a user lets them invoke options that are locked with the key. For options with reverse locks, allocating the security key locks the user out from the option. In either case, allocating the key to a user does *not* allow the user to give the key to anyone else.

To remove a security key from a user, use the De-allocation of Security Keys option [XUKEYDEALL].

Unless you have been delegated a security key, the only way you can allocate or de-allocate keys is if you hold the XUMGR security key or have a FILE MANAGER ACCESS CODE (#3) field of @.





**REF:** For more information on delegating security keys, see the “[Delegating Security Keys](#)” section.

All of the security keys that a new user needs to use their assigned options can be determined by using the All Keys a User Needs option on the Key Management menu [XQLOCK1]. This produces a list of the primary and secondary menus for that user, and compiles a list of the keys for that menu tree. This list can then be assigned or delegated. It can also be edited before the keys are given to the user. Similarly, the Keys For a Given Menu Tree option [XQLOCK2] examines a menu and lists all of the security keys associated with all sibling options.

## 8.12.4 Delegating Security Keys

Delegating keys allows you to give a user the ability to assign specific security keys to other users, as opposed to the XUMGR security key and @ VA FileMan Access code (i.e., FILE MANAGER ACCESS CODE [#3] field), which allow all keys to be assigned.

One way to delegate security keys is to use the Change user’s allocated keys to delegated keys option [XQKEYALTODEL]. This option delegates to a user all of the security keys that are currently allocated to that user. Any entries in their KEYS Multiple field are entered in the DELEGATED KEYS Multiple field as well. They can now use the Allocation of Security Keys option [XUKEYALL] to give the security keys to others.

Alternatively, system administrators can use the Delegate keys option [XQKEYDEL] to populate the DELEGATED KEYS Multiple field one-by-one.

A user who has been delegated a security key can allocate that key to others in two ways:

- Through the Allocation of Security Keys option [XUKEYALL], if it is on their menu.
- By delegating an option locked by the security key in question; the key is allocated along with the option.

The key recipients (excepting holders of the XUMGR security key or a FILE MANAGER ACCESS CODE [#3] field of @) *cannot* assign the security key to others, however, even if they have access to the Allocation option, because the key does *not* exist in their DELEGATED KEYS Multiple field.

One example of key delegation is a system administrator designee, delegated the Provider key, who allocates that key to incoming medical residents.

For security reasons, users who have a key in their DELEGATED KEYS Multiple field *cannot* allocate that key to themselves. That key *must* be awarded by another user who has been delegated the key or by a system administrator who holds the XUMGR system security key.

## 8.12.5 Creating and Editing Security Keys

Keys can be created using the Enter/Edit of Security Keys option [XUKEYEDIT] on the Key Management menu. If a security key has already been defined, its name *cannot* be edited. It also *cannot* be deleted, as discussed below. Other key attributes stored in the SECURITY KEY (#19.1) file can be used for special purposes. Attributes of the Provider key are shown in the following example:

Figure 113: Attributes for the Provider Security Key—Sample User Dialogue

```
Select SECURITY KEY NAME: PROVIDER

No editing.

NAME: PROVIDER// <Enter>
DESCRIPTIVE NAME: Provider// <Enter>
PERSON LOOKUP: LOOKUP// <Enter>
KEEP AT TERMINATE: YES// <Enter>
DESCRIPTION:
  1>This KEY is given to all entries in the New Person file that need
  2>to be looked up as a Provider. Those entries that hold this key
  3>are considered to be providers. It was given to all active
  4>Providers in file 6 at the time of the Kernel 7 install.
EDIT Option: <Enter>
Select SUBORDINATE KEY: <Enter>
GRANTING CONDITION: <Enter>
```

### 8.12.5.1 PERSON LOOKUP

As described in the “Security Keys: Developer Tools” chapter in the *Kernel 8.0 & Kernel Toolkit 7.3 Developer’s Guide*, a special AK cross-reference on the NEW PERSON (#200) file is maintained automatically for anyone who is granted a security key that is flagged for Person Lookup. This cross-reference has been introduced to facilitate identification of user groups, like providers.

### 8.12.5.2 KEEP AT TERMINATE

As described in the “[Signon/Security](#)” section concerning user deactivation, security keys that are marked as “KEEP AT TERMINATE” is *not* removed as a user attribute of terminated users. This allows the continued processing of activities that had been previously authorized (e.g., for billing purposes, notes, pending orders, or other actions), because the user held the security key.

For example, the PROVIDER security key KEEP AT TERMINATE field is set to **YES** in case a medical order continues to hold an approved status, even though the authorizing provider had been deactivated. As another example, the AudioCare (COTS) pharmacy software depends on the PROVIDER key remaining. The renewal process (OR\*3\*336, **ORAREN** routine) looks at the original order and creates a new order with the same information, sending an alert to the provider to review and sign the order. If the original provider is no longer active, the order still gets created, but the alert gets forwarded to a surrogate or backup reviewer for signature of the order.

### 8.12.5.3 SUBORDINATE KEY (Exploding Keys)

If a security key has any associated subordinate keys (i.e., entries in the SUBORDINATE KEY Multiple field), the subordinate keys are automatically assigned along with the overall key. A security key with this feature is called an exploding key, since it and its subordinates are assigned all at once.



**NOTE:** If entries in the SUBORDINATE KEY Multiple Field are edited, dynamic updating of the security keys already assigned to users does *not* occur.

Exploding security keys *cannot* be exported with software, although, there may be support for this functionality in the future. They are intended to be created by system administrators as a timesaving method in the key allocation process.

## 8.12.6 Deleting Security Keys

Keys should *not* be deleted from the SECURITY KEY (#19.1) file. Kernel has made the NAME (#.01) field of the SECURITY KEY (#19.1) file uneditable to prevent deletion of security keys through VA FileMan. System administrators should *not* attempt to edit the key global directly to remove a key, since associated pointing relationships are left to cause errors. The one mechanism Kernel does provide for deletion of security keys is through the Kernel Installation and Distribution System (KIDS).



**REF:** For more information on KIDS, see the “[Kernel Installation and Distribution System](#)” section in this manual and the “KIDS Developer Tools” section in the *Kernel 8.0 & Kernel Toolkit 7.3 Developer’s Guide*.

## 8.12.7 Reindexing All Users’ Security Keys Option

Figure 114: Reindex the users key’s Option

SYSTEMS MANAGER MENU ...	[EVE]
User Management ...	[XUSER]
Manage User File ...	[XUSER FILE MGR]
Reindex the users key’s	[XUSER KEY RE-INDEX]

You can use the Reindex the users key’s option [XUSER KEY RE-INDEX] to re-index all users’ security keys in the NEW PERSON (#200) file. If a user has a security key, but is lacking the corresponding ^XUSEC cross-reference for the key, you can use this option to regenerate the ^XUSEC cross-reference. While the ^XUSEC cross-reference is being rebuilt, there can be an impact on all users with security key lookups failing in ^XUSEC until the index is entirely rebuilt; therefore, this option should be used with caution and is best delayed until users are *not* signed on.

## 8.12.8 Using Security Keys with Reverse Locks

If a security key is associated with an option via the REVERSE/NEGATIVE LOCK field, rather than the LOCK (#3) field, it functions to lock out users who hold the key. The security key used for a reverse lock is just like any other key, differing only in the way it is associated with an option. Menu Management’s Diagram Menus option indicates the existence of any reverse locks, such as the use of the XMNOPRIV security key to prevent access to MailMan’s shared mail facility.

The typical use of a security key with the REVERSE/NEGATIVE LOCK field is to restrict access to options otherwise available to all users (e.g., MailMan User and other options on the Common menu).

## 8.12.9 Security Key Delegation Levels

Starting with Kernel 8.0, security keys are subject to delegation levels just as options are subject to delegation levels. A field in the NEW PERSON (#200) file, DELEGATION LEVEL, stores a user's delegation level (for security keys and options). When a security key is delegated, the person to whom it is delegated is assigned a level one number lower than the delegation level of the person doing the delegating. This is to prevent the delegated-to person from removing DELEGATED KEYS from someone with a lower delegation level.



**REF:** For more information about delegation levels, see the “[Secure Menu Delegation](#)” section.

## 9 Secure Menu Delegation

The job of allocating menu options to users can be a time-consuming activity, so site managers may want to consider delegating this responsibility to application coordinators. Application coordinators are familiar with the menus for their software and can learn how to assign these to new users in their service area.

Secure Menu Delegation allows the Site Manager to delegate the management of certain menu options to another user (e.g., an application coordinator). This user, now a delegate, can then assign these as primary or secondary options (along with their security keys) to users who fall under their administrative jurisdiction.

For example, the Site Manager might delegate the management of the Laboratory software options to the Lab Application Coordinator (LAC), and the LAC could then allocate or remove options from everybody in the Laboratory software. The system is set up in such a way that the LAC could also delegate, with the Site Manager's permission and manager's menu, the management of all the chemistry menus to the head of the Chemistry Section, and so on, creating another level of delegation.

There are two divisions in Secure Menu Delegation:

- The menu to create and manage delegates.
- The menu for the delegates themselves to assign options to end users.

### 9.1 User Interface: Acting as a Delegate

As a delegate, you have been delegated options (usually by system administrators). If you have been delegated options, you can assign these options to computer users on the computer system.

As a delegate, you can assign the following options to your users:

- Options that have been delegated to you.
- Menus that you have created from options delegated to you.
- Options you have created from VA FileMan templates.

As a delegate, you need to understand the basic structure of the OPTION (#19) file, which is a file that points back to itself. That is, a menu is an entry in the OPTION (#19) file; but items on menus are themselves pointers to other entries in the OPTION (#19) file. You should also understand the difference between types of options, be familiar with menu trees, and be sufficiently reluctant to assign great numbers of secondary menus.

#### 9.1.1 Delegate's Menu

To delegate options to users, you need to be assigned a menu called Delegate's Menu Management [XQSMD USER MENU], which is located under the Secure Menu Management menu. The options on the Delegate's Menu Management menu are as follows:

**Figure 115: Delegate's Menu Management Options**

Delegate's Menu Management	[XQSMD USER MENU]
Build a New Menu	[XQSMD BUILD MENU]
Edit a User's Options	[XQSMD EDIT OPTIONS]
Copy Everything About an Option to a New Option	[XQCOPYOP]
Copy One Users Menus and Keys to others	[XQSMD COPY USER]
Limited File Manager Options (Build)	[XQSMD LIMITED FM OPTIONS]

Each of these options on the delegate's menu is discussed in the topics that follow.

## 9.1.2 Edit a User's Options Option

Using the Edit a User's Options option [XQSMO EDIT OPTIONS] allows you to edit a user's primary and secondary menus. This is the chief method you can use to add (and subtract) options on your users' menus.

Most of your work is in adding and deleting options on your users' secondary menus. You are only able to add or delete options from a user's secondary menu if the option in question has been delegated to you. That means that you do *not* have access to a user's entire secondary menu; instead, only those options on the secondary menu that are also delegated to you.

If, when you edit a user's secondary menu, you choose an option that is already on a user's secondary menu, you are asked if you want to delete it from their secondary menu. Otherwise, you are asked if you want to add the option to their secondary menu.

If you are assigning an option that is locked with a security key, the delegation process checks whether you have been delegated the key as well. If you have, the key is automatically assigned to the user along with the option. If you have *not* been delegated the key, you get an error message saying that you have *not* been delegated the needed security key (the option is assigned to the user, but they do *not* have the key to unlock the option).

If you delete an option that is locked with a security key and that key is delegated to you (and you are at a higher key delegation level than the option holder), the key is deleted along with the option (unless the user holds another option locked by the same security key).

In the following example (Figure 116), the LRZ MAIN menu option is added to the user's secondary menu. LRZ MAIN is locked with a security key and that key is automatically assigned when the option is assigned:

Figure 116: Edit a User's Options—Sample User Dialogue

```
Select Delegate's Menu Management Option: EDIT A USER'S OPTIONS
Select NEW PERSON NAME: XUUSER,FIVE
PRIMARY MENU OPTION: XMUSER// <Enter>      MailMan Menu .
No keys needed to delete!.
No keys needed to give!

SECONDARY MENU OPTION: LRZ MAIN <Enter>     Lab User Menu ...
ZZLRMAIN key also given!

SECONDARY MENU OPTION: <Enter>

Select NEW PERSON NAME:
```

Unlike secondary menus, you are only able to edit a user's PRIMARY MENU OPTION if their current primary menu is an option that has been delegated to you. Otherwise, you are *not* allowed to change that user's PRIMARY MENU OPTION.



**NOTE:** You *cannot* add or subtract options on a user's primary menu; you can only replace the user's entire PRIMARY MENU OPTION with another one.

### 9.1.3 Build a New Menu Option

Using the Build a New Menu option [XQSMD BUILD MENU], located on the Delegate's Menu Management menu [XQSMD USER MENU], you can create new menus with menu items chosen from your delegated options.

First, you need to provide an option name for the new menu you are creating. The menu name prefix, used by the delegate to create local options, can be in one of two forms:

- (Preferred) A system administrator-assigned local namespace beginning with the letter "A" (e.g., A6A).
- (Discouraged) Package namespace (e.g., LR) to which the user *must* add the letter "Z" (e.g., LRZ) in order to avoid conflict with national releases.



**NOTE:** As of Kernel patch XU\*8.0\* 482, options in the A\* namespace can be created *without* adding a "Z" to the end of the package namespace.

Once you provide a name for the menu, you are asked to provide the following information:

- Text for the menu.
- Description for the menu.
- Items for the menu (choose from your delegated options).

Once you have created a new menu, you can assign it to your users just as if it were an option delegated to you.

### 9.1.4 Copy Everything About an Option to a New Option Option

Using the Copy Everything About an Option to a New Option option [XQCOPYOP], you can copy any option on the computer system into a new option. First you are asked which existing option you would like to copy; then, you are asked for a name for the copied option. The option name *must* begin with a namespace assigned to you by the system administrators.

### 9.1.5 Copy One Users Menus and Keys to others Option

Using the Copy One Users Menus and Keys to others option [XQSMD COPY USER], you can copy the menus and security keys of one user to another user. Each menu or security key you copy, however, *must* have been delegated to you; otherwise, they are skipped in the copy process. What gets copied from one user into the other user are:

- PRIMARY MENU OPTION (and all descendant menus).
- SECONDARY MENU OPTIONS.
- KEYS.

The PRIMARY MENU OPTION of the user you're copying from *replaces* the PRIMARY MENU OPTION of the user you are copying to. The SECONDARY MENU OPTIONS and the KEYS of the user you're copying from are *merged* into the SECONDARY MENU OPTIONS and the KEYS of the user you're copying to.

### 9.1.6 Limited File Manager Options (Build) Option

The Secure Menu Delegation system provides a way for delegates to create options out of VA FileMan templates. Delegates who have enough access to VA FileMan to create INPUT, SORT, or PRINT templates can create menu options for their users that directly call these templates.

### 9.1.6.1 Characteristics of Intended Users

The Limited File Manager Options (Build) option [XQSMD LIMITED FM OPTIONS] is designed for delegates, such as some application coordinators who have VA FileMan access to a set of files and can create INPUT, SORT, or PRINT templates. These delegates may have the VA FileMan options for editing or printing without the ability to modify data dictionaries. They may also have explicit file access to a specified set of files via the File Access Management system. Typically they would be working without the special FILE MANAGER ACCESS CODE (#3) field, **DUZ(0)**.

### 9.1.6.2 System Administrator Setup to Enable Building Options from Templates

To allow a user to create menu options from VA FileMan templates, system administrators *must* first assign to the user:

- Delegate's Menu Management menu [XQSMD USER MENU].
- XQSMDFM Security Key.
- A namespace beginning with the letter "A" (e.g., A6A) in which to create options. To do this, use the Specify Allowable New Menu Prefix option [XQSMD SET PREFIX] located on the Secure Menu Delegation menu [XQSMD MGR]. System administrators are discouraged from assigning package namespaces (e.g., LR) to which the user *must* add the letter "Z" (e.g., LRZ) to avoid conflict with national releases.

### 9.1.6.3 Building Options

The tool for building options with VA FileMan templates is called the Limited File Manager Options (Build) option [XQSMD LIMITED FM OPTIONS]. It is part of the Delegate's Menu Management menu under the Secure Menu Management menu and is locked with the XQSMDFM security key.

First, you *must* have created a SORT, PRINT, or INPUT template for a VA FileMan file. Once you have created a template, you can make this template available as an option to your users by turning it into an option.

You can create three types of options:

- Edit-type option (from an EDIT template).
- Print-type option (from PRINT and SORT templates).
- Inquire-type option (from either a PRINT template or a file name).

Once you have turned the template into an option, you can assign that option to your users as you deem necessary. Then, when a user uses the option, they execute the PRINT, SORT, or INPUT template from which the option was created.



Suppose you have created a PRINT template called LRZ REFERRAL PRINT for the Lab's REFERRAL file. To turn this PRINT template into an Inquire option, use the Limited File Manager Options (Build) option, as shown below:

**Figure 117: Limited File Manager Options (Build)—Sample User Dialogue**

```

Select Delegate's Menu Management Option: LIMITED FILE MANAGER OPTIONS (BUILD)
The menu options you build or edit must begin with the namespace:
    LRZ

The option types that may be built are P(rint), E(dit), and I(nquire), and
you must have a template or templates ready to be included in the option.

Or enter D(elete) to DELETE an option

Select Option Type (P/E/I/D): I
    Enter Print Template Name (Optional): LRZ REFERRAL PRINT

    Option Name: LRZ REFERRAL INQUIRE
    Located in the LR (LAB SERVICE) namespace.
    ARE YOU ADDING 'LRZ REFERRAL INQUIRE' AS A NEW OPTION (THE 996TH)? Y <Enter>
    (YES)
    OPTION MENU TEXT: DISPLAY A REFERRAL
    MENU TEXT: Display a Referral Replace <Enter>
    DESCRIPTION:
    1> Display Lab Referral entries (option created by LAB ADPAC).
    2> <Enter>
    EDIT Option: <Enter>

Select Delegate's Menu Management Option:

```

## 9.2 System Management: Managing Delegates

The options for creating and managing delegates are on the Secure Menu Delegation menu [XQSMD MGR], which is on the Menu Management menu. Typically, system administrators would be the sole holder of this menu. The options on this menu are:

**Table 13: Secure Menu Delegation Menu Options**

Option Text	Function
Select Options to be Delegated	Delegate options
List Delegated Options and their Users	Print Report
Print All Delegates and their Options	Print Report
Remove Options Previously Delegated	Undo Delegation
Replicate or Replace a Delegate	Copy a Delegate
Show a Delegate's Options	Print Report
Delegate's Menu Management ...	Delegate's menu
Specify Allowable New Menu Prefix	Assign namespaces

The main options to create and manage delegates are:

- Select Options to be Delegated
- Replicate or Replace a Delegate

## 9.2.1 Delegating Options: Select Options to be Delegated Option

To delegate options, use the Select Options to be Delegated option [XQSMD ADD] from the Secure Menu Delegation menu. Using this option is a two-step process:

1. Choose the users to whom options are delegated.
2. Choose which options to delegate to that group of users.

You can choose to set up one user or many users as delegates. You can choose one option or a group of options to delegate to them.

You also need to assign (*not* delegate!) the Delegate's Menu Management menu [XQSMD USER MENU] to the delegate; this menu gives delegates the means to assign delegated options to users.

**Figure 118: Delegating Options: Select Options to be Delegated Option—Sample User Dialogue**

```
Select Secure Menu Delegation Option: SELECT OPTIONS TO BE DELEGATED
Enter the name(s) of your delegate(s), one at a time
Name: XUUSER,THREE
Name: XUUSER,FOUR
Name: <Enter>
Enter options you wish to DELEGATE TO these users
Add option(s): XUINQUIRE
Add option(s): XUUSERACC
Add option(s): <Enter>
For the following user(s):
1. XUUSER,THREE
2. XUUSER,FOUR
You will delegate the following options:
XUINQUIRE    Inquire
XUUSERACC    Diagram Menus
Delegated by XUUSER,FIVE on Jul. 21, 2004  3:55 PM.
Ready to delegate these options to these people? Y// <Enter>
Request to add delegated options has been queued, task # 465,
named: XUUSER,FIVE adding delegated options.
```

### 9.2.1.1 Delegating Security Keys

If options that you intend to delegate are locked with security keys, you need to delegate the matching keys to the delegate; otherwise, the delegate is *not* able to assign keys to unlock options they have assigned to their users.

If the option is locked with a security key that you possess, the Select Options to be Delegated option branches you to the Key Management program, and lets you allocate (if you so wish) the appropriate keys to the delegates you are creating.

However, to assign security keys to users, the delegate *must be delegated* the key. To do that, you need to use the Key Management menu option, Delegate keys option [XQKEYDEL]. This option allows you to delegate security keys to delegates by populating the DELEGATED KEYS Multiple field in their NEW PERSON (#200) file entry. Security keys entered in a delegate's DELEGATED KEYS Multiple allow them to allocate the entered keys to other users (but *not* themselves).

When a delegate assigns options to a user, they can assign the matching security keys as part of that process. However, as an enhancement to a delegate's ability to work with keys, system administrators can assign the delegate the following options from the Key Management menu:

- Allocation of Security Keys
- De-allocation of Security Keys
- Show the Security Keys of a Particular User

As long as the delegate does *not* hold the XUMGR security key, which allows any key to be allocated, the Key Management menu options only allow delegates to allocate and de-allocate security keys they've been delegated. Kernel also follows key delegation levels with the Allocation of Security Keys and De-allocation of Security Keys options.



**NOTE:** Key management options *must* be separately assigned; they are *not* a part of the Delegate's Menu Management menu [XQSMD USER MENU].

### 9.2.1.2 Delegation Level (Options and Keys)

DELEGATION LEVEL is a field in the NEW PERSON (#200) file specifying the number of steps that a person is from the original delegation of options by the Site Manager (whose Delegation Level is 0). Starting with Kernel 8.0, the delegation level is also maintained for DELEGATED KEYS. For instance, if the Site Manager delegates all laboratory options to the Lab ADP Application Coordinator (ADPAC), then the Lab ADPAC would have a Delegation Level of 1. Should the Lab ADPAC further delegate a set of those options to the Chief of Chemistry, the Chief would have a level of 2, and so on.

The use of levels insures that supervision is *not* compromised such that the lower level user could alter menus or remove security keys of the higher level person. No attempt is made to determine who actually works for whom since that information is *not* available to the software. Delegation chains should therefore be constructed with some care.

To modify the set of options (and accompanying security keys) delegated to a particular person, you *must* have a Delegation Level equal to, or less than, the person you are trying to modify. If you create a new delegate by delegating some (or all) of the options delegated to you, that person has a Delegation Level equal to your level +1.

It may be necessary to modify Delegation Levels using VA FileMan as the organization's structure changes over time.

## 9.2.2 Further Delegation

The only way a delegate can delegate, rather than simply assign, options to someone else is if the delegate has access to the Select Options to be Delegated option [XQSMD ADD], or the Replicate or Replace a Delegate option [XQSMD REPLICATE]. These options should only be on the Secure Menu Delegation menu [XQSMD MGR]. You should carefully evaluate whether to give this menu to delegates, because it gives them the right to further delegate.

## 9.2.3 Options too Sensitive to Delegate

Certain options (e.g., Programmer-related options) are considered too sensitive or powerful to be delegated. They are marked as *not* delegable in the OPTION (#19) file, and the Secure MenuMan Delegation software does *not* delegate these options. The traditional methods of assigning these menu options *must* be employed by the Site Manager.

It should be noted that a higher-level option, such as EVE, would still give the delegate access to lower level options, such as XUMAINT, even though XUMAINT is itself marked in the OPTION (#19) file as non-delegable. The Delegation software does *not* follow the option trees down to insure that options of options are *not* delegable.



**CAUTION:** It is *highly recommended* that the Site Manager, Information Security Officer (ISO), or chief system administrator review the options marked as too sensitive to be delegated and, using VA FileMan, add any locally sensitive options to this list.

**It is the responsibility of each site to insure that the security of the system is not violated.**

## 9.2.4 Replicate or Replace a Delegate Option

You can copy the Delegated Options of a delegate to another user. Use the Replicate or Replace a Delegate option [XQSMD REPLICATE] to do this. The options that you transfer to another user do *not* replace any options the user has been previously delegated. They are added to those options, if any. Like the Select Options to be Delegated option, this option also can branch you to the security key allocation program for the new delegate.

You are also asked if the delegated options should be removed from the original delegate. If you say **NO (N)**, the original delegate remains a delegate. If you say **YES (Y)**, all Delegated Options are removed from the original delegate, who is no longer an active delegate. In order to remove the options from a delegate, however, you *must* have a Delegation Level lower than they do.

## 9.2.5 Remove Options Previously Delegated Option

To simply remove an option from a delegate's list of delegable options, use the Remove Options Previously Delegated option:

1. Enter the name or names of the delegates from which you want to remove options.
2. Enter the option or options you want to remove from the specified set of delegates.

You're given a chance to review the choices you made; if you say to proceed, a task is queued that removes the options you selected from the delegates you specified.

## 9.2.6 Specify Allowable New Menu Prefix Option

Use the Specify Allowable New Menu Prefix option to assign allowable menu prefixes to your delegates. Your delegates need to be given allowable new menu prefixes if they:

- Build new menus.
- Copy options.
- Create options from VA FileMan templates.

Typically, if your delegate works with one particular software application, you would assign them that software's namespace as an allowable prefix. Options that the delegate creates *must* then be prefixed with that namespace, appended with a Z.

If you do *not* specify an allowable prefix for a delegate, they are *not* able to use the following options:

- Build a New Menu
- Copy Everything About an Option to a New Option
- Limited File Manager Options (Build)

You can specify multiple new menu prefixes for a given delegate.

## 9.2.7 Reports

You can use the following options to generate reports about delegates on your system:

- List Delegated Options and their Users  
(Sort by delegated option.)
- Print All Delegates and their Options  
(Sort by delegate name.)
- Show a Delegate's Options  
(Display all delegated options for one delegate.)

# 10 Alerts

## 10.1 User Interface

When you receive an alert, something on the computer system is requesting your immediate attention. A software application might issue an alert to one or more users when certain conditions are met (e.g., depleted stock levels or abnormal lab test results).

The first time you reach a menu prompt after receiving a particular alert, the alert's message is displayed to you by the menu system. The alert message is displayed along with a standard notice to select the View Alerts "VA" option on the Common menu to process the alert (see [Figure 119](#)).

When you receive an alert, you should find out what the alert is asking of you, and attend to it. This is called processing the alert.

Until you process all unprocessed alerts you receive, you'll be reminded that you have pending alerts each time you are at a menu prompt. You do *not*, however, see the alert message; you only see that the first time you receive an alert and reach the menu prompt.

**Figure 119: Alert—Sample User Message**

```
Dr. You need to enter a progress note on 'KRNPATIENT,ONE'.  
Enter "VA VIEW ALERTS" to review alerts  
  
Select Systems Manager Menu Option:
```

### 10.1.1 Processing Alerts

To process alerts, choose the View Alerts "VA" option from the Common menu. The View Alerts "VA" option presents a list of all pending alerts, numbered consecutively with the most recent alerts listed first, with the exception of *Critical* alerts (as of Kernel patch XU\*8.0\*602):

- Critical alerts move to the top of the list and are shown in reverse video.
- Critical alerts are identified by strings of text contained in the ALERT CRITICAL TEXT (#8992.3) file.

Information-only alerts are displayed with the letter "I" in front of the alert message. When you process Information-only alerts, all that happens is that they are removed from the pending alerts list. Their only purpose was to send you the one-line alert message.

When you process alerts that are *not* Information-only, processing the alert may send you to a particular option or program. Afterwards, you are returned to the View Alerts screen if more alerts need processing, or back to the menu prompt if no pending alerts remain.

[Table 14](#) lists the various methods for processing alerts from the View Alerts screen. You can enter any of the following alert process codes (listed alphabetically):

**Table 14: Alert Processing Codes**

Process Code	Description
<b>A</b>	Process all alerts in the order shown.
<b>D</b>	Delete specific alerts (some alerts <i>cannot</i> be deleted). Only listed if one or more INFORMATION-ONLY alerts have been listed. If unable to delete an alert, users see: "Unable to delete alerts which require action: n,n,n, ..."
<b>F</b>	Forward one or more specific alerts. Forwarding may be sent as an alert to specific users or mail groups, a mail message, or sent to a specific printer.
<b>I</b>	Process all INFORMATION-ONLY alerts. Only listed if one or more INFORMATION-ONLY alerts have been listed.
<b>M</b>	List pending alerts in a mail message and deliver the message to your VistA MailMan IN basket.
<b>n</b>	Single number to process a single alert.
<b>n,n,n-n</b>	Range of numbers to process a range of alerts (e.g., 1,3,5-8).
<b>P</b>	Print a copy of the pending alerts to a printer.
<b>R</b>	Redisplay available alerts.
<b>S</b>	Add or remove a surrogate to receive alerts for you. An optional start and end date can also be entered.
<b>^</b>	Exit the alert processing screen by entering a caret (^).

The Alert Handler ordinarily deletes alerts once you have processed the alert. If you have processed all pending alerts, and try to select the View Alerts "VA" option [], nothing is displayed. View Alerts only offers a listing when there are pending alerts; if no alerts are pending, View Alerts simply returns you to the menu prompt.

**Figure 120: View Alerts “VA” Option—Sample User Dialogue**

```
ACCESS CODES: *****
VERIFY CODES: *****
Good evening One You last signed on Jan 9,2004 at 14:39

Dr. You need to enter a progress note on 'KRNPATIENT,ONE'.
Enter "VA VIEW ALERTS to review alerts

Select Clinic Manager Menu Option: "VA"
1. Dr. You need to enter a progress note on 'KRNPATIENT,ONE'.
2. Alk Phos elevated, schedule fu bone scan
3.I For your information, meeting at 12 noon, room 223
   Select from 1 to 3
   or enter ?, A, I, F, S, P, M, R, or ^ to exit: ?

YOU MAY ENTER:
One or more numbers in the range 1 to 3 to select specific alert(s)
for processing. This may be a series of numbers, e.g., 2,3,6-9
A to process all of the pending alerts in the order shown.
I to process all of the INFORMATION ONLY alerts, if any, without further ado.
S to add or remove a surrogate to receive alerts for you
F to forward one or more specific alerts. Forwarding may be as an ALERT
to specific user(s) and/or mail group(s), or as a MAIL MESSAGE, or to a
specific PRINTER.
D to delete specific alerts (some alerts may not be deleted)
P to print a copy of the pending alerts on a printer
M to receive a MailMan message containing a copy of these pending alerts
R to Redisplay the available alerts
^ to exit
or RETURN to see additional pending ALERTS

Select from 1 to 3
or enter ?, A, I, F, S, P, M, R, or ^ to exit
or RETURN to continue:
```

## 10.1.2 Deleting Alerts

As of Kernel patch XU\*8.0\*114, you can delete alerts by using the “D” alert processing code when viewing alerts. The user can, if desired, delete specific alerts without viewing or processing them. This option provides the ability to delete “INFORMATION ONLY” alerts. Alerts that require processing *cannot* currently be deleted. However, if alerts requiring processing are created with the **XQACNDEL** variable set to **1** they too would be able to be deleted (i.e., the developer of the code that creates the alert can specify if it *must* be processed or can be deleted). Any alerts that were selected for deletion, but could *not* be deleted are noted for the user.

The ability for the user to delete alerts other than INFORMATION ONLY requires that the developers within a software application decide that specific alerts, which would normally invoke processing via an option or routine, can be deleted specifically by the user *without* processing. They would then set the **XQACNDEL** variable to a value of **1 (one)** prior to calling SET^XQALERT to set up the alert. Deletion of an alert by the user (or by system administrators or ADPACs using the existing option) is noted within the ALERT TRACKING (#8992.1) file as deletion by a user (with the user ID) *without* processing of the alert.



### 10.1.3 Forwarding Alerts

Beginning with Kernel 8.0, you can forward alerts by using the “F” alert processing code when viewing alerts. You can choose one or more alerts and forward them in the following ways:

- Forward as alerts to a specific user on the computer system.
- Forward as alerts to a mail group on the system.
- Copy alerts into mail messages and send to users and mail groups on the system.
- Print to an output device on the system (e.g., a printer).

### 10.1.4 Surrogates and Alerts

Beginning with Kernel patch XU\*8.0\*114, you can designate or remove a surrogate for alerts by using the “S” alert processing code when viewing alerts. The user can, if desired, specify a start date/time or an end date/time for the surrogate to be effective. If a start date/time is *not* specified, the surrogate becomes active immediately. If an end date/time is specified, the surrogate is removed automatically effective with the first alert sent to the user after the end date/time has passed. If an end date/time is *not* specified, the surrogate is active until another surrogate is specified or the user removes the surrogate.

As of Kernel patch XU\*8.0\*602, entering a start or end date/time in the past is *not* permitted:

- If a date is entered, then a time is also required.
- If a start date or end date is entered *without* the year, and appending the *current* year creates a date in the past, then the next *future* year is appended to the date.

A message is sent to the surrogate to indicate that he has been designated as a surrogate, and a message is sent when the surrogate is removed.

If the user has no alerts and selects the alert option, he is asked if he wants to add or remove a surrogate. The XQALERT SURROGATE SET/REMOVE option is also provided. It can be used by system administrators or ADPACs to add or remove a surrogate for a selected user. This option is located on the Alert Management menu.

## 10.2 System Management

An alert notifies one or more users of a matter requiring immediate attention. Thus, alerts function as brief notices that are distinct from mail messages or triggered bulletins.

Starting with Kernel 8.0, alerts are stored in the ALERT (#8992) file, which are stored in the ^XTV(8992, global. Also the ALERT TRACKING (#8992.1) file, stored in ^XTV(8992.1,) provides a means to track alerts and users' responses to alerts.

For each user to whom an alert is sent, the ALERT TRACKING (#8992.1) file stores the following data:

- Alert name.
- Date created.
- Software identifier of alert.
- User who generated the alert.
- Message text of the alert.
- Action associated with the alert.
- Data associated with the alert.

For each recipient of the alert, the ALERT TRACKING (#8992.1) file stores the following data:

- First date and time observed (shown in menu cycle).
- First date and time selected for processing.
- Date and time processing completed (if any).
- Date and time alert was deleted.
- Forwarding information—If alert was forwarded, user who forwarded it, and date and time of forwarding.
- Surrogate information—If a surrogate was added for alerts, user who was the surrogate, and date and time of the surrogate.

The PATIENT^XQALERT and USER^XQALERT functions provide access to information in the ALERT TRACKING (#8992.1) file.



**REF:** For a description of the XQALERT and other alert-related APIs, see the “Alerts: Developer Tools” chapter in the *Kernel 8.0 & Kernel Toolkit 7.3 Developer's Guide*. Kernel and Kernel Toolkit APIs are also available in HTML format at a VA Intranet Website.

## 10.2.1 Alert Management Menu

The Alert Management menu [XQALERT MGR] contains the following options, described below:

**Figure 121: Alert Management Menu Options**

```
SYSTEMS MANAGER MENU ... [EVE]
Operations Management ... [XUSITEMGR]
Alert Management... [XQALERT MGR]
  SURO Alerts - Set/Remove Surrogate for User [XQALERT SURROGATE SET/REMOVE]
  Delete Old (>14 d) Alerts [XQALERT DELETE OLD]
  Make an Alert on the fly [XQALERT MAKE]
  Purge Alerts for a User [XQALERT BY USER DELETE]
  **> Locked with XQAL-DELETE
  Report Menu for Alerts ... [XQAL REPORTS MENU]
  Set Backup Reviewer for Alerts [XQAL SET BACKUP REVIEWER]
  Surrogate for which Users? [XQAL SURROGATE FOR WHICH USERS]
```

### 10.2.1.1 Alerts - Set/Remove Surrogate for Users Option

The Alerts - Set/Remove Surrogate for User option [XQALERT SURROGATE SET/REMOVE] is provided so that system administrators or ADPAC personnel can do the following:

- Set a surrogate to receive alerts for a user.
- Remove a surrogate from receiving alerts for a user.

The option asks for a user to be selected, then is ready to specify a new surrogate for the selected user, or to remove the current surrogate for that user.

This option is *not* needed by the individual users who may select to name or remove a surrogate as one of the options while processing alerts (or if no alerts are present for the user, as his/her only option on selecting alert processing).

### 10.2.1.2 Delete Old (>14 d) Alerts Option

The Delete Old (>14 d) Alerts option [XQALERT DELETE OLD] performs the following functions:

- Purges unprocessed alerts from the ALERT (#8992) file.
- Purges alert tracking information from the ALERT TRACKING (#8992.1) file.
- Forwards unprocessed alerts to supervisors or surrogates.

You can use the Delete Old (>14 d) Alerts option to purge all alerts that have been unprocessed for longer than a specified retention period (the default is 14 days.) It is assumed that an alert becomes obsolete within this period and can be purged by system administrators. This option also performs additional functions, which are described below.

This option can be run either directly or as a queued job. You can specify a retention period other than the 14-day default when you queue the option only, by using the TASK PARAMETERS field of the OPTION SCHEDULING (#19.2) file. If you put a numeric value in the TASK PARAMETERS field, this value replaces the default alert retention value of 14 days.

The Delete Old (>14 d) Alerts option also purges the ALERT TRACKING (#8992.1) file. It purges all entries in the ALERT TRACKING (#8992.1) file that are more than 30 days old. The only exception is if, when an alert is created, the call to create the alert specified a retention period different than 30 days; in this case, the different period is used.

Finally, this option forwards unprocessed alerts to supervisors and surrogates (if this was requested when the alert was created). However, if the period to wait before forwarding exceeds the purging retention period used by this option, the alerts are purged rather than forwarded.

Due to the number of tasks performed by this option, it should be queued through TaskMan on a regular basis. The suggested scheduling frequency is once every day.

### 10.2.1.3 Make an Alert on the Fly Option

The Make an Alert on the Fly option [XQALERT MAKE] allows you to generate an alert on the fly. It interactively asks you for the alert message, recipients, and alert action, if any (you can specify an alert action type of routine or option). It then generates the alert on the fly.

This option is *recommended* primarily for system administrators and ADPACs; it may or may not be appropriate for other selected users.



**NOTE:** This option does *not* allow the user to set the CAN DELETE WITHOUT PROCESSING (#.1) field in the ALERT (#8992) file.

### 10.2.1.4 Purge Alerts for a User Option

The Purge Alerts for a User option [XQALERT BY USER DELETE] allows you to delete alerts for a user. The main purpose of this option is to provide a way to delete alerts for a user who has been inactive for a period of time (e.g., on leave), and who has accumulated a number of alerts that should *not* need processing.

This option is locked with the XQAL-DELETE security key, and should only be used by system administrators or ADPACs.

### 10.2.1.5 Report Menu for Alerts Menu

The Report Menu for Alerts menu [XQAL REPORTS MENU] This menu provides several options for generating reports on alerts for users or patients. It consists of the following submenu items:

**Figure 122: Report Menu for Alerts Menu Options**

Select Report Menu for Alerts Option: ??	
Critical Alerts Count Report	[XQAL CRITICAL ALERT COUNT]
List Alerts for a user from a specified date	[XQAL ALERT LIST FROM DATE]
Patient Alert List for specified date	[XQAL PATIENT ALERT LIST]
User Alerts Count Report	[XQAL USER ALERTS COUNT]
View data for Alert Tracking file entry	[XQAL VIEW ALERT TRACKING ENTRY]

### **10.2.1.5.1 Critical Alerts Count Report Option**

The Critical Alerts Count Report option [XQAL CRITICAL ALERT COUNT] is used to generate a report of users who have more than a specified number of alerts containing the word “critical” or the words “abnormal imaging” between the specified start and end dates. The report is presented in descending order for the number of critical/abnormal imaging alerts present.

For each user who has the specified number of critical/abnormal imaging alerts or more, the report includes the following:

- User name.
- Section/Service for the user.
- Number of alerts in the ALERT (#8992) file.
- Last signon date.
- Number of Critical alerts or Abnormal Imaging alerts.
- Date of the oldest alert.

### **10.2.1.5.2 List Alerts for a user from a specified date Option**

The List Alerts for a user from a specified date option [XQAL ALERT LIST FROM DATE] is used to obtain an interactive list of alerts from the ALERT TRACKING (#8992.1) file for a specified user starting from a specified date.

The listing includes the following:

- Internal Entry Number (IEN) for the alert in the ALERT TRACKING (#8992.1) file.
- Date and time the alert was generated.
- Message text of the alert.
- Information about any option or routine to be executed for processing the alert.

### **10.2.1.5.3 Patient Alert List for specified date Option**

The Patient Alert List for specified date option [XQAL PATIENT ALERT LIST] is used to obtain a list of alerts for a specified patient from the ALERT TRACKING (#8992.1) file for a selected date.

A prompt is provided to obtain a quick scan listing of dates with at least some alerts for the patient on it based on OR and DVB alerts (other patient related alerts need to be identified by looking at each alert’s message text and are included in the full list, but *not* the quick scan).

The listing includes the following:

- Internal Entry Number (IEN) for the alert in the ALERT TRACKING (#8992.1) file.
- Date and time the alert was generated.
- Message text of the alert.
- Information about any option or routine to be executed for processing the alert.

#### 10.2.1.5.4 User Alerts Count Report Option

The User Alerts Count Report option [XQAL USER ALERTS COUNT] is used to generate a report on users who have more than a specified number of alerts in the ALERT (#8992) file. The report covers a specified range of dates, and can be sorted by any of the following data:

- User name
- Number of alerts
- Service/Section

In addition, the report in each of these formats may be generated by Divisions if desired.

For each user who has the specified number of alerts or more, the report includes the following:

- User name
- Section/Service for the user
- Number of alerts in the ALERT (#8992) file
- Last signon date
- Number of Critical alerts or Abnormal Imaging alerts
- Date of the oldest alert

#### 10.2.1.5.5 View data for Alert Tracking file entry Option

The View data for Alert Tracking file entry option [XQAL VIEW ALERT TRACKING ENTRY] can be used to view data for one or more entries in the ALERT TRACKING (#8992.1) file in captioned format. The internal entry numbers for the entries to be displayed *must* be entered individually.

#### 10.2.1.6 Set Backup Reviewer for Alerts Option

The Set Backup Reviewer for Alerts option [XQAL SET BACKUP REVIEWER] was added with Kernel patch XU\*8.0\*174.

This option provides a mechanism for a user to set entries into the PARAMETERS (#8989.5) file that assigns an individual as the “Backup Reviewer for Unprocessed Alerts,” which is the DISPLAY TEXT (#.02) field for the “XQAL BACKUP REVIEWER“ entry in the NAME (#.01) field in the PARAMETER DEFINITION (#8989.51) file, if there is a date specified in the DAYS FOR BACKUP REVIEWER (#.15) field in the ALERT DATE/TIME (#.01) Multiple field in the ALERT (#8992) file for that alert.

If this is the case, an alert that remains unread for the specified number of days is forwarded to the “Backup Reviewer for Unprocessed Alerts” indicated at the lowest level found for processing for the user in the PARAMETERS (#8989.5) file. The following is the processing order (listed lowest to highest level):

1. User
2. OERR Team
3. Team
4. Service
5. Division
6. System

### **10.2.1.7 Surrogate for which Users? Option**

The Surrogate for which Users? option [XQAL SURROGATE FOR WHICH USERS] provides a view of which users have specified a selected user as surrogates for themselves.

# 11 Server Options

## 11.1 System Management

### 11.1.1 What is a Server Option?

A server option is a special type of option (stored in the OPTION [#19] file) that can be triggered by mail messages. Addressing a mail message to a server option is termed a “server request.” A server request awakens the option and causes it to execute the following:

- Any M code in the server option’s ENTRY ACTION (#20) field.
- Any M code in the HEADER (#26) field.
- The routine indicated in the ROUTINE (#25) field.
- Any M code in the EXIT ACTION (#15) field.

A server-type option is similar to a run routine-type option. The difference is that a server option is activated by a mail message while a run routine option is activated by a user choosing that option from a menu on a screen. Server options should only be invoked by mail messages (never directly by a user).

The form of the mail message that activates the server option is identical to any other mail message except that it is addressed to **S.<option name>**. The “S.” (like the “G.” form for sending to mail groups) routes the message to the server request software.

### 11.1.2 What Can Server Options Do?

A server request might trigger a bulletin, send a MailMan reply, or initiate an audit of itself. Developers and local system administrators can also customize the bulletins or MailMan replies.

### 11.1.3 Can Server Requests Be Denied?

Only server-type options can be activated by mail messages. The following *must* be true for a server request to be processed:

- The server option *must* be set to type “s” in the TYPE (#4) field of the OPTION (#19) file. If the type is *not* “s” and a request is received, it results in an error that, by default, is recorded in the AUDIT LOG FOR OPTIONS (#19.081) file.
- The server option name *must* be complete and exact when a server request is made or the request is denied.
- The server option *must not* be disabled (it can be disabled for all requests by setting its LOCK [#3] or OUT OF ORDER MESSAGE [#2] fields).



As long as the conditions listed above are satisfied, the only mechanism a site has for security for server requests is the setting of the server option's SERVER ACTION (#221) field. This field has the following settings:

**Table 15: SERVER ACTION (#221) Field Security Values for Server Requests**

Value	Description
R	Run immediately. This code causes the server request to be honored in real time as soon as it is received from MailMan (run immediately), provided it is <i>not</i> prevented by a setting in the TIMES/DAYS PROHIBITED (#3.91) field.
Q	Queue server. This code causes the server request to be honored (queued) as soon as permitted by the TIMES/DAYS PROHIBITED (#3.91) Multiple field.
N	Notify local authorities. This code causes the server request to create a TaskMan entry but does <i>not</i> schedule it to run. A local mail group is notified along with the task number so that it can be approved locally and then scheduled to run using TaskMan's Requeue Tasks option.
I	Ignore any server requests. This code causes the software to ignore all requests for this server option. A bulletin or MailMan message can still be sent, however.

When a server request is received, the server option itself is executed similarly to the way a normal option is executed. That is, if a server request causes a server option to be run or queued, the server option, (along with its associated entry action code, header code, routine, and exit action code), does *not* run until the option as a whole runs as scheduled by TaskMan.

### 11.1.4 How Can the Number of Instances of a Server Option Be Controlled?

To tie a server option to a device of type RESOURCES, use the SERVER DEVICE (#227) field and set the SERVER ACTION (#221) field to "Q" (Queue server) in the OPTION (#19) file. This allows you to control how many instances of the server option can run at any one time. Only as many server option processes can run at any one time as are set up in the associated device's RESOURCE SLOTS (#35) field in the DEVICE (#3.5) file. So if 30 mail messages come in at the same time and attempt to fire off 30 server option processes, you can control the maximum number of simultaneous processes that actually run. Additional server options are able to run when resource slots are freed up from the resource device.



### 11.1.5 Setting Up a Server Option


A server option has many fields in common with other option types and is set up using the Menu Management option Edit options. This option calls the FileMan edit template option [XUEDITOPT], which prompts for data to be entered in the following fields (listed in field number order):

**Table 16: OPTION (#19) File Field Values When Setting Up a Server Option**

Field Name	Description
NAME (#.01)	This should be a namespaced set of 3 to 30 uppercase letters.
MENU TEXT (#1)	Since there is never a menu prompt for a server option, this field should instead contain an accurate description of what this server option does, as it is used by the server request in error messages, bulletins, and MailMan replies. It should be 3 to 50 characters in length.
OUT OF ORDER MESSAGE (#2)	If this field contains between 1 and 80 characters of text, the

Field Name	Description
	server option is placed “out of order” and is <i>not</i> activated by a server request. The message itself is included in bulletins or MailMan replies that report the failure.
LOCK (#3)	Since server options have no online user associated with them, the existence of a lock in this field prevents the execution of a server option, much like an OUT OF ORDER MESSAGE. The user for all server options is the PostMaster. The originator of a server request is recorded, however, in the return address variable.
DESCRIPTION (#3.5)	This word-processing field should contain an extensive description of the server option intended for the local site manager and system administrators. The description should include an exact description of what the server option does and the resources it requires.
PRIORITY (#3.8)	This field determines the priority at which the server option runs.
TIMES/DAYS PROHIBITED (#3.91) Multiple	This Multiple allows the local system administrators to control the days and times during which the server request is honored. If data is entered that prevents the server option from being honored immediately, the software determines the next available time slice that is <i>not</i> prohibited and queues the request for that time. Server options that are marked <b>R</b> for Run Immediately in the SERVER ACTION field are instead queued to run at the next non-prohibited time period.
TYPE (#4)	This field <i>must</i> always contain the code “ <b>s</b> ” for server-type option or the request is denied and an error results.
EXIT ACTION (#15)	The M code stored in this field is executed just before the server option exits.
ENTRY ACTION (#20)	The M code in this field is executed if the server request is honored. If, as with other options, the variable <b>XQUIT</b> exists after the Entry Action is executed, the request is terminated at that point and an error is generated.
ROUTINE (#25)	If there is a routine name in this field in any of the following forms, the routine is run: <ul style="list-style-type: none"> <li>• ROUTINE</li> <li>• ^ROUTINE</li> <li>• TAG^ROUTINE.</li> </ul>
HEADER (#26)	This field of M code is executed, if it exists.
SERVER BULLETIN (#220)	This field is a pointer to the BULLETIN (#3.6) file; it indicates the bulletin to use to notify the local mail group of a server request on their system. If there is no bulletin entered in this field, the default bulletin XQSERVER is used.  Unless there are pressing reasons to do otherwise, it is recommended that the default bulletin XQSERVER be used by leaving the SERVER BULLETIN field blank.  If the mail groups pointed to by XQSERVER (or the bulletin pointed to in this field) do <i>not</i> contain an active user (i.e., a user

Field Name	Description
	<p>possessing a Verify code and no effective TERMINATION DATE) the software turns on auditing (i.e., SERVER AUDIT described below) and sends a MailMan message to the local PostMaster.</p> <p> <b>CAUTION: The most common reason for server options not functioning is that there is no active user associated with the bulletin specified. For security reasons, server options do <i>not</i> run without a locally defined active user associated with the chosen bulletin.</b></p>
SERVER ACTION (#221)	This SET OF CODES field allows the local system administrators to decide how a server request is to be treated (see <a href="#">Table 15</a> ).
SERVER MAIL GROUP (#222)	<p>This field is a pointer to another mail group (the first is pointed to by XQSERVER or the bulletin in Field #220) to which server request notifications are to be sent. The software notifies all legitimate users in all mail groups pointed to. It is <i>recommended</i> that this field be left blank and a mail group be assigned the chosen bulletin instead.</p> <p> <b>CAUTION: Server options do <i>not</i> work unless there is a local, active user associated with the specified mail group.</b></p>
SERVER AUDIT (#223)	<p>This field causes the server request to be audited in the AUDIT LOG FOR OPTIONS (#19.081) file. The default is <b>YES</b>. The information stored for an audited server option includes:</p> <ul style="list-style-type: none"> <li>• Option name</li> <li>• User (always PostMaster)</li> <li>• Device</li> <li>• Job number</li> <li>• Date/Time</li> <li>• CPU</li> <li>• Message number</li> <li>• Return address of sender</li> <li>• Subject of the message</li> <li>• Error message</li> </ul> <p>A server option can also be audited using the normal option auditing software. Auditing the PostMaster or the namespace "XQSRV" captures all server requests.</p>
SUPPRESS BULLETIN (#224)	If set to "Y" ( <b>YES</b> ), it prevents a bulletin from being sent under normal conditions. If there is an error or a possible security breach, a bulletin is still fired. If the field is <i>not</i> filled in, it takes the default of "N," which means that the sending of bulletins is <i>not</i> suppressed.
SERVER REPLY (#225)	This SET OF CODES controls the MailMan reply to a server

Field Name	Description
	<p>request. The reply is a message returned to the user who has sent the server request and should <i>not</i> be confused with the local user to whom the bulletin is addressed. If a reply is requested, the software uses the return address of the sender as supplied by MailMan to send a local or network reply.</p> <p> <b>REF:</b> For an example of a server-type option return message, see the <a href="#">Figure 124</a>.</p> <p>The possible codes are:</p> <ul style="list-style-type: none"> <li>• <b>N</b> No reply is sent (the default).</li> <li>• <b>E</b> A reply is sent to the return address of the sender only in the event of an error.</li> <li>• <b>R</b> A reply is always sent.</li> </ul>
SERVER DEVICE (#227)	<p>Optionally, use this field and the SERVER ACTION (#221) field set to “Q” (Queue server) to control the number of server requests for this server option that can be processed at any one time. Enter the name of a device of type RESOURCES (in the DEVICE [#3.5] file). The number of instances of this server option that can run at any one time is limited to the number of resource slots in the selected resource device (i.e., RESOURCE SLOTS (#35) field in the DEVICE (#3.5) file).</p>

### 11.1.6 Testing if a Site is Reachable: XQSPING Server Option

You can use the XQSPING server option to invoke the Kernel XTSPING utility at a site. This utility tests to see if the domain to which a message is addressed is reachable. For example, if you want to see if the network link to the Field Office (FO) is working properly, you could address a message to:

S.XQSPING@FO-SITE.VA.GOV

If the text of the message and the subject are simply the line “Testing”, you should get the following message in return:

**Figure 123: Sample Message Received when “pinging” a Domain Address**

```
MailMan message for Xmuser,One COMPUTER SPECIALIST
Subj: PING reply to: TESTING [#999] 28 Nov 92 12:17 1 line
From: PING SERVER in 'IN' basket.
-----
Testing.
```

The XTSPING utility copies the message addressed to it and returns it to the person who sent it.

## 11.1.7 Testing a Server Option: XQSCHK

You can use the XQSCHK server option to return information about a server option on a remote system. You should list the server option you want to test in the text of the message addressed to XQSCHK. The subject of the message sent to the XQSCHK server option is *not* important. However, the body of the text *must* contain the name of the server option to be checked. When you specify the server option to be checked, do *not* precede the server option name with an “S.”, instead, list the server option’s name exactly as it appears in the OPTION file’s .01 field.

The XQSCHK server option returns Fields #220 to #225 from the OPTION (#19) file to show how the option has been set up. In addition, several other things about the option are investigated and error or warning messages may be also returned.

For example, if you want diagnostic information about a server option named ZZSERVER, and the option resides on the system at a field office (FO), you should create a message containing the text ZZSERVER and send it to:

```
S.XQSCHK@FO-SITE.VA.GOV
```

The XQSCHK server option unloads the name of the server option (in this example ZZSERVER, see [Figure 124](#)). Assuming such a server option exists, you would expect to receive a reply in a MailMan message as shown below:

**Figure 124: XQSCHK Server Option—Sample MailMan Return Message**

```
MailMan message for XUUSER,ONE  COMPUTER SPECIALIST
Subj: Server Request Reply from FO-SITE.VA.GOV
From: Postmaster  in 'IN' basket
-----
                Nov. 28, 1992  12:18 PM

Sender: XUUSER,ONE
Option name: ZZSERVER
Subject: TESTING XQSCHK
Message #: 999

This is a reply from FO-SITE.VA.GOV
Checking Server Option ZZSERVER.

Fields 220 to 225 in the Option File:
  220 - No bulletin selected, will use default XQSERVER.
  221 - The server action code is Run Immediately.
  222 - The mail group ZZGROUP is pointed to.
  223 - Auditing is turned off.
  224 - The server's bulletin is not suppressed.
  225 - Reply mail is sent when an error is trapped.
```

## 11.1.8 Errors and Warnings from the XQSCHK Server Option

[Table 17](#) lists the errors or warnings that might be included in the return message from the XQSCHK server option, along with an explanation of each:

**Table 17: XQSCHK Server Option—Error/Warning Messages**

Error/Warning Message	Description
Can't unload name of server from message: [message subject].	The name of the server option to be tested could <i>not</i> be unloaded from the text of the message sent to waken the XQSCHK server option. The message should contain just the name of the server option to be tested and nothing more. XQSCHK ignores blank lines (up to 4) and any lines of text that follow the line where it finds the options' name.
The option [option name] is not in the Option File.	There is no option in the remote site's OPTION (#19) File that matches the name of the server option that was unloaded from the text of the message. The string it is using to search the OPTION (#19) File is returned in [option name].
Option [option name] is not shown as a server-type option but a [type].	The option is <i>not</i> marked in the remote OPTION (#19) File as a server-type option, but some other kind of option returned in [type], such as a print-type option.
[Option name] is marked as Out Of Order with the message: [message].	The OUT OF ORDER MESSAGE field for that option has been filled in with the text that is returned in [message].
The expected data in ^DIC(19,[option number], 220) is missing.	There is no information for this option in Fields #220 through #225. The <b>220</b> node of the OPTION (#19) File is missing or blank.
No bulletin associated with this option default XQSERVER is missing from system.	There is no bulletin pointed to by Field #220 of this option in the OPTION (#19) File, and the default XQSERVER bulletin has been removed from the system. Server options are <i>not</i> run without an associated bulletin, even if it is suppressed.
Option [option name] points to a bulletin not in the bulletin file.	WARNING: there is an invalid pointer in Field #220 of the OPTION (#19) File that points to a nonexistent bulletin. The default bulletin XQSERVER is used.
Option [option name] points to a mail group not in the Mail Group File.	WARNING: there is an invalid pointer in Field #222 of the OPTION (#19) File indicating a mail group that should receive the bulletin in addition to the mail group pointed to by the BULLETIN file.
There are no mail groups associated with the bulletin [bulletin name].	The bulletin returned in [bulletin name] does <i>not</i> have a mail group associated with it in the BULLETIN (#3.6) file.

Error/Warning Message	Description
There is no active user associated with the bulletin [bulletin name].	When following the pointers from the bulletin to the mail group to the NEW PERSON (#200) file, an active user was <i>not</i> found. Each server option <i>must</i> be linked to a user who has an Access and Verify code and is not terminated.
There is no routine in field 25 of the Option File for this option.	This server option has no routine associated with it in the ROUTINE field of the remote site's OPTION (#19) File.
The routine [routine name] is not on the system.	The routine that is named in the ROUTINE field of the OPTION (#19) File is <i>not</i> found on the system. It has been removed or is in another UCI.
There is no server action code for this option.	The required server option action code in Field #221 of the OPTION (#19) File is blank.

# 12 Help Processor

## 12.1 User Interface

Kernel's Help Processor is a utility for displaying help frames. A help frame is a screen of text that explains some part of a software application. Each individual help frame can have keyword links to other help frames. Using these keywords, you can navigate through a series of related help frames to learn more about each help frame section.

Some places where you may encounter help frames are:

- When requesting help on options in the menu system.
- When requesting help on a menu in the menu system.
- As a standalone option describing some part of a software application.

**Figure 125: Help Frame Example**

```
                USING THE 'Help Processor' OPTION
The Help processor is a frame-oriented display system which allows
users and programmers to access and manage help text.

The system is driven off of the HELP FRAME FILE.

There are several LINKS which will cause the help text to be
displayed to the user. The system is interactive, and the user may
select which section he/she wishes further information on.
The Help Frame Processor Menu contains the following options:

DISPLAY/EDIT      - Displays the text of a help frame, and allows for the
                    edit of the name, header, text, or related frames.

CROSS REFERENCE  - Lists all the help frames for a specified package,
                    showing parent help frames, linked to menu option,
                    and invoking routine.

LIST             - Lists the help frames in several different formats.

MORE OPTIONS...

Select HELP SYSTEM action or <return>:
```

At the bottom of every displayed help frame is a “Select HELP SYSTEM action...” prompt. You have several choices at this prompt. To back your way out of the help frame system, you can simply press the **<Enter>** key. This backs you up one level, or exits you if you are at the top level of a help frame tree. If you want to exit quickly from help frames, you can enter **^Q** to quit immediately without having to back all of the way out.



You can list other choices at the “Select HELP SYSTEM action...” prompt by entering a question mark (?). The full list of choices is:

**Table 18: Help System Command Actions**

Response	Action
<b>Keyword</b>	Jump to help frame associated with Keyword.
<b>&lt;Enter&gt;</b>	Quit to previous help frame (exit if no previous).
<b>^Q</b>	Quit the help system.
<b>^R</b>	Refresh the current frame.
<b>^T</b>	Table of related frames.
<b>^O</b>	On/off switch for bracketing/reverse video of keywords.
<b>^H</b>	How you got to this frame.
<b>^E</b>	Edit this frame (only if authorized as editor of frame).

Keywords in a help frame are displayed by the help processor in reverse video. If you enter the first few letters of a keyword and press the <Enter> key, the help processor jumps to the help frame linked to the entered keyword.

### 12.1.1 Help Frames in the Menu System

If a menu option has associated help frames, you can display them by entering a question mark (?) followed by an option’s menu text or synonym at a menu prompt (i.e., ?option). For example:

**Figure 126: Display a Help Frame for an Option—Entering One Question Mark (?) and Option Name**

```
Select Office Menu Option: ?MAILMAN
```

Entering three question marks (???) at the menu prompt indicates which options have associated extended help (help frames).

**Figure 127: Display a Help Frame for an Option—Entering Three Question Marks (???)**

```
Select Office Menu Option: ???
```

If a menu itself has an associated help frame, entering four question marks (????) at the menus “Select ... action: ” prompt displays the help frame associated with that menu if one exists:

**Figure 128: Display a Help Frame for an Option—Entering Four Question Marks (????)**

```
Select Help Processor Option: ????
```

## 12.2 System Management

Help frames are entries in the HELP FRAME (#9.2) file. The Header and Text of help frames can be displayed to users to provide instruction about software or other topics. Help frames can be distributed with software or can be created locally to provide information about local policies and procedures.

The options used to create, edit, and link help frames are on the Help Processor menu [XQHELP-MENU], shown below:

**Figure 129: Help Processor Menu Options**

SYSTEMS MANAGER MENU ...	[EVE]
Menu Management ...	[XUMAIN]
Help Processor ...	[XQHELP-MENU]
Display/Edit Help Frames	[XQHELP-DISPLAY]
List Help Frames	[XQHELP-LIST]
New/Revised Help Frames	[XQHELP-UPDATE]
Cross Reference Help Frames	[XQHELP-XREF]
Assign Editors	[XQHELP-ASSIGN]
Unassign Editors	[XQHELP-DEASSIGN]
Fix Help Frame File Pointers	[XQHELPPFIX]

Use of the Help Processor options is explained by help frames associated with the options.

### 12.2.1 Display/Edit Help Frames Option

The help frames can be displayed with the Display/Edit Help Frames option [XQHELP-DISPLAY]. You can use the **?option** syntax at the select prompt, as follows:

**Figure 130: Display/Edit Help Frames Option—Displaying Help Using the ?option Syntax**

```
Select Help Processor Option: ?DISPLAY <Enter> /Edit Help Frames
```

### 12.2.2 List Help Frames Option

The List Help Frames option [XQHELP-LIST] can be used to print a series of frames with a table of contents and page numbering to resemble a hard copy manual.

**Figure 131: List Help Frames Option—Sample User Dialogue**

```
Select Help Processor Option: LIST HELP FRAMES
Select primary HELP FRAME from which to list: XUDOC NEW
```

### 12.2.3 New/Revised Help Frames Option

The New/Revised Help Frames option [XQHELP-UPDATE] produces a VA FileMan-generated print of all help frames that have been updated during a specified time period.

## 12.2.4 Cross Reference Help Frames Option

The Cross Reference Help Frames option [XQHELP-XREF] lists any of the following cross-references to a specified set of help frames:

- Parents (other help frames that call the specified help frame).
- Options (options whose HELP FRAME field references the specified help frame).
- Routines (if a developer has entered the routine in the specified help frame's INVOKED BY ROUTINE field).

## 12.2.5 Fix Help Frame File Pointers Option (Deleting Help Frames)

There is no Kernel utility to delete help frames, but the menu system does *not* generate errors if a pointed-to help frame is missing. If a site chooses to delete help frames using VA FileMan, they should use the Fix Help Frame File Pointers option [XQHELPPFIX] afterwards to delete dangling pointers from the OPTION file's HELP FRAME field.

## 12.2.6 Assigning/De-assigning Help Frame Editors

An existing help frame can be edited, through the Help Processor options, by the following people:

- The help frame author.
- Any holder of the XUAUTHOR security key.
- Anyone who has been assigned as an editor to that help frame.

To assign an editor to a given help frame use the Assign Editors option [XQHELP-ASSIGN] or to de-assign an editor to a given help frame, use the Unassign Editor option [XQHELP-DEASSIGN].

## 12.2.7 Disk Space Concerns

Help frames consume disk space. The amount can be considerable if numerous frames are exported with a software application. You can estimate the size of the HELP FRAME (#9.2) file by Kernel's Block Count utility.

**Figure 132: Estimating the Size of the HELP FRAME (#9.2) File Using Kernel's Block Count Utility**

```
Select Systems Manager Menu Option:  PROG <Enter>  rammer Options
Select Programmer Options Option:    GLOBAL <Enter>  Block Count
Block Count for Global ^DIC(9.2)
```

## 12.2.8 Creating and Editing Help Frames

One way to edit help frames from the HELP FRAME (#9.2) file is to use the Display/Edit Help Frames option to display the help frame in question. Then, at the "Select Help System Action:" prompt, you can enter ^E to edit the help frame if you have edit access to the help frame. You have edit access if:

- You are the help frame's author.
- You are assigned as an editor for the help frame.
- You are a holder of the XUAUTHOR security key.

Another handy way to edit help frames is within the help frame system as invoked from a software application. For example, if the help frames are tied to a software's options, you can use the software, invoke the help frame for each field or option, and then edit that help frame on the spot. To edit a help

frame in this manner, enter **^E** at the help frame action prompt. To do this, however, you *must* have edit access to the help frame as described above.

### 12.2.8.1 Namespacing of Help Frames

Like entries in the OPTION (#19) or SECURITY KEY (#19.1) files, entries in the HELP FRAME (#9.2) file *must* be namespaced to avoid overwriting problems.

### 12.2.8.2 Help Frame Layout Considerations

When entering the text of help frames, you should keep each line to fewer than 80 characters for proper screen display.



**NOTE:** The text is displayed “as it stands” and is *not* processed by VA FileMan’s text formatter. That is, the text is *not* wrapped, and word-processing “windows” are *not* evaluated. Frames are usually **22** lines in length although an end-of-page **READ** is issued to allow a pause if the frame exceeds **22** lines.

If there are only a few lines of text, the Help Processor displays a table at the bottom of the screen of all related frames (those frames that the current frame has keyword links to). The table shows the choices of other frames so the user need *not* enter the keywords in the text. You can force the table of related frames out of the display by entering enough blank lines so that the frame’s length is 20 lines (assuming the display has a page length of **24** lines).

For the Help Processor to identify and highlight keywords, the keywords are entered in the text of the help frame enclosed in square brackets. By convention, keywords in help frames are usually in all capital letters. A square bracket character can be displayed as part of the frame’s text by entering two of the characters (e.g., [[ or ]]).

If the frames are to be printed using the List Help Frames option, the resulting help manual has an organized outline, if the frames are linked in a top-down tree structure without any circular connections among the branches.

### 12.2.8.3 Linking a Help Frame as Help for an Option or Menu

Once a help frame (or a series of help frames) has been created, you can associate it (them) with options by entering the name of the top-level help frame in the HELP FRAME field of the OPTION (#19) file. You can use Menu Manager’s option Edit options to do this. That way, when a user enters a single question mark (?) in conjunction with the option name, Menu Manager invokes the associated help frame.

**Figure 133: Linking Help Frames to an Option—Sample User Dialogue**

```
Select Systems Manager Menu Option:  MENU <Enter> Management
Select Menu Management Option:      EDIT OPTIONS
Select OPTION to edit:               XQHELP-MENU <Enter> Help Processor
NAME: XQHELP-MENU// ^HELP FRAME
HELP FRAME: XQHELP
```

# 13 Error Processing

## 13.1 User Interface

When an option you are using encounters an error condition, you are usually returned to the menu system. A message is displayed indicating that an error has occurred. You are then presented with the last menu prompt and can continue.

There are certain error conditions, however, that may prohibit or prevent return to the menu system. In these situations, you are halted off the system.

## 13.2 System Management

The Error Processing menu handles errors for Caché systems. It provides access to options pertaining to the error trap, displaying, printing, and purging errors. Like the error traps provided by the operating systems, the utility allows the investigation of program execution errors or the examination of system errors by capturing a picture of the environment for later reconstruction.

The **%ZTER\*** routines are called from ERR^ZU to trap errors and store them in the ^%ZTER global, a Manager account global that should be translated so that all errors are included on one report. The **XTER\*** routines are used to format the error report.

### 13.2.1 Error Screens

At times you may not want to trap a certain type of error, but merely to count them because you are already aware of the error and can do nothing to prevent it. At other times you may not even want to count the error because it is inevitable or harmless. An error screen is a string of characters that is compared with the error message of every error trapped. Any trapped error whose message contains the screen is screened out. You decide for each screen whether the error is counted or completely ignored. In either case the error is *not* recorded in either the Kernel ERROR LOG (#3.075) file or the TaskMan Error Log. In TaskMan, if a running task encounters a screened error, the Submanager still notes the error in the record for that task.

Kernel gives you four options with which to manage your error screens:

- [List Error Screens Option](#) [XUTM ERROR SCREEN LIST]
- [Add Error Screens Option](#) [XUTM ERROR SCREEN ADD]
- [Edit Error Screens Option](#) [XUTM ERROR SCREEN EDIT]
- [Remove Error Screens Option](#) [XUTM ERROR SCREEN REMOVE]



**NOTE:** Even though these four option names are prefixed with “XUTM” and located on TaskMan menus, these error screen options apply to all errors and *not* just TaskMan-specific errors. These four options are located on the Taskman Error Log menu [XUTM ERROR], located under the Taskman Management Utilities menu [XUTM UTIL], located under the Taskman Management menu [XUTM MGR], which are all located under the Systems Manager Menu [EVE].

### 13.2.1.1 List Error Screens Option

Figure 134: List Error Screens Option

```
SYSTEMS MANAGER MENU ... [EVE]
Taskman Management ... [XUTM MGR]
  Taskman Management Utilities ... [XUTM UTIL]
    Taskman Error Log ... [XUTM ERROR]
      List Error Screens [XUTM ERROR SCREEN LIST]
```

The List Error Screens option [XUTM ERROR SCREEN LIST] lists in a simple table the screens you have established and the number of errors that have been screened out by each.

### 13.2.1.2 Add Error Screens Option

Figure 135: Add Error Screens Option

```
SYSTEMS MANAGER MENU ... [EVE]
Taskman Management ... [XUTM MGR]
  Taskman Management Utilities ... [XUTM UTIL]
    Taskman Error Log ... [XUTM ERROR]
      Add Error Screens [XUTM ERROR SCREEN ADD]
```

With the Add Error Screens option [XUTM ERROR SCREEN ADD] you can enter a screen and specify whether the errors should be counted. If there are already similar screens in place (e.g., entering SYN when SYNTAX is already established) you are so informed, shown the similar screens, and prompted for confirmation before being asked about the count. Entering two question marks (??) at the “Enter Screen To Apply:” prompt displays the list of error screens.

### 13.2.1.3 Edit Error Screens Option

Figure 136: Edit Error Screens Option

```
SYSTEMS MANAGER MENU ... [EVE]
Taskman Management ... [XUTM MGR]
  Taskman Management Utilities ... [XUTM UTIL]
    Taskman Error Log ... [XUTM ERROR]
      Edit Error Screens [XUTM ERROR SCREEN EDIT]
```

Use the Edit Error Screens option [XUTM ERROR SCREEN EDIT] if you want to reset the counter on a screen or change your mind about whether or not the screen counts its errors. You *must* type in the exact screen you wish to edit. Again, entering two questions marks displays the list of error screens currently in place.

### 13.2.1.4 Remove Error Screens Option

Figure 137: Remove Error Screens Option

```
SYSTEMS MANAGER MENU ... [EVE]
Taskman Management ... [XUTM MGR]
  Taskman Management Utilities ... [XUTM UTIL]
    Taskman Error Log ... [XUTM ERROR]
      Remove Error Screens [XUTM ERROR SCREEN REMOVE]
```

When you type in a screen at the prompt for this option, the screen is removed for you. If there are any similar screens, the Remove Error Screens option [XUTM ERROR SCREEN REMOVE] asks whether you wish to remove them also. Again, entering two question marks (??) displays the list of error screens.

### 13.2.2 Enhanced Error Processing

Enhanced error processing for Caché sites is supported. Kernel's error trap captures variables in their state at the time errors occur, regardless of how variables may have been **NEW**ed beforehand. Stack levels for the routine call stack are recorded in the error trap in the **\$STACK** variable.

The descriptions of the Error Processing menu option topics that follow are arranged in the same order as the options appear on the Error Processing menu [XUERRS].

Figure 138: Error Processing Options

```
SYSTEMS MANAGER MENU ... [EVE]
  Programmer Options ... [XUPROG]
    Error Processing ... [XUERRS]
      P1 Print 1 occurrence of each error for T-1 (QUEUE) [XUERTRP PRINT T-1 1 ERR]
      P2 Print 2 occurrences of errors on T-1 (QUEUED) [XUERTRP PRINT T-1 2 ERR]
      Clean Error Trap [XUERTRP CLEAN]
      Error Trap Display [XUERTRAP]
      Interactive Print of Error Messages [XUERTRP PRINT ERRS]
```

### 13.2.3 Print 1 Occurrence of Each Error for T-1 (QUEUE) Option

The Print 1 occurrence of each error for T-1 (QUEUE) option [XUERTRP PRINT T-1 1 ERR] lists the first occurrence of each error recorded on the previous day. T-1 represents "Today-1 = Yesterday". You can queue it to run shortly after midnight. If a device is specified, the output is sent to the specified device. If a device is *not* specified, the output is placed in a mail message and sent to the individual who queued the option to run. It should be set to automatically requeue at a 1 day ("D") interval.

### 13.2.4 Print 2 Occurrences of Errors on T-1 (QUEUED) Option

The Print 2 occurrences of errors on T-1 (QUEUED) option [XUERTRP PRINT T-1 2 ERR] lists the first two occurrences of each error recorded on the previous day. T-1 represents "Today-1 = Yesterday". It can be queued to run shortly after midnight. If a device is specified, the output is sent to the specified device. If a device is *not* specified, the output is placed in a mail message and sent to the individual who queued the option to run. It should be set to automatically requeue at a 1 day ("D") interval.

## 13.2.5 Clean Error Trap Option

You can use the Clean Error Trap option [XUERTRP CLEAN] to purge the error log. It is locked with the XUPROGMODE security key. You can use the corresponding direct mode utility, ^XTERPUR, in programmer mode. There is also a queueable version, Error Trap Auto Clean option [XUERTRP AUTO CLEAN].

Purging is a partial clearing of the ERROR LOG (#3.075) file stored in the ^%ZTER(1, global. This global node should *not* be deleted directly since potentially important recent errors would be purged. Deletion of the entire ^%ZTER global would be a greater mistake since the standard reference data contained in the ERROR MESSAGES (#3.076) file stored in ^%ZTER(2, would be lost.

You are first prompted for the number of days to leave in the error trap. If you enter a number of days to retain errors, all errors older than the specified number of days are immediately purged:

**Figure 139: Choosing the Number of Days to Leave Errors in the Error Trap**

```
To Remove ALL entries except the last N days, simply enter the number N at the
prompt. OTHERWISE, enter return at the first prompt, and a DATE at the second
prompt. If no ending date is entered at the third prompt, then only the date
specified will be deleted. If an ending date is entered that range of dates
INCLUSIVE will be deleted from the error log.
```

```
Number of days to leave in error trap: 50
```

```
DONE
```

If you just press <Enter> instead of entering a number of days to retain, you are then prompted for a start date and end date between which to remove errors. Errors in the period you specify are then purged immediately:

**Figure 140: Choosing a Start and End Date Range to Delete Errors from the Error Trap**

```
Starting Date to DELETE ERRORS from: 1/1 <Enter> (JAN 01, 2004)
Ending Date to DELETE ERRORS from: 1/31 <Enter> (JAN 31, 2004)
```

The queueable version of this option, Error Trap Auto Clean, can be scheduled to run in the background. By default, it cleans up errors recorded more than 7 days in the past. You can specify a different interval by placing a numeric value (representing the number of days beyond which to purge) in this option's TASK PARAMETERS field.

## 13.2.6 Error Trap Display Option

The Error Trap Display option [XUERTRAP] displays errors that have been trapped on the system. The messages for these errors are operating-system dependent. You can use the corresponding direct mode utility, ^XTER, from programmer mode.



The error trap tries to capture a description of the error, the local symbol table, the last global reference, and other signon statistics. For Caché, \$ZC calls are used to record IO counts, CPU time, and page faults.

**Figure 141: Error Trap Display Option—Sample User Dialogue**

```
In response to the DATE prompt you can enter:
    'S' to specify text to be matched in error or routine name.

Which date? > T-1
1 error logged on 2/9/95
  1) <ECODETRAP>PRGMODE+5^%ZOSV:2    07:41:52  KDE,KDE  20801D46
    _TNA4523:

No disconnect error

Which error? > 1

Process ID:  2020107A  (538972282)          JAN 18, 1992 17:19:21

Username:  EXAMPLE          Process Name:  VISTA User

UCI/VOL:  [NXT~NXT~ABC999~NXT:KDAABC999]

$ZA:    0                      $ZB:  \013

Current $IO:  _TNA4523:          Current $ZIO:  LTA_00129420196A

CPU time:   3.17                Page Faults:          1204

Direct I/O:  81                  Buffered I/O:          96

$ZE= <ECODETRAP>PRGMODE+5^%ZOSV:2

  D @XQZ G OUT"

Last Global Ref: ^XUSEC(0,"CUR",24,2950209.074142)

Which symbol? >
```

Errors can be reported by searching for a date range or character string. Question marks show a count of errors for the selected range:

- Two question marks (??) *exclude* disconnects.
- Three question marks (???) *include* disconnects.

A string search could be used to find **XQ** in all routines or an **UNDEF** in the definition of all errors. Once an error is identified, the report generator shows the following:

- Job Number
- Username
- IO value
- Date/Time
- UCI/Volume Set
- Error Type
- Last Global Reference

- Line of code that caused the error

It then prompts for a listing of variables, enter **^L** to list all or a letter, such as **X**, to list those starting with **X**. The listing can be printed to the screen or to an output device. You can page through the screen listing, one screen at a time, and enter **^Q** to quit or enter **^** to exit at the end of each screen.

A restore feature can be invoked by entering **^R** provided that the user is working in programmer mode. Programmer mode is required as a protection against restoration of variables from within the menu system. To the extent possible, the environment at the time of the error is restored with the routine and local symbol table intact.

**Figure 142: Local Symbol Table Help**

```
Which symbol? > ?
Enter:
  ^Q to EXIT
  ^^ to return to the last question
  Leading character(s) of symbol(s) you wish to examine
  $ to get a display of the $ system variables
  ^L to obtain a list of all symbols
  ^R to restore the symbol table and ... and enter direct mode
```

After reviewing the error log, you are given the opportunity to examine the operating system's error log. Now that most VistA applications record their errors in Kernel's error log, however, there is less need to track VistA errors in the operating system error log.

**Figure 143: Choosing to Examine the Operating System's Error Log—Sample User Dialogue**

```
Do you want to check the OPERATING SYSTEM ERROR TRAP too? NO//
```

## 13.2.7 Interactive Print of Error Messages Option

The Interactive Print of Error Messages option [XUERTRP PRINT ERRS] provides for an interactive print of the first “n” of occurrences of an error (where “n” is user selectable) over a specified date range.

### III. Device Handler

#### 14 Device Handler: User Interface

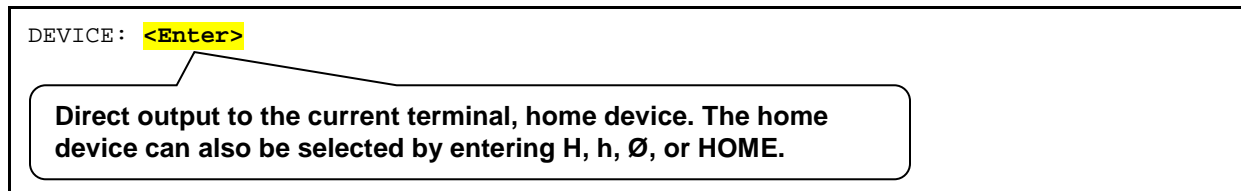
Applications that are designed for the Kernel environment perform output in a consistent manner, using Kernel’s Device Handler. This ensures consistency, both for how you are asked to select devices for output, and also for how output is actually performed.

When you respond to the “DEVICE:” prompt, you are using the Device Handler.

##### 14.1 Printing to Devices

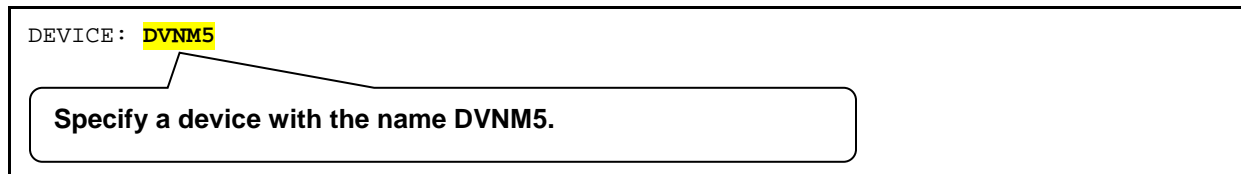
At the “DEVICE:” prompt, to send output to your terminal, you can simply press the <Enter> key. This tells the Device Handler to display the report on the home device (that is, on your terminal), as shown below:

Figure 144: Choosing the Home Device



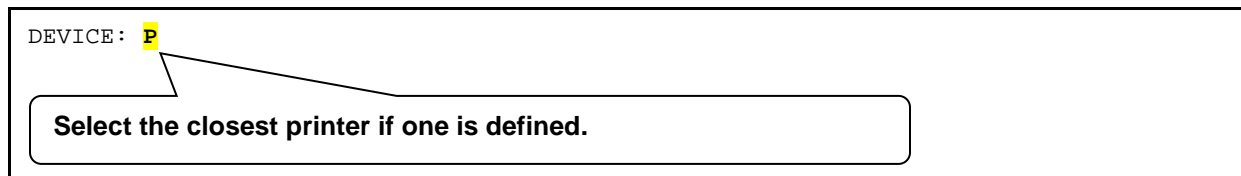
To send output to a printer, enter the name of the printer at the “DEVICE:” prompt, as shown below:

Figure 145: Choosing a Printer Device



To select the closest printer, if one is defined (unlikely), you can simply enter **P** and press <Enter>, as shown below:

Figure 146: Choosing the Closest Printer Device



You can enter a question mark (?) to display help about the syntax of the response.

**Figure 147: Device Syntax Help—One Question Mark (?)**

```
DEVICE: ?
Specify a device with optional parameters in the format
    Device Name;Right Margin;Page Length
    or
    Device Name;Subtype;Right Margin;Page Length
```

You can enter two question marks (??) to display available printers and other devices connected to the current Volume Set or “reachable from” the current Volume Set. You can also ask for a series of help frames under extended help:

**Figure 148: Displaying Devices Help—Two Question Marks (??)**

```
DEVICE: ??
The following information is available:
    All Printers
    Printers only on 'ROU'
    Complete Device Listing
    Devices only on 'ROU'
    Extended Help

Select one (A,P,C,D, or E):
```

You can list all devices. In addition to printers, this list shows other types of devices you can use to handle output. An example of a partial printer listing is shown below:

**Figure 149: Sample Printer Listing**

```
Select one (A,P,C,D, or E): P
GENICOM10P 6th Floor 301      GENICOM16P 6th Floor 301
HP LASER DEV-10P             HP LASER DEV-12P
```



**REF:** Unusual device types (e.g., Resource devices) are discussed in “[Special Devices.](#)”

## 14.1.1 Specifying Right Margin and Page Length

Ordinarily, when choosing an output device, you only need to specify the device name. There can be times, however, when you may find it useful to specify the right margin or the page length for your output. The syntax to specify margin and page length uses semicolon delimiters. The format is:

```
DEVICE: Device Name ; Right Margin ; Page Length
```

The following examples show how to use the additional semicolon-delimited pieces at the “DEVICE:” prompt:

**Table 19: Sample Semicolon-delimited Pieces at the “DEVICE:” Prompt**

Semicolon-delimited Piece	Description
DEVICE: DVNM5;80;66	Use the DVNM5 device with a right margin of 80 columns and page length of 66 lines.
DEVICE: ;132	Use the home device, right margin of 132.
DEVICE: ;;66	Use the home device and format the output with page breaks at 66 lines.
DEVICE: ;;9999	Scroll output on the home device without needing to press the <Enter> key at page breaks.

## 14.2 Queuing

At the “DEVICE:” prompt, if you enter a device’s name, the output goes directly to that device. If the output you’re sending is, for example, a long report, this ties your terminal up until the report finishes printing to that device.

You can print output and yet keep your terminal free for other processing by queuing your jobs rather than running them directly. As described in the “[TaskMan: User Interface](#)” section, you can queue output by entering **Q** at the “Device:” prompt. The device prompt is then presented a second time so that you can specify the output device.

**Figure 150: Specifying a Device and Queuing a Print Job—Sample User Dialogue (1 of 2)**

```
DEVICE: Q
DEVICE: DVNM5
REQUESTED TIME TO PRINT: NOW// <Enter>
REQUEST QUEUED!
Task number: 856103
```

Alternatively, you can still specify the device first. The Device Handler checks to see if the device is available and, if so, asks you if you want to queue your output. If the device cannot be reached at the current time, Device Handler indicates that the device is busy or unavailable. You can avoid the preliminary availability check by entering **Q** at the first prompt (see [Figure 150](#)).

**Figure 151: Specifying a Device and Queuing a Print Job—Sample User Dialogue (2 of 2)**

```
DEVICE: DVNM5
DO YOU WANT YOUR OUTPUT QUEUED? NO// YES

REQUESTED TIME TO PRINT: NOW// T@18:00 <Enter> (JUL 11, 2004@18:00)
REQUEST QUEUED!
Task number: 856109
```

Whether you request queuing before or after naming a device, Device Handler then asks you to specify a time for the queued job to run. You can accept the default (NOW) or indicate a later time in the usual format. Queuing sends output to TaskMan for scheduling. Meanwhile, you can continue working on the computer system without a delay.

**Figure 152: Queuing a Print Job—Sample User Dialogue**

```
REQUESTED TIME TO PRINT: NOW// T@18:00 <Enter> (JUL 11, 2004@18:00)
REQUEST QUEUED!
Task number: 856109
```



**REF:** For more information about queuing output, see the “[TaskMan: User Interface](#)” section.

## 14.3 Specifying a Special Subtype

There is an exception to using numbers in the second semicolon piece to indicate a right margin setting. If, instead of a number, you use a letter and then a hyphen in a device specification (e.g., P-DEC), the second semicolon piece specifies a terminal type entry from the TERMINAL TYPE (#3.2) file to use for the output. A terminal type entry specifies information about what commands to use with specific printers (e.g., escape codes).

**Figure 153: Terminal-Type Device Entry—Without Pauses**

```
DEVICE: ;P-DEC
```

If the home device is a video terminal, output would be formatted with page breaks, and it would scroll without waiting for the user to press the <Enter> key after a screen display.

One form of the subtype request made possible by VA FileMan's print routines is the use of the word **SINGLE** along with **P-** or **PK-**. Appending **-SINGLE** indicates that a pause should occur after the display of each page. If using a slaved device to print the screen display, for example, the next page is displayed only after the user has pressed **<Enter>**:

**Figure 154: Terminal-Type Device Entry—With Pauses**

```
DEVICE: ;P-DEC-SINGLE
```

If the home device is a video terminal, output would be presented one (single) page at a time; the next page being displayed after the user presses the **<Enter>** key.

If you are *not* sure which subtype to use, you can enter a partial specification of the subtype in the second piece, and the Device Handler lets you choose from all matching subtypes. For example, if a dozen subtypes begin with "P-LASER...", you can list them by entering only the beginning of the subtype name (e.g., P-LASER):

**Figure 155: Partial Device Specification—Unknown Subtype**

```
DEVICE: LASER;P-LASER
```

All subtypes beginning with P-LASER are listed; you can then choose a subtype from this list.

When using a subtype as the second semicolon piece of a device specification, you can still specify a right margin and page length to use, but you then do so with the 3rd and 4th semicolon pieces:

**Figure 156: Device Specification—Four Semicolon Piece: Sample**

```
DEVICE: LASER;P-LASER-NEW;132;100
```

The syntax for the four semicolon piece form of the device specification is:

**Figure 157: Device Specification—Four Semicolon Piece: Syntax**

```
DEVICE: Device Name ; Subtype ; Right Margin ; Page Length
```

### 14.3.1 Spool Document Names—An Exception

When you request the spool device at the device prompt, you can use the following formats to specify the spool document name:

**Figure 158: Device Syntax—Specifying a Spool Document Name: Sample Formats (1 of 2)**

```
DEVICE: Spooler ; Spool Document Name ; Right Margin ; Page Length
```

**Figure 159: Device Syntax—Specifying a Spool Document Name: Sample Formats (2 of 2)**

```
DEVICE: Spooler ; Subtype ; Spool Document Name
```

Although neither right margin nor page length can be specified when including a subtype as the second piece and spool document name as the third, no functionality is lost. The explanation is simple; the spooler only responds to these two terminal type specifications. In other words, identifying a subtype for the spooler does no more than define a margin and page length.

Spool document entries in the SPOOL DOCUMENT (#3.51) file *cannot* have names beginning with: **P-**, **PK-**, **C-**, etc. (i.e., one or two letters followed by a hyphen, see Section #15.4.1). Because this syntax is the required naming convention for subtypes, you are allowed to specify the document name and the subtype in any order.



**REF:** For more information about Spool Devices, see the “[Spooling](#)” section.

## 14.4 Alternate Syntax for Device Specification

An alternate syntax is available for specifying right margin and page length when responding to the device prompt. Using the alternate format, you can specify pitch, intensity, and quality. The success of specifying these additional attributes, however, depends on whether the corresponding fields have been defined by system administrators at your site.

The syntax requires the use of a slash (“/”) after the last semicolon (see [Figure 160](#)).

You can use the following codes to specify special device attributes (in any order), without separating punctuation to delimit the pieces:

**Table 20: Alternate Device Attribute Codes**

Code	Description
<b>B</b>	Boldface
<b>L</b>	Page length
<b>M</b>	Margin
<b>P</b>	Pitch
<b>Q</b>	Quality (can be Q, Q1, or Q2)



For example, you could specify:

**Figure 160: Specifying a Device—Using Alternate Syntax**

```
DEVICE: LASER;P-LASER-LANDSCAPE;/M132L100P16BQ2
```

In this example (Figure 160), the following attributes are set:

- Margin (“M”) is set to 132 (**M132**)
- Page length (“L”) is set to 100 lines (**L100**)
- Pitch (“P”) is set to 16 (**P16**)
- Intensity to boldface (“B”)
- Quality (“Q”) set to letter quality (**Q2**).

An absence of the **B** would indicate normal intensity. The quality settings are: **Q**, **Q1**, and **Q2**.

Your system administrators need to confirm that the appropriate code to set the specified printer attributes is set up for the device that you are using. Then, when the Device Handler closes the device, system administrators need to be sure that appropriate reset code is in the CLOSE EXECUTE field, so that the characteristics do *not* stay in effect. If, for example, someone requests a small pitch, subsequent reports also use the small pitch unless reset in the CLOSE EXECUTE statement for that device (or altered by the OPEN EXECUTE statement of the next device called).

## 14.5 Summary

The Device Handler is a common interface used by all VistA applications to send output to devices (usually, printers). Once you become familiar with the Device Handler, you can enhance your productivity by making use of some of the Device Handler’s special features, including queuing, selecting a specific right margin or page length, and selecting a special subtype.

# 15 Device Handler: System Management

The Device Handler makes use of two primary Files:

- DEVICE (#3.5) File
- TERMINAL TYPE (#3.2) File

Together, these two files control most of the characteristics of devices in Kernel.

The global locations of the device-related files are:

**Table 21: Device-related Files Global Locations**

Device-related File Name	Global Location
DEVICE (#3.5)	^%ZIS(1,
TERMINAL TYPE (#3.2)	^%ZIS(2,
DA RETURN CODES (#3.22)	^%ZIS(3.22,

## 15.1 DEVICE (#3.5) File

Kernel's DEVICE (#3.5) file stores information about devices on the system. All connected volume Sets/CPU's should make use of a single DEVICE (#3.5) file. Then all information concerning a particular device is stored in just one place, which facilitates device management.

Sometimes, a CPU has an attachment point to which a device can be connected, for example, physical ports. The \$I field in the DEVICE (#3.5) file entry identifies this attachment point.

Most devices (e.g., printers) are connected to the network and \$I points to the name used by the underlying OS to point to the device. When using such a device, Kernel's Device Handler allows the creation and use of multiple DEVICE (#3.5) file entries for the same physical device. Each DEVICE (#3.5) file entry can contain different specifications (font, margin, page length, etc.) to format output. Each entry in the DEVICE (#3.5) file, then, uniquely identifies a set of instructions to send to a particular device on the network.



Each device that Kernel Device Handler needs to communicate with should be set up as an entry in the DEVICE (#3.5) file. The DEVICE (#3.5) file supports a variety of devices, including video display terminals (VDTs), commonly called cathode ray tube devices (CRTs); printers; tape drives; and operating system files (e.g., Host File Server [HFS] devices).





The DEVICE (#3.5) file is located in the Manager's account for common reference from all associated accounts. With TaskMan's help, this information is also available to all associated processors (CPUs) in the local area network.

## 15.1.1 DEVICE File Fields

The most essential fields in the DEVICE (#3.5) file to populate or consider populating for device entries are:

**Table 22: DEVICE File Fields**

Field	Description
NAME (#.01)	This is the name of the device. It is used at the “DEVICE” prompt to select this device. It should <i>not</i> be the internal name for the device but a logical one. It <i>must</i> start with one uppercase character and <i>not</i> contain lowercase characters.
\$I (#1)	This field holds the hardware port name that the operating system (OS) can identify when referencing a port on a CPU. On layered systems where opening of host files is supported, this field can hold the host file name.
VOLUME SET(CPU) (#1.9)	<p>(Optional) This field holds the name of the CPU to which this device belongs. It holds the name of the CPU where the physical port resides.</p> <p>If entered, the device is assumed to be accessible only from the specified CPU.</p> <p>If the field is left blank, this device is assumed to be accessible from all CPUs in the network. In other words, when this device is referenced, the Device Handler operates as if this device is resident on the local CPU. For example, if there is a device that uses the same \$I on each CPU, one entry can be made in the DEVICE (#3.5) file by leaving this field set to <b>NULL</b>. This shortcut works only if the same \$I has been associated with this device on every CPU. The Device Handler still maintains the CPU cross-reference to support queuing and other activities. The cross-reference format involves use of periods as delimiters. If the VOLUME SET(CPU) value were “<b>BBB</b>,” the cross-reference for the device with a \$I of <b>75</b> would be “<b>BBB.75</b>”. If the VOLUME SET(CPU) value were <b>NULL</b>, then “.75” would be the CPU cross-reference.</p> <p> <b>NOTE:</b> In the Caché environment, where cluster mounting is used and most devices are set up on all CPUs, all such devices do <i>not</i> need a value for this field.</p>
SIGN-ON/SYSTEM DEVICE (#1.95)	If set to <b>YES</b> , this field identifies that this entry is the primary device among those device entries that have the same \$I with the same VOLUME SET(CPU) . Among those device entries that have a common \$I and CPU, only one of these entries can have this field set to <b>YES</b> . If none of the common device entries is set to <b>YES</b> , the default device is identified by the first device on the CPU cross-reference. The default device is used when the Device Handler is invoked with \$I as the device to be selected.
TYPE (#2)	<p>This field contains the general type of device on the CPU.</p> <p> <b>REF:</b> For a list of device types, see <a href="#">Table 23</a>.</p>
SUBTYPE (#3)	Use this field to select a default terminal type for the device. This field points to the TERMINAL TYPE (#3.2) file to retrieve a standard

Field	Description
	<p>set of characteristics that have been defined for vendor devices (e.g., Laser printers or VT320 CRTs).</p> <p> <b>REF:</b> For a discussion of the <code>TERMINAL TYPE</code> (#3.2) file, see the “<a href="#">TERMINAL TYPE (#3.2) File</a>” section.</p>
QUEUING (#5.5)	<p>You can control the degree of queuing allowed for a device with the <code>QUEUING</code> field.</p> <p> <b>REF:</b> For a list of settings to control queuing for a device, see <a href="#">Table 24</a>.</p>
PRE-OPEN EXECUTE (#7)	<p>This is the executable M code that is used by <code>%ZIS</code> before opening the device.</p> <p>If you define the <code>%ZISQUIT</code> variable, the device open fails. Setting <code>%ZISQUIT=1</code> in the <code>PRE-OPEN EXECUTE</code> code signals <code>%ZIS</code> to reject the selected device. With this variable, you can use the <code>PRE-OPEN EXECUTE</code> as a screen on whether the device should be opened or not.</p>
POST-CLOSE EXECUTE (#8)	<p>This is the executable M code that is used by <code>%ZISC</code> after closing the device.</p>
OPEN PARAMETERS (#19)	<p>These parameters are used to open a device with specified characteristics/addresses. This field is primarily used with non-terminal devices (e.g., Magtape and Sequential Disk Processor). Magtape (MT), SDP (obsolete), and Host File Server (HFS) device types use the value in this field as the default if the <code>ASK PARAMETERS (#5)</code> flag is set. Users would then be prompted for address/parameters. If the <code>ASK PARAMETERS</code> flag is <i>not</i> set and if there is a value in the <code>OPEN PARAMETERS (#19)</code> field, this value is used when opening the device (or file).</p> <p> <b>NOTE:</b> Each operating system has its own way of specifying parameters. For example, under Caché, margins are set with both the <b>OPEN</b> and <b>USE</b> command.</p>
USE PARAMETERS (#19.5)	<p>This field holds the parameters to be used in an M <b>USE</b> statement. The Device Handler takes information from this field when opening and using such devices as the Magtape (MT) drive.</p> <p> <b>NOTE:</b> Each operating system has its own way of specifying parameters. For example, under Caché, margins are set with both the <b>OPEN</b> and <b>USE</b> command.</p>

**Table 23: Device Types in the TYPE Field in the DEVICE (#3.5) File**

Type	Description
<b>BAR</b>	Identifies the device as a bar code reader.
<b>CHAN</b>	Network Channels are high speed devices that use network protocols (e.g., TCP/IP).
<b>HFS</b>	The Host File Server (HFS) type, and the associated functionality, provides the vehicle to <b>READ</b> and <b>WRITE</b> to host level files. Instead of directing reports to a printer, the results could be placed into an OpenVMS or UNIX/Linux file. This would allow non-M-based statistical software or spreadsheet to use data produced by the M-based application by simply extracting data from the host file.
<b>IMPC</b>	Imaging work station device (reserved for Vista Imaging).
<b>MT</b>	Magtape (MT) devices.
<b>OTH</b>	Other (OTH) devices that do <i>not</i> fit a particular category.
<b>RES</b>	Resources (RES) is a type used for special sequencing of tasks that do <i>not</i> require a particular device.
<b>SDP</b>	(Obsolete) Sequential Disk Processor (SDP) is a predefined allocated disk space used for sequential processing; use HFS.
<b>SPL</b>	Spool (SPL) device is a predefined allocated disk space. It is similar to SDP; however, access to the spool device can be achieved from multiple users simultaneously.
<b>TRM</b>	Terminal devices (e.g., most CRTs and printers) should be associated with a corresponding device entry with a type of <b>TRM</b> .
<b>VTRM</b>	Virtual Terminal Server devices are those that are associated with a dynamically created M port identification ( <b>\$I</b> ). A generic device entry with a device type of <b>VTRM</b> can be established for users who log into the system through terminal servers or other network protocols.



**NOTE:** Device type descriptions can also be obtained by entering two question marks (??) at the TYPE field while editing a device.



**REF:** For more information on these device types, see “[Special Devices.](#)”

Also, for more information on Host File Server (HFS) devices, see “[Host Files.](#)”

**Table 24: Queuing Settings**

Setting	Queuing	Description
0	ALLOWED	Jobs can be queued or run directly (default).
1	FORCED	Queuing is forced, unless disallowed by application.
2	NOT ALLOWED	Queuing to device is <i>not</i> allowed.

### 15.1.1.1 OpenVMS-Specific DEVICE Fields



**NOTE:** These fields are used by VMS and *not* Caché.

The DEVICE (#3.5) file can store operating system-specific information. For example, several fields are included in the DEVICE (#3.5) file to configure terminals and ports on Terminal Servers as part of an OpenVMS start-up command file. These are:

**Table 25: Mixed OS Environment Fields in the DEVICE (#3.5) File**

Field	Description
LAT SERVER NODE (#61)	This is the DECserver/terminal server node name that the device is on. It is used by the <b>XTLATSET</b> routine to build data files for VMS startup.
LAT SERVER PORT (#62)	This is the port on the DECserver/terminal server to which this device is connected. It can be entered in the <b>LC-2-5</b> form or <b>31</b> form. On EQUINOX it is in the <b>PORT_31</b> form. This field is used by the <b>XTLATSET</b> routine to build VMS data files for startup.
VMS DEVICE TYPE (#63)	This is a flag that is passed into the file LT_PTR.DAT by the <b>XTLATSET</b> routine to select how this port should be set up in VMS by the <b>SY\$MANAGER:SYSPRINT.COM</b> file when it runs.
LAT PORT SPEED (#64)	This field holds the value that is passed to the TSC_LOAD.COM file for loading the DECserver permanent database.
PRINT SERVER NAME OR ADDRESS (#65)	This field contains the fully qualified domain name (FQDN) or specific TCP/IP address of a remote server (e.g., LPD/LPR printing) or device (e.g., Telnet printer).
TELNET PORT (#66)	This field contains the Telnet port of a remote device (e.g., Telnet printer). The allowable range is a number between <b>2000</b> and <b>65534</b> .
REMOTE PRINTER NAME (#67)	This is the name of the remote printer that is referenced by the PRINT SERVER NAME OR ADDRESS (#65) and TELNET PORT (#66) fields.

Kernel Toolkit software distributes the **XTLATSET** and **NVSTNSET** routines that makes use of these fields.

## 15.1.2 Device Edit Menu

The DEVICE (#3.5) file has many more fields where additional specific information for particular devices can be entered. Kernel provides a number of options to facilitate creating and editing device types on the Device Edit menu [XUDEVEDIT] on the Device Management menu [XUTIO]:

**Figure 161: Device Edit Options**

Device Management ...		[XUTIO]
Device Edit		[XUDEVEDIT]
ALL	Edit All Device Fields	[XUDEVEDITALL]
CHAN	Network Channel Device Edit	[XUDEVEDITCHAN]
HFS	Host File Server Device Edit	[XUDEVEDITHFS]
LPD	LPD/VMS Device Edit	[XUDEVEDITLPD]
MT	Magtape Device Edit	[XUDEVEDITMT]
RES	Resource Device Edit	[XUDEVEDITRES]
SPL	Spool Device Edit	[XUDEVEDITSPL]
TRM	TRM or VTRM Device Edit	[XUDEVEDITTRM]



**AUTHOR'S NOTE:** The SDP Device Edit option [XUDEVEDITSDP] is purposely *not* displayed in this menu list, because it is obsolete.

### 15.1.3 Sample Device File Entries

Kernel patch XU\*8.0\*440 also included the addition of the SECONDARY \$I (#52) field in the DEVICE (#3.5) file.

#### 15.1.3.1 HFS Devices

[Figure 162](#) and [Figure 163](#) show an HFS device using the Host File Server Device Edit option [XUDEVEDITHFS] to update Field #52:

**Figure 162: HFS Device—Sample Data Entry Screen**

```
-----
                        EDIT A HOST FILE SERVER DEVICE

NAME: HFS                                LOCATION: Host Disk File

      $I: USER$:[TEMP]MIXED.TXT
ALT $I: /TMP/MIXED.TXT
SUBTYPE: P-OTHER

      ASK PARAMETERS: YES                 MARGIN WIDTH:
      ASK HOST FILE: YES                 PAGE LENGTH:
ASK HFS I/O OPERATION: NO                VOLUME SET(CPU):

      OPEN PARAMETERS: ("NWS")
      CLOSE PARAMETERS:
      PRE-OPEN EXECUTE:
      POST-CLOSE EXECUTE:

      QUEUING: ALLOWED                   SUPPRESS FORM FEED: YES

-----
Exit      Save      Refresh

Enter a command or ``^`` followed by a caption to jump to a specific field.

COMMAND:                                     Press <PF1>H for help Insert
```

**Figure 163: HFS Device—Sample DEVICE File Entry**

```
NAME: HFS                                $I: USER$:[TEMP]MIXED.TXT
ASK DEVICE: NO                            ASK PARAMETERS: NO
LOCATION OF TERMINAL: Disk                  ASK HOST FILE: NO
ASK HFS I/O OPERATION: YES                SECONDARY $I: /tmp/mixed.txt
OPEN COUNT: 5                             SUBTYPE: P-OTHER
TYPE: HOST FILE SERVER
OPEN PARAMETERS: ("NWS")
```



Figure 164 shows a printer set up as an HFS device with the Terminal Type CLOSE EXECUTE, which submits the file to the OS print queue:

**Figure 164: HFS Device—Sample Data Entry Screen with the Terminal Type CLOSE EXECUTE**

```
EDIT A HOST FILE SERVER DEVICE

NAME: SDD P10                                LOCATION: Printer next to One Xuuser

  $I: USER$:[TEMP]SDD_DN2$PRT.TXT
Alt $I:
SUBTYPE: P-HP8000 TCP/S

      ASK PARAMETERS: NO                      MARGIN WIDTH:
      ASK HOST FILE: NO                      PAGE LENGTH:
ASK HFS I/O OPERATION: NO                  VOLUME SET(CPU):

      OPEN PARAMETERS: "NWS"
      CLOSE PARAMETERS:
      PRE-OPEN EXECUTE:
      POST-CLOSE EXECUTE:
      QUEUING:                               SUPPRESS FORM FEED: YES

-----
Exit      Save      Refresh

Enter a command or ``^`` followed by a caption to jump to a specific field.

COMMAND:                                     Press <PF1>H for help Insert
```

### 15.1.3.2 NULL Devices

[Figure 165](#) and [Figure 166](#) shows a **NULL** device entry for a mixed operating system, VMS (Primary) and Linux (Secondary), using the TRM or VTRM Device Edit option [XUDEVEDITTRM] to update the SECONDARY \$I (#52) field in the DEVICE (#3.5) file:

**Figure 165: Mixed Operating System: VMS (Primary) and Linux (Secondary) NULL Device—Sample Data Entry Screen**

```

                                Edit a TRM or VTRM device

NAME: NULL                                LOCATION: Bit Bucket

    $I: _NLA0:
    ALT $I: /dev/null
    TYPE: TERMINAL
    SUBTYPE: P-OTHER

                                SIGN-ON/SYSTEM DEVICE: NO
                                VOLUME SET(CPU):

    ASK DEVICE: NO                        MARGIN WIDTH:
    ASK PARAMETERS: NO                    PAGE LENGTH:

    QUEUING:                              SUPPRESS FORM FEED:

-----
Exit      Save      Refresh

Enter a command or '^' followed by a caption to jump to a specific field.

COMMAND:                                Press <PF1>H for help  Insert
```

**Figure 166: Mixed Operating System: VMS (Primary) and Linux (Secondary) NULL Device—Sample DEVICE File Entries**

```

NAME: NULL                                $I: NLA0:
    ASK DEVICE: NO                        ASK PARAMETERS: NO
    SIGN-ON/SYSTEM DEVICE: NO            LOCATION OF TERMINAL: Bit Bucket
    SECONDARY $I: /dev/null              OPEN COUNT: 8523
    SUBTYPE: P-OTHER                     TYPE: TERMINAL
```



**REF:** For additional sample **NULL** device entries, see Section [15.6.4.2](#), “[NULL Device](#).”

### 15.1.3.3 BROWSER Devices

The following example shows DEVICE (#3.5) file entries for a BROWSER device:

**Figure 167: BROWSER Device—Sample DEVICE File Entry**

```
NAME: BROWSER                               $I: USER$:[BROWSER]DDBR.TXT
ASK DEVICE: YES                             ASK PARAMETERS: NO
SIGN-ON/SYSTEM DEVICE: NO                  QUEUING: NOT ALLOWED
LOCATION OF TERMINAL: BROWSER                ASK HOST FILE: NO
ASK HFS I/O OPERATION: NO                 SECONDARY $I: /tmp/ddbr.txt
OPEN COUNT: 1                             OPEN PARAMETERS: ("NWS")
POST-CLOSE EXECUTE: D POST^DDBRZIS I $G(IO("CLOSE"))'="" N % S %=$$DEL1^%ZISH(
IO("CLOSE"))
PRE-OPEN EXECUTE: N X S X=$$TEST^DDBRT S:X IO=$$UNIQUE^%ZISUTL(IO) I 'X S %ZIS
QUIT=1,X="Browser not selectable from current terminal." W $C(7),!,X
SUBTYPE: P-BROWSER                         TYPE: HOST FILE SERVER
```

### 15.1.3.4 P-MESSAGE Devices

[Figure 168](#) shows DEVICE (#3.5) file entries for a P-MESSAGE device:

**Figure 168: P-MESSAGE Device—Sample DEVICE File Entry**

```
NAME: P-MESSAGE-HFS-ONT                     $I: USER$:[TEMP]XMHFS.TMP
ASK DEVICE: NO                             ASK PARAMETERS: NO
SIGN-ON/SYSTEM DEVICE: NO                 QUEUING: ALLOWED
LOCATION OF TERMINAL: HFS FILE==> MESSAGE
ASK HOST FILE: NO                         ASK HFS I/O OPERATION: NO
SECONDARY $I: /tmp/xmhfs.tmp              OPEN PARAMETERS: ("NWS")
PRE-OPEN EXECUTE: D EN^XMAPHOST Q:$G(POP) S IO=$$UNIQUE^%ZISUTL(IO)
SUBTYPE: P-MESSAGE-HFS-ONT               TYPE: HOST FILE SERVER
```

### 15.1.3.5 TELNET Devices

The following examples show DEVICE (#3.5) file entries for TELNET devices:

**Figure 169: TELNET Device—Sample DEVICE File Entry (1 of 2)**

```
NAME: TELNET/LINUX                          $I: /dev/pts/
ASK DEVICE: YES                             SIGN-ON/SYSTEM DEVICE: YES
LOCATION OF TERMINAL: Telnet Terminal
OPEN COUNT: 101                            SUBTYPE: C-VT320
TYPE: VIRTUAL TERMINAL
```

**Figure 170: TELNET Device—Sample DEVICE File Entry (2 of 2)**

```
NAME: TELNET/VMSS                           $I: TNA
ASK DEVICE: YES                             ASK PARAMETERS: NO
SIGN-ON/SYSTEM DEVICE: YES                 LOCATION OF TERMINAL: Telnet terminal
OPEN COUNT: 8657                           SUBTYPE: C-VT320
TYPE: VIRTUAL TERMINAL
```

## 15.2 Mixed OS Environment Fields



**NOTE:** This is for Caché only.

With the advent of remote data centers (RDCs), the VA may use mixed OS environments with a Caché Extended Caché Protocol (ECP) App/Data server configuration. In this environment output devices need different **\$IO** values depending on where the job is running. Kernel patch XU\*8.0\*440 added support to allow the Device Handler to work in a mixed operating system (OS) environment. The following fields were added to the KERNEL SYSTEM PARAMETERS (#8989.3) file to provide this support:

**Table 26: Mixed OS Environment Fields in the KERNEL SYSTEM PARAMETERS (#8989.3) File**

Field	Description
MIXED OS (#.05)	This is used to select which field to use when selecting operating system (OS)-specific data fields in a mixed OS environment. The support is for Caché in an ECP client/server configuration with only two operating systems at a time. In a mixed environment the primary OS is always VMS, and the secondary OS is <i>not</i> VMS (i.e., Linux or NT). Some of the fields that need mixed values are: <ul style="list-style-type: none"><li>• PRIMARY HFS DIRECTORY (#320) field in the KERNEL SYSTEM PARAMETERS (#8989.3) file</li><li>• SECONDARY HFS DIRECTORY (#320.2) field in the KERNEL SYSTEM PARAMETERS (#8989.3) file</li><li>• SECONDARY \$I (#52) field in the DEVICE (#3.5) file</li></ul>
SECONDARY HFS DIRECTORY (#320.2)	This field holds the secondary HFS directory path.
LOGICAL DISK NAME (#504)	This field holds a logical disk name that is stored in the Caché CPF file for client system in an ECP client/server configuration.
PHYSICAL DISK (#505)	This field holds the physical disk name to which Cache VMS converts the LOGICAL DISK NAME (#504).
SECONDARY \$I (#52)	This field holds the <b>\$IO</b> value to be used if this is the secondary system in a mixed OS environment. It is <i>not</i> used otherwise. It is only used for output devices.

### 15.2.1 Edit Logical/Physical Mapping Option

Kernel patch XU\*8.0\*440 added the Edit Logical/Physical Mapping option [XU SID EDIT] on the Kernel Management Menu [XUKERNEL]. The XU SID EDIT option lets you edit the fields that support the LOGICAL to PHYSICAL translation for the System ID. This is only valid in a Caché 5.2 client/server configuration.

## 15.2.2 Enter/Edit Kernel Site Parameters option

Kernel patch XU\*8.0\*440 updated the Enter/Edit Kernel Site Parameters option [XUSITEPARM], screen 3, shows these added fields:

**Figure 171: Enter/Edit Kernel Site Parameters Option—ScreenMan Form 3: MIXED OS (#.05) and SECONDARY HFS DIRECTORY (#320.2) Fields**

```
-----
                        Kernel Site Parameter edit
                DOMAIN:XXX.KERNEL.FO-SITE.MED.VA.GOV

        MAX SPOOL LINES PER USER: 99999
        MAX SPOOL DOCUMENTS PER USER: 99
        MAX SPOOL DOCUMENT LIFE-SPAN: 60

                MIXED OS: VMS/LINUX
        DEFAULT DIRECTORY FOR HFS: USER$:[TEMP]
        SECONDARY HFS DIRECTORY: /VAR/TMP/

        DNS IP: 10.9.99.10,10.9.21.999

        NEW PERSON IDENTIFIERS:

        -----
        Exit      Save      Next Page      Refresh

        Enter a command or ``^`` followed by a caption to jump to a specific field.

        COMMAND:                                     Press <PF1>H for help Insert
```

## 15.3 Device Security

To regulate who can use a particular device, you can use the PASSWORD and SECURITY fields.

The SECURITY field, if populated, should contain a string of characters to compare with a user's FILE MANAGER ACCESS CODE (#3) field, **DUZ(0)**, when the device is selected. Access is denied to anyone whose **DUZ(0)** does *not* contain one of the specified characters. As with other uses of **DUZ(0)**, the at-sign (@; Programmer access) overrides this restriction.


The PASSWORD field, if populated, forces all users trying to log on to the device to be prompted for the matching password, before entering their Access code.

## 15.4 TERMINAL TYPE (#3.2) File

The TERMINAL TYPE (#3.2) file holds device vendor-specific code to characterize a terminal type. For example, escape sequences can be entered in the OPEN EXECUTE (#6) and CLOSE EXECUTE (#7) fields to set pitch or font. Every device in the DEVICE (#3.5) file *must* be assigned a terminal type, in the SUBTYPE (#3) field.

The most common fields to populate for TERMINAL TYPE (#3.2) file entries are:

**Table 27: Common Fields in the TERMINAL TYPE (#3.2) File**

Field	Description
NAME (#.01)	The name of the terminal type.  <b>REF:</b> For a description and list of acceptable terminal type name formats, see the “ <a href="#">Terminal Type Naming Conventions</a> ” section and <a href="#">Table 28</a> .
SELECTABLE AT SIGN-ON (#.02)	This field is used to screen the choices that can be made at the “DEVICE TYPE” prompt during signon.
RIGHT MARGIN (#1)	This field is the number of characters wide for this device.
FORM FEED (#2)	The argument of an M <b>WRITE</b> statement that sets the top-of-form for the use of tractor-feed paper on a printer, or clears the screen of a video display terminal.
PAGE LENGTH (#3)	This field is the number of usable lines on the output device.
BACK SPACE (#4)	The argument of an M <b>WRITE</b> statement that causes the cursor to back space.
OPEN EXECUTE (#6)	This is the executable M code that is used by %ZIS to <b>OPEN</b> the terminal.
CLOSE EXECUTE (#7)	This is the executable M code that is used by %ZIS to <b>CLOSE</b> the terminal [i.e., X ^%ZIS(“C”)].

The TERMINAL TYPE (#3.2) file has many more fields where additional specific information for particular terminal types can be entered. Kernel provides the following options to facilitate creating and editing terminal types:

**Figure 172: Terminal Type Edit Options**

Device Management ...	[XUTIO]
Terminal Type Edit	[XUTERM]
Change Device’s Terminal Type	[XUCHANGE]
List Terminal Types	[XULIST]

## 15.4.1 Terminal Type Naming Conventions

The convention for naming terminal types is as follows:

**Table 28: Terminal Type Naming Conventions**

Terminal Type	Description
<b>C-</b>	Video terminals (e.g., C-VT320).
<b>PK-</b>	Printers with keyboards.
<b>P-</b>	Printers without keyboards (e.g., P-LASER).
<b>M-</b>	Modems.

The general format is limited to two alphabetic character prefix, followed by a hyphen, and followed by alphanumeric characters.

As mentioned previously (see Section #[14.3.1](#)), a spool document name *cannot* use this format; this is so that it can be distinguished from a device subtype in a call to the Device Handler. Confusion could arise since either can be used as the second piece of the device specification. The SPOOL DOCUMENT (#3.51) file has an input transform pattern match that guards against creation of document names in the format of device subtypes.

## 15.4.2 How Shared Device and Terminal Type Attributes are Used

The DEVICE (#3.5) and TERMINAL TYPE (#3.2) files share attribute fields for RIGHT MARGIN and PAGE LENGTH. If a value is entered for RIGHT MARGIN or PAGE LENGTH in the DEVICE (#3.5) file, it overrides the value from the TERMINAL TYPE [#3.2] file.

When a user selects a device by responding to the device prompt with only the first required piece of information, the device identification, Device Handler retrieves parameters to characterize the device (e.g., RIGHT MARGIN) from the DEVICE (#3.5) file. Furthermore, the Device Handler checks the ASK PARAMETERS (#5) flag for the selected device and, if the flag is set, prompts the user for associated parameters, presenting DEVICE (#3.5) file characteristics as the default. For terminals and virtual terminals (types TRM and VTRM, respectively), the user is prompted for the right margin. For magtape (MT), Sequential Disk Processor (SDP; obsolete), and Host File Server (HFS) devices, they can be prompted for address/parameters with the value of the OPEN PARAMETERS (#19) field (in the DEVICE [#3.5] file) as the default.



**REF:** For more information on Magtape (MT) devices, see “[Special Devices.](#)”

For more information on Host File Server (HFS) devices, see Chapter [16](#), “[Host Files.](#)”

### 15.4.3 Terminal Type Information Retained by User

User can change some terminal type attributes of their signon device by doing either of the following:

- Changing the terminal type during the session with the Edit User Characteristics option [XUSEREDITSELF].
- Selecting a device for direct output.

Kernel uses the `^XUTL` global to hold information about changes made to device characteristics of the home device during a session.



**REF:** For more information the `^XUTL` global, see the “[Menu Manager: System Management](#)” section.

The terminal type established for users at each signon is stored in their NEW PERSON (#200) file entries so that, if necessary, it can be used as a default for the next signon.

## 15.5 Devices and Signon

### 15.5.1 Device Selection at Signon and Virtual Terminal Devices

Every interactive user *must* be associated with a device by the Device Handler when they sign onto the VistA system. The device association is done by matching the incoming user’s `$I` (#1) field value with the `$I` value of an entry in the DEVICE (#3.5) file.

Historically, it was practical to set up one device entry with a matching `$I` for each physical port. With the move to OpenVMS, however, the `$I` of the user was dynamic, with many thousands of `$I` values possible. The Virtual Terminal device type (VTRM; see [Table 23](#)) was created as a way to have one device entry to be used for signon for multiple incoming `$I` values. The Device Handler still checks to see if it can assign a device to an incoming process based on an exact match of `$I` values. If there is no direct match, however, Device Handler checks to see if the *first part* of the user’s `$I` value matches the `$I` value of a virtual device entry. This way, a virtual device with a `$I` value of `_TNA` can service all incoming processes whose `$I` values *start* with the string `TNA`.

Virtual devices do *not* need a value in the VOLUME SET(CPU) (#1.9) field; they should have the SIGNON/SYSTEM DEVICE (#1.95) field set to **YES**, however, to speed up the signon device selection process.

Common device prefixes on VMS systems that could be used for virtual terminal device entries include:

- **TNA**—Telnet devices
- **RTA**—Remote processes using the **SET HOST** command
- **FTA**—Secure Shell devices

Processes on VMS systems that use Telnet usually have `$I` values beginning with the prefix **TNA**, concatenated with an integer value and a colon (e.g., “**TNA8456:**”). A single virtual terminal device entry whose `$I` value is **TNA** services all such processes.



## 15.5.2 Terminal Type Selection at Signon

Besides needing a device assigned at signon, users also need a terminal type. As described in the “[Signon/Security: System Management](#)” section, Kernel can usually determine the correct subtype without needing to prompt the user by querying the terminal and matching the returned string (if any) with return codes for terminals stored in the DA RETURN CODES (#3.22) file.

If the user is prompted to enter a terminal type, they need to choose one. The list of terminal types from which they can choose is screened by the SELECTABLE AT SIGN-ON (#.02) field in the TERMINAL TYPE (#3.2) file. Users can only choose from entries with this field set to **YES**. This stops users from choosing inappropriate terminal types. The setting of this field does *not* prevent terminal types from being chosen by the DA return code method, however. Make sure that all terminal types appropriate for signon have SELECTABLE AT SIGN-ON (#.02) set to **YES**.

If the Signon/Security system cannot supply even a default, the Device Handler makes a selection according to the signon device’s subtype.

### 15.5.2.1 Managing Display Attributes (DA) Return Codes

Figure 173: DA Return Code Edit Option

```
Device Management ... [XUTIO]
  DA Return Code Edit [XU DA EDIT]
```

The DA RETURN CODES (#3.22) file stores entries for the codes returned by different terminals after Kernel prompts for their display attributes at signon. This file then maps Kernel terminal types to the terminal’s return codes. This mapping allows sites to set up mappings for new terminals or to map different terminals to a common type. For example, a site could map all codes returned by all DEC VT type terminals to a single C-VT102 type terminal type.

The DA RETURN CODES (#3.22) file is a small static file managed by the DA Return Code Edit option [XU DA EDIT]. You can use the DA Return Code Edit option to automate the population of the DA RETURN CODES (#3.22) file. When you select this option, the terminal you are using is queried and you are shown the terminal’s DA code response. You are then prompted for the terminal type and description for this return code. Enter the terminal type name for the terminal you are using. The option updates the DA RETURN CODES (#3.22) file, and all terminals responding with this code are recognized at signon. You can quickly populate the DA RETURN CODES (#3.22) file by using this option from several different types of terminals.

Kernel pre-populates the DA RETURN CODES (#3.22) file with a set of standard terminal type entries. You may need to add more entries as needed to handle all terminals at your site.

## 15.6 Troubleshooting

Figure 174: Device Management—Troubleshooting Options

```
SYSTEM MANAGER MENU [EVE]
  Device Management... [XUTIO]
    Loopback Test of Device Port [XUTLOOPBACK]
    Send Test Pattern to Terminal [XUTTEST]
    Out of Service Set/Clear [XUOUT]
```

Kernel provides several options on the Device Management menu [XUTIO] to aid with troubleshooting device problems, which are described in the topics that follow.

### 15.6.1 Loopback Test of Device Port Option

Use the Loopback Test of Device Port option [XUTLOOPBACK] to test an RS-232 serial data line when using a loopback connection on the line. First, disconnect the data line from the device it is attached to (if any). Then, tie pins 2 and 3 of the RS-232 serial data line together. This is a loopback connection; data sent down pin 2 (transmit) loops back up pin 3 (receive). The Loopback Test of Device Port option sends the letters of the alphabet down the data line one at a time, and attempts to **READ** them back. If both lines are intact, you should see “**ABCDEFGHIJKLMNOPQRSTUVWXYZ**” print on the terminal from which you are testing the data line.

### 15.6.2 Send Test Pattern to Terminal Option

Use the Send Test Pattern to Terminal option [XUTTEST] to send a simple test pattern to a device. This is an easy way to verify whether a device is connected to the system. It lets you choose how many lines of the test pattern to send, and then sends that number of lines to the device. You can confirm on the device end exactly how many lines of the test pattern you receive, which can be useful when troubleshooting printer handshaking problems.

### 15.6.3 Out of Service Set/Clear Option

You can use the Out of Service Set/Clear option [XUOUT] to set a device out of order. It asks you the date on which to put the device out of order. From that date forward, the Device Handler does *not* allow any jobs to use the device (users get a message that the device is out of order). To clear the out of order status, use this option again and delete the out of order date.

### 15.6.4 Verify HFS and NULL Device Setup (required)

#### 15.6.4.1 HFS Device

Verify you have a Host File Server (HFS) device in the DEVICE (#3.5) file named **HFS**. If you have performed KIDS installations on your server before, you probably already have an appropriate **HFS** device set up. If you do *not* have an entry for this device, you *must* create one.



**REF:** For information on how to create an **HFS** device, see “[Host Files](#).”

#### 15.6.4.2 NULL Device

Verify you have a **NULL** device in the DEVICE (#3.5) file named **NULL** (or whose mnemonic is named **NULL**). You can have other devices with similar names, but one device is needed whose name or mnemonic is **NULL**. The subtype should be a “**P-**” subtype (e.g., **P-OTHER**), the margin should be a minimum of **80**, and the page length should be a minimum of **60**. Sample setups:

**Figure 175: VMS NULL Device—Sample DEVICE File Entry**

NAME: NULL	\$I: <b>NLA0:</b>
ASK DEVICE: NO	ASK PARAMETERS: NO
SIGN-ON/SYSTEM DEVICE: NO	LOCATION OF TERMINAL: BIT BUCKET
SUBTYPE: P-OTHER	TYPE: TERMINAL

**Figure 176: Mixed Operating System: VMS (Primary) and Linux (Secondary) NULL Device—Sample DEVICE File Entry**

NAME: NULL	\$I: <b>NLA0:</b>
ASK DEVICE: NO	ASK PARAMETERS: NO
SIGN-ON/SYSTEM DEVICE: NO	LOCATION OF TERMINAL: Bit Bucket
SECONDARY \$I: <b>/dev/null</b>	
SUBTYPE: P-OTHER	TYPE: TERMINAL

**Figure 177: Linux NULL Device Example—Caché NULL Device Setup**

NAME: NULL	\$I: <b>/dev/null</b>
ASK DEVICE: NO	ASK PARAMETERS: NO
SIGN-ON/SYSTEM DEVICE: NO	LOCATION OF TERMINAL: BIT BUCKET
SUBTYPE: P-OTHER	TYPE: TERMINAL

**Figure 178: Windows NULL Device Example—Caché NULL Device Setup**

NAME: NULL	<b>\$I: //./nul</b>
ASK DEVICE: NO	ASK PARAMETERS: NO
SIGN-ON/SYSTEM DEVICE: NO	LOCATION OF TERMINAL: BIT BUCKET
SUBTYPE: P-OTHER	TYPE: TERMINAL

[Figure 179](#) is the TERMINAL TYPE (#3.2) file entry that is used by all of the **NULL** device configurations.

**Figure 179: NULL Device Example—P-OTHER Terminal Type Setup**

NAME: P-OTHER	RIGHT MARGIN: 132
FORM FEED: #	PAGE LENGTH: 64
BACK SPACE: \$(8)	DESCRIPTION: General prntr (132)

## 15.7 Device Identification and Cross-References

Devices can be selected in several ways from the “DEVICE:” prompt. Besides the NAME (#.01) field, three other attributes: **MNEMONIC**, **LOCAL SYNONYM**, and **\$I** can also be used to select devices. When **LOCAL SYNONYM** is used, the Device Handler searches the local CPU for a match. Thus, the same **LOCAL SYNONYM** value (e.g., **PRINTER**) can be used to identify several devices, one per CPU.

When editing devices through VA FileMan, two additional fields can be used for lookup:

- VOLUME SET(CPU) (#1.9)
- SIGN-ON/SYSTEM DEVICE (#1.95)

You can separate these values with a period delimiter, as follows:

**Table 29: Sample Period-delimited Pieces Used for Device Lookup**

Period-delimited Piece	Description
CPU	All devices matching CPU.
CPU.\$I	All devices matching the CPU and \$I.
SYS	All SIGN-ON DEVICES.
SYS.CPU	All SIGN-ON DEVICES matching CPU.
SYS.\$I	All SIGN-ON DEVICES matching \$I.
SYS.CPU.\$I	All SIGN-ON devices matching CPU and \$I.

For example, to display all signon devices on CPU “**BBB**”, you could do:

**Figure 180: Displaying Signon Devices on a Specific CPU—Sample User Dialogue**

```
Select DEVICE NAME: SYS.BBB
```

To display all signon devices whose \$I begins with **\_TNA** you could do:

**Figure 181: Displaying Signon Devices with a Specific \$I—Sample User Dialogue**

```
Select DEVICE NAME: SYS._TNA
```

The **^%ZIS** global listing in [Figure 182](#) shows the cross-references for a device with a \$I value of **99** and an internal entry number (IEN) of **251**. It is a SIGN-ON/SYSTEM DEVICE (#1.95) and has a VOLUME SET(CPU) (#1.9) value of **AAA**.

**Figure 182: Global Listing for Device Cross-references—\$I Value = 99 and IEN = 251**

```
^%ZIS(1,"G","SYS.AAA.99",251) = ""
^%ZIS(1,"CPU","AAA.99",251) = ""
^%ZIS(1,"C","99",251) = ""
```

If this device is a virtual terminal with a \$I of **\_TNA** and established as a SIGN-ON/SYSTEM DEVICE (#1.95) but *not* given a VOLUME SET(CPU) (#1.9) value, the cross-reference structure would be as follows:

**Figure 183: Global Listing for Virtual Terminal Device Cross-references—\$I Value = \_TNA and IEN = 251**

```
^%ZIS(1,"G","SYS._TNA",251) = ""
^%ZIS(1,"CPU","._TNA",251) = ""
^%ZIS(1,"C","_TNA",251) = ""
```

# 16 Host Files

## 16.1 Host Files: User Interface

Host File Server (HFS) devices allow you to send output to a file maintained by your computer's operating system, rather than to a printer. You can send your output to an HFS device, if such a device type has been established on the system. Depending upon how system administrators define the HFS device, you may be prompted for a host file name and for an input/output operation:

**Figure 184: Choosing a Host File Server (HFS) Device—Sample User Dialogue**

```
DEVICE: HFS <Enter> DISK FILE
HOST FILE NAME: TMP.TMP// <Enter> INPUT/OUTPUT OPERATION: ?
Enter one of the following host file input/output operation:
    R = READONLY
    N = NEWVERSION
    RW = READ/WRITE
```

Not all input/output modes are available on all systems. The possible modes for input/output operation work as follows:

**Table 30: HFS Input/Output Modes of Operation**

Input/Output Mode	Description
<b>APPEND</b>	Data from a <b>WRITE</b> operation is appended to the file.
<b>MIXED</b>	Both <b>READs</b> and <b>WRITEs</b> are allowed for the specified file.
<b>NEWVERSION</b>	A new file is created with a higher version number; this file can be used for <b>WRITEs</b> only.
<b>READ</b>	<b>READs</b> are allowed from the specified file; <b>WRITEs</b> are <i>not</i> allowed.
<b>READONLY</b>	<b>READs</b> are allowed from the specified file; <b>WRITEs</b> are <i>not</i> allowed.
<b>READ/WRITE</b>	Both <b>READs</b> and <b>WRITEs</b> are allowed for the specified file; if a <b>WRITE</b> operation is performed, output is appended to the file.
<b>WRITE</b>	<b>WRITEs</b> are allowed; output can be sent to the specified file.

## 16.2 Host Files: System Management

To provide access to host files through the Device Handler, set up device entries of type HFS.

There are three fields in an HFS device entry that act as flags for what a user *must* enter when they use an HFS device. The fields are:

**Table 31: HFS-related Fields in the DEVICE (#3.5) File**

Field	Description
ASK PARAMETERS (#5)	If this field is set to <b>YES</b> , the user <i>must</i> enter the correct M open parameters to open the device. This field should be set to <b>NO</b> if the device is accessible to <i>non</i> -system administrator users. If it is set to <b>YES</b> , the default value is the current value of the OPEN PARAMETERS (#19) field.
ASK HOST FILE (#5.1)	When this field is set to <b>YES</b> , the user can choose what file is opened. If it is set to <b>NO</b> , the default file name built into the device entry is always used. This field should be set to <b>NO</b> if the HFS device is accessible to <i>non</i> -system administrator users. Host files can proliferate if too many users are able to create many files. Also, an HFS device opens up access to the host operating system and the potential for overwriting vital files.
ASK HFS I/O OPERATION (#5.2)	If this field is set to <b>YES</b> , the user can choose in what mode the file should be opened (e.g., <b>READ</b> or <b>WRITE</b> ). If it is set to <b>NO</b> , files are opened in <b>WRITE</b> mode. This should be set to <b>NO</b> if the device is accessible to <i>non</i> -system administrator users, assuming that all such users would only need to <b>WRITE</b> host files.

### 16.2.1 Host File Server Device Edit Option

**Figure 185: Host File Server Device Edit Option**

Device Management...	[XUTIO]
Edit Devices by Specific Types...	[XUDEVEDIT]
Host File Server Device Edit	[XUDEVEDITHFS]

The Host File Server Device Edit option [XUDEVEDITHFS] lets you to edit Host File Server device attributes using a ScreenMan form.

## 16.2.2 Caché and GT.M HFS Device Setup

Caché and GT.M require the name of the host file to be part of the device **\$I** and *not* part of the parameter list.

**Table 32: HFS I/O Operation Modes for Caché and GT.M**

I/O Operation Mode	Description
<b>NEWVERSION</b>	A new file is created (on VMS with a higher version number); this file can be used for <b>WRITEs</b> only.
<b>READONLY</b>	<b>READs</b> are allowed from the specified file; <b>WRITEs</b> are <i>not</i> allowed.
<b>READ/WRITE</b>	Both <b>READs</b> and <b>WRITEs</b> are allowed for the specified file; if a <b>WRITE</b> operation is performed, output is appended to the file.

**Figure 186: Host File Server Device for Caché and GT.M—Sample Settings**

Name:	HFS
\$I:	TMP.TMP
Type:	HFS
Ask Parameters:	NO
Ask Host File:	NO
Ask HFS I/O Operation:	NO
Open Parameters:	( "NWS" )

# 17 Spooling

## 17.1 Spooling: User Interface

Spooling privileges can be granted by system administrators to users who prepare and manage reports. By sending your output to the spooler, rather than to a printer, you can benefit in several ways. Since spooling saves the output online in a holding area, you can easily print multiple copies of the report at a later time. Spooling is also a good way to store the results of a time-consuming calculation (e.g., a complex VA FileMan report). By queuing to the spooler, a report involving intensive processing can be done at night or off hours when the system is relatively free. Output can then be printed during the day when the printer can be attended. Finally, when using the spooler, report processing can run to completion without printer problems interfering.

### 17.1.1 Sending Output to the Spooler

If you have been given the authority to spool, you can send output to the spooler by responding to the “DEVICE:” prompt with the name of the spool device. Devices used for spooling are commonly named SPOOL or SPOOLER.

If you do *not* have spooling privileges and you try to use the spool device, the spooler issues a message that authority has *not* been granted, as shown below:

**Figure 187: Unable to Send Output to a Spool Device—Sample Message**

```
DEVICE: SPOOL
      You aren't an authorized SPOOLER user.
```

To send output to the spooler with a customized right margin of 96 and page length of 66, you can use the following syntax:

**Figure 188: Specifying Spooled Output Margin and Length**

```
DEVICE: SPOOL;96;66
```

After requesting the spool device, you are usually prompted for a spool document name, as shown below ([Figure 189](#)). The prompt is *not* issued, however, if the spool device has been set up to generate the spool document name itself.

**Figure 189: Spool Document Name Prompt**

```
DEVICE: SPOOL
Select SPOOL DOCUMENT NAME:
```

To skip the “Select SPOOL DOCUMENT NAME:” prompt, you can specify the spool document name at the “DEVICE:” prompt by entering the name in the second semicolon piece. A name entered here is *not* used if the spooler is set up to generate names itself, however. Because of the format used, the Device Handler knows that a spool document name, rather than a device subtype, is being specified. Subtypes begin with one or two letters followed by a hyphen (e.g., P-DEC), while spool document names cannot (see Section #[14.3.1](#)).



**Figure 190: Specifying Spool Device and Document Name**

```
DEVICE: SPOOL;MYDOC
DEVICE: SPOOL;P-OTHER80;MYDOC
```

If the computing environment is composed of several networked processors, you may need to specify where spooling should take place. The spooler on the current CPU should be chosen unless the output is queued.

**Figure 191: Spooling Output to a Spool Device on the Same CPU**

```
DEVICE: SPOOL
1 SPOOL AAA
2 SPOOL BBB
Choose 1-2>
```

If the output is queued, you can choose a spooler on another CPU and a time to schedule the job to run.

**Figure 192: Queuing Output to a Spool Device**

```
DEVICE: Q
DEVICE: SPOOL BBB
```

**Figure 193: Spooler Parameters at the Device Prompt (Summary)**

```
DEVICE: Spooler
DEVICE: Spooler;Right Margin;Page Length
DEVICE: Spooler;Subtype
DEVICE: Spooler;Spool Document Name
DEVICE: Spooler;Subtype;Spool Document Name
```

## 17.1.2 Retrieving Spooled Documents

After a spool document has been created, you can retrieve the output by using options on the Spooler Menu. This menu is distributed as part of Kernel's Common menu, a menu available to all users. Specifically, the Spooler Menu is in your User's Toolbox menu.

To quickly reach the Toolbox, or any other option on the Common menu, you can enter a quotation mark plus the menu text or synonym, as shown in [Figure 194](#):

**Figure 194: Spooler Menu Options**

```
Select Primary Menu Option: "TBOX
Select User's Toolbox Option: SPOOLER MENU
Select Spooler Menu Option: ?

    Allow other users access to spool documents           [XU-SPL-ALLOW]
    Browse a Spool Document                               [XU-SPL-BROWSE]
    Delete A Spool Document                               [XU-SPL-DELETE]
    List Spool Documents                                  [XU-SPL-LIST]
    Make spool document into a mail message               [XU-SPL-MAIL]
    Print A Spool Document                                [XU-SPL-PRINT]
```

### 17.1.2.1 List Spool Documents Option

The List Spool Documents option [XU-SPL-LIST] lists any documents that you have created. Other users *cannot* read or print these documents unless you have authorized them to do so with the Allow other users access to spool documents option [XU-SPL-ALLOW], also on the Spooler menu.

### 17.1.2.2 Delete A Spool Document option

Use the Delete A Spool Document option [XU-SPL-DELETE] to delete spool documents. Since there is a limit on the amount of spool space that any one user can consume, you may need to delete old spool documents to free up space for new ones. If you attempt to create a new document when the space limits have been exceeded, the spooler issues a message about the need to delete some documents.

Old documents are deleted automatically, on a schedule as determined by system administrators. System administrators set the "life span" of a spool document via the MAX SPOOL DOCUMENT LIFE-SPAN (#31.3) field in the KERNEL SYSTEM PARAMETERS (#8989.3) File. System administrators should inform you of the life span of spooled documents, so that you are *not* surprised when old documents are purged.

## 17.1.3 Browsing a Spool Document

### 17.1.3.1 Browse a Spool Document Option

With the Browse a Spool Document option [XU-SPL-BROWSE], you can view spool documents with VA FileMan's Browser. The Browser allows you to view spool documents on your terminal screen, letting you scroll backward and forward through the report, and also letting you perform simple searches within the report.



**REF:** For more information on using the Browser, see the *VA FileMan User Manual*.

## 17.1.4 Printing Spool Documents

### 17.1.4.1 Print A Spool Document Option

Use the Print A Spool Document option [XU-SPL-PRINT] to print spool documents. Before selecting an output device, you are prompted for the number of copies to print. If you have been granted the ability to print to multiple devices, you can send your output to several devices for simultaneous printing. If this privilege has been granted to you, the device prompt is displayed again after you choose the first printer. Entering a **NULL** response to the second device prompt tells the spooler *not* to use any more additional printers.

To save users the time and trouble of despooling their documents, system administrators can set up a spool device for auto-despooling. If you invoke such a spool device, the spool document is sent to one or more printers when the spooling process has completed. After automatic printing, the spool document remains available for reprinting as necessary (it is *not* automatically deleted upon despooling).

## 17.1.5 Making Spool Documents into Mail Messages

### 17.1.5.1 Make spool document into a mail message Option

If you have been granted the ability to make spool documents into mail messages, the Make spool document into a mail message option [XU-SPL-MAIL] on the Spooler Menu is available. You can use it to make documents into regular mail messages that can then be edited, copied, or forwarded just like other VistA MailMan messages. After the text has been moved into a mail message, the spool document is deleted. The deletion is to allow space for new spool documents.

If you plan to make a document into a message, you should do the original output to the spool device with an appropriate margin and page length for a MailMan message. Since MailMan breaks incoming text lines at about the 75th character, a right margin of 75 may be desirable. Indicating that page breaks should *not* be inserted during the spooling process may also be desirable. Otherwise, the VA FileMan window command |**TOP**| is inserted into the text at the beginning of each page. While this automatic formatting is an advantage when printing spool documents, it is a disadvantage when creating a mail message. Page breaks are *not* inserted when indicating a page length of 99999 lines or a number greater than the document's total. Therefore, when you know your spool document is to be a MailMan message, a suitable margin and page length request might be:

**Figure 195: Formatting/Sending a Document to a Spool Device to Print as a MailMan Message—  
Sample User Dialogue**

```
DEVICE: SPOOL;75;99999
```

To turn the spool document into a MailMan message, once your spool document completes, go to the Spooler Menu and select the appropriate option, as illustrated below:

**Figure 196: Make Spool Document into a Mail Message Option**

```
Select Primary Menu Option: ^SPOOLER MENU  
Select Spooler Menu Option: MAKE SPOOL DOCUMENT INTO A MAIL MESSAGE
```

If the number of lines in the document exceeds 500, you are asked whether the transfer process should be queued. This prompt is provided for your convenience since queuing of a time-consuming process is usually preferred. After using the option, you can find your messages by reviewing recently delivered mail in your MailMan IN basket.

## 17.2 Spooling: System Management

### 17.2.1 Spool Document Storage

Spool document identification is stored in the SPOOL DOCUMENT (#3.51) file in the **^XMB** global. This file is for internal use by Kernel's spooler and should *not* be directly manipulated by system administrators. It holds identifying information, such as the name of the spool document and the line count totals. The document's text is stored in the SPOOL DATA (#3.519) file in the **^XMBS** global. If the spool document is made into a mail message, the text is moved into the MESSAGE (#3.9) file, the **^XMB** global, and the corresponding entry in the SPOOL DOCUMENT (#3.51) file is deleted.

When initially creating a spooled document, output is sent to the operating system's spooling area (as defined in the spool device). Kernel's spooler moves the output into the **^XMBS** global when the operating system's spooling process is complete. The status of the document (a field in the SPOOL DOCUMENT [#3.51] file) is then changed from Active to Ready and the document can be accessed by the user. Thus, except during spooling, the operating system's spool area should be empty.

### 17.2.2 Overflowing Spool Document Storage

When the output is moved from the operating system's spool area into the **^XMBS** global, the lines are counted. If during the count the user's maximum line limit is reached (as defined in the MAX SPOOL LINES PER USER [#31.1] field in the KERNEL SYSTEM PARAMETERS [#8989.3] file), the transfer process is halted and a notification message is appended to the transferred text. The entry in the SPOOL DOCUMENT (#3.51) file is also marked as incomplete. Thus, the **^XMBS** global is protected from growth expansion that could overflow the disk storage area.

The Kernel spooler *cannot*, however, count the lines of output as they are sent to the operating system's spool area. If the user's line limit is *not* exceeded before initiating the report, Kernel permits sending of an unlimited amount of output to the operating system's spooler. System administrators should consider this when granting spooling privileges. Users who are allowed to spool should be trained accordingly.

Users need to anticipate the results of a process they send to the spooler. If they are *not* sure what to expect, they should be instructed to test the process by sending it directly to an output device. If unexpected results should occur (e.g., an endless loop or meaningless sort), they can interrupt and cancel the process. Users should also be advised about appropriate use of processing time. Methods of efficient VA FileMan searching and sorting should be used when invoking the spooler (just as when printing directly). For example, as described in the VA FileMan documentation, the first sort-by field should be a cross-referenced field when possible and search criteria should be specified with the most likely conditions first.

### 17.2.3 Granting Spooling Privileges

Options on the Spool Management menu can be used to grant spooling privileges to users.

**Figure 197: Edit User's Spooler Access Option**

SYSTEMS MANAGER MENU ...	[EVE]
Spool Management ...	[XU-SPL-MGR]
Edit User's Spooler Access	[XU-SPL-USER]

The following spooler-related fields are user-specific and are stored in the NEW PERSON (#200) file:

**Table 33: User Spooler-related Fields in the NEW PERSON (#200) File**

Field	Description
ALLOWED TO USE SPOOLER (#41)	If set to <b>YES</b> it gives the user the ability to invoke the spooler at the device prompt.
MULTI-DEVICE DESPOOLING (#41.1)	If set to <b>YES</b> it enable the user to despool a spooled document to more than one device simultaneously.
CAN MAKE INTO A MAIL MESSAGE (#41.2)	If set to <b>YES</b> it permits the conversion of a spool document into a MailMan mail message. The user is able to use all MailMan functions, such as copying and forwarding. As a mail message, the document can no longer be manipulated with the spooler since its flag in the SPOOL DOCUMENT (#3.51) file has been deleted.

As mentioned earlier, the user-oriented spooler options are distributed as part of the Common menu, a menu available to all users. If system administrators have chosen to lock the Spooler Menu or removed it from the Common menu, access to the options needs to be re-established for users who are allowed to spool via the Edit User's Spooler Access option [XU-SPL-USER], as shown below:

**Figure 198: Edit User's Spooler Access—Sample User Dialogue**

```
Select Spool Management Option: EDIT USER'S SPOOLER ACCESS
Select NEW PERSON NAME: XUUSER,SIX
ALLOWED TO USE SPOOLER: YES// <Enter>
MULTI-DEVICE DESPOOLING: YES// <Enter>
CAN MAKE INTO A MAIL MESSAGE: YES// <Enter>
```

## 17.2.4 Managing Spool Documents

The remaining options on the Spool Management menu [XU-SPL-MGR] are also found on the user-oriented Spooler Menu. They are provided on the Spool Management menu simply for convenience to system administrators to access any spool document on the system. Users *must* hold the XUMGR security key in order to access all spool documents. Together, these options along with the XUMGR security key permit system administrators to view, print, or delete anyone's spooled documents.

**Figure 199: Spool Management Menu Options**

```
SYSTEMS MANAGER MENU ... [EVE]
Spool Management ... [XU-SPL-MGR]
  Delete A Spool Document [XU-SPL-DELETE]
  List Spool Documents [XU-SPL-LIST]
  Print A Spool Document [XU-SPL-PRINT]
```

## 17.2.5 Spooler Site Parameters Edit Option

Figure 200: Spooler Site Parameters Option

SYSTEMS MANAGER MENU ...	[EVE]
Spool Management ...	[XU-SPL-MGR]
Spooler Site Parameters Edit	[XU-SPL-SITE]

The Spool Management menu [XU-SPL-MGR] also has the Spooler Site Parameters Edit option [XU-SPL-SITE] for setting the spooler site parameters (system-wide defaults for the spooler). The initial settings are defined when installing Kernel but can be edited afterwards.

The spooler site parameters control the total number of documents a user can create and the total number of lines for all documents. When the limits are reached, the user *cannot* create new spooled documents.

The effects of the three spooler site parameter fields are as follows:

Table 34: Spooler Site Parameter Fields in the KERNEL SYSTEM PARAMETERS (#8989.3) File

Spooler Site Parameter Field	Description
MAX SPOOL LINES PER USER (#31.1)	This field holds the MAX number of lines of spooled output a user is allowed. If the user has more than this number, then they are <i>not</i> permitted to spool any more until some of their spool documents are deleted. This only controls allowing the creation of new spool documents and does <i>not</i> terminate a job that is running that has gone over the limit. Recommended value <b>9999</b> .
MAX SPOOL DOCUMENTS PER USER (#31.2)	This field limits the number of spool documents that any user can have on the system. Recommended value <b>10-100</b> .
MAX SPOOL DOCUMENT LIFE-SPAN (#31.3)	This field controls the number of days that a spooled document is allowed to remain in the spooler before deletion by the XU-SPL-PURGE option that needs to be setup to run in the background.

## 17.2.6 Purge old Spool documents Option

Figure 201: Purge old Spool documents Option

PARENT OF QUEUABLE OPTIONS	[ZTMQUEUABLE OPTIONS]
Purge old spool documents	[XU-SPL-PURGE]

A spool document is automatically deleted when its life span (in days) is reached. The purge is carried out by the Purge old spool documents option [XU-SPL-PURGE]. This option is listed on the PARENT OF QUEUABLE OPTIONS menu [ZTMQUEUABLE OPTIONS] along with others that should *not* be invoked interactively but should be scheduled to run through TaskMan.

## 17.2.7 Defining Spool Device Types

The DEVICE (#3.5) file entries for spooler device types make use of information about the underlying operating system's spooling mechanism. Examples for several operating systems are provided in the topics that follow.

### 17.2.7.1 Caché and GT.M

Caché and GT.M use an OpenVMS directory for spooling. As indicated in the VistA Cookbook for VAX sites, the directory should be established with full privileges for System, Owner, Group, and World. The directory specifications are used as the \$I value.

Figure 202: Spool Device for Caché and GT.M

```
Name:      SPOOL
$I:       VA1$: [ SPOOLER ]
Type:     SPOOL
Subtype:  P-OTHER
```

## 17.2.8 Spool Device Edit Option

The Spool Device Edit option [XUDEVEDITSP] lets you edit spool device attributes using a ScreenMan form.

Figure 203: Spool Device Edit Option

```
Device Management...                               [XUTIO]
  Edit Devices by Specific Types...                 [XUDEVEDIT]
    Spool Device Edit                               [XUDEVEDITSP]
```



**NOTE:** The type of data entered in the \$I (#1) and OPEN PARAMETERS (#19) fields depends on the type of M system you are using and the mode of access.



**REF:** For further details, see your M system manuals.

**REF:** Examples are provided in the “[Defining Spool Device Types](#)” section.

## 17.2.9 Auto-Despooling

For convenience, spool devices can be defined to ensure that despooling takes place automatically, without user interaction. If the AUTO DESPOOL (#31) field in the DEVICE (#3.5) file is set to **YES**, one copy of the spooled output is sent to each device named in the DESPOOL DEVICES (#32) Multiple field. Having the output automatically despoiled saves users the time and trouble of logging on and printing a spool document that may have been created the previous evening. Documents are *not* deleted upon despooling; they remain available to the user for subsequent printing.

Figure 204: Device Edit Option—Sample User Dialogue

```
Select Device Handler Option: DEVICE EDIT

Select DEVICE NAME: SPOOL
NAME: SPOOL// ^AUTO D <Enter> ESPOOL
AUTO DESPOOL: 1 <Enter> YES
Select DESPOOL DEVICES:
```

## 17.2.10 Generating Spool Document Names

Spool devices can be set up to automatically generate the name that identifies the spool document. If the GENERATE SPL DOC NAME (#33) field in the DEVICE (#3.5) file is set to **YES**, users of that device are *not* prompted to enter the spool document name. Also, if the flag is set, any user- or developer-defined name [in **IO("DOC")**] is ignored. The generated name consists of the first 15 characters of the spool device's name, followed by an underscore (\_), and followed by the internal entry number (IEN) of the spool document in the SPOOL DOCUMENT (#3.51) file.

**Figure 205: Generating Spool Document Name—Sample User Dialogue**

```
NAME: SPOOL// ^GENERATE SPL DOC NAME
GENERATE SPL DOC NAME: YES
```



# 18 Special Devices

This chapter discusses the following special devices and device issues:

- [Browser Device](#)
- [Form Feeds](#)
- [Magtape \(MT\)](#)
- [Network Channel Devices](#)
- [Resources](#)
- [Sequential Disk Processors \(Obsolete\)](#)
- [Slaved Printers](#)

## 18.1 Browser Device

### 18.1.1 User Interface

VA FileMan's Browser allows you to view reports on your terminal screen, letting you scroll backward and forward through the report, and also letting you perform simple searches within the report.

If the Browser has been installed at your site and set up as a device, you can use the Browser to view any report that asks you for an output device.

To send a report to the BROWSER device, at any device prompt, enter BROWSER as the device. You may *not* want to send huge reports to the BROWSER, however, since the report *must* complete before you can view its output in the Browser.



**REF:** For information on using the Browser and on Browser commands, see the *VA FileMan User Manual*.

**Figure 206: Print File Entries Option—Sample User Dialogue when Sending a Report to the Browser Device**

```
Select VA FileMan Option: PRINT FILE ENTRIES
OUTPUT FROM WHAT FILE: NEW PERSON// DOMAIN <Enter> (314 entries)
SORT BY: NAME// <Enter>
START WITH NAME: FIRST// <Enter>
FIRST PRINT FIELD: NAME
THEN PRINT FIELD: <Enter>
HEADING (S/C): DOMAIN LIST// <Enter>
DEVICE: BROWSER <Enter> BROWSER
BROWSER TITLE (optional): VA FileMan Browser// <Enter>

...one moment...
```

**Figure 207: Print File Entries Option—Sample Domain List report, as Displayed in the Browser Device**

```
VA FileMan Browser
DOMAIN LIST          JUL 28,2009  12:44  PAGE 1
NAME
-----
ALBANY.MED.VA.GOV
ALBUQUERQUE.MED.VA.GOV
ALEXANDRIA.MED.VA.GOV
ALTOONA.MED.VA.GOV
AMARILLO.MED.VA.GOV
ANCHORAGE.MED.VA.GOV
ANN-ARBOR.MED.VA.GOV
ASHEVILLE.MED.VA.GOV
ATLANTA.MED.VA.GOV
AUGUSTA.MED.VA.GOV
B43.FO-SITE.MED.VA.GOV
BALTIMORE.MED.VA.GOV
BATAVIA.MED.VA.GOV
BATH.MED.VA.GOV
BATTLE-CREEK.MED.VA.GOV
BAY-PINES.MED.VA.GOV
BDC.MED.VA.GOV
BECKLEY.MED.VA.GOV
Col>  1 | <PF1>H=Help <PF1>E=Exit | Line>  22 of 320  Screen>  1 of 15
```

## 18.1.2 System Management

You can set up VA FileMan's Browser as a device to which users can send their output.

When a user sends output to a Browser device, the Browser device performs the following steps:

1. Output is sent to a host file.
2. When the output completes, the host file is closed.
3. The contents of the host file are read back into a scratch global.
4. The host file is deleted.
5. The Browser is called, which displays the data in the global to the user, through the Browser interface.
6. When the user exits the Browser, the scratch global is deleted.

This provides a quick way to generate a report and view the report through the scrollable Browser, potentially saving paper and wear and tear on printers.

To support the Browser device, you need to set up a special terminal type (P-BROWSER) and a special device type (BROWSER).



**REF:** For sample entries of the special Browser terminal type and device entries for the Caché and GT.M operating systems, see [Figure 208](#) and [Figure 209](#).

The Browser device tests the current terminal to see whether it supports:

- A scrolling region.
- Reverse indexing.

If the terminal does *not* support these features, the Browser device issues a message saying that it is *not* selectable from the current terminal. Also, in order for the check (\$\$TEST^DDBRT) to work properly, the user *must* already be in the Kernel menu system or *must* have set up developer variables through the ^XUP entry point. Otherwise, the test always fails.

### 18.1.2.1 Storing Host Files in a Specific Directory

By default, the temporary host files created by the Browser device are stored in the current default directory. You can optionally specify a path to a specific directory to store the temporary host files. Make sure the directory you specify exists on all nodes/CPU's where users can sign on. On DOS systems, do *not* specify the root directory, since there is a limit on the number of files a DOS root directory can hold. Finally, make sure you change both the OPEN PARAMETERS (#19) and POST-CLOSE EXECUTE (#19.8) fields in the Browser DEVICE (#3.5) file entry to specify the directory (replace DD with, for example, D:\BROW\DD).

**Figure 208: Caché and GT.M Browser Device—TERMINAL TYPE (#3.2) File Entry**

```
NAME: P-BROWSER                               SELECTABLE AT SIGN-ON: NO
RIGHT MARGIN: 80                              FORM FEED: #
PAGE LENGTH: 99999                            BACK SPACE: $(8)
OPEN EXECUTE: D OPEN^DDBRZIS
CLOSE EXECUTE: D CLOSE^DDBRZIS
DESCRIPTION: Browser Device
```

**Figure 209: Caché and GT.M Browser Device—DEVICE (#3.5) File Entry**

```
NAME: BROWSER                                $I: DDBR.TXT
ASK DEVICE: YES                              ASK PARAMETERS: NO
SIGN-ON/SYSTEM DEVICE: NO                   QUEUING: NOT ALLOWED
LOCATION OF TERMINAL: HFS/CRT                 ASK HOST FILE: NO
ASK HFS I/O OPERATION: NO                   MARGIN WIDTH: 80
FORM FEED: #                                PAGE LENGTH: 99999
BACK SPACE: $C(8)                           OPEN PARAMETERS: NEW:DELETE
POST-CLOSE EXECUTE: D POST^DDBRZIS          TYPE: HOST FILE SERVER
SUBTYPE: P-BROWSER
PRE-OPEN EXECUTE: I `$$TEST^DDBRT S %ZISQUIT=1 W $C(7),!,"Browser not selectable
from current terminal.",!
```

## 18.2 Form Feeds

### 18.2.1 User Interface

Most users would prefer to see their printouts without any extra blank pages before or after the content. Most prefer to see their reports printed on a fresh page instead of starting in the middle of the previous printout. The printing of labels should also be accomplished without unnecessary form feeds. If a printer is generating extra pages, you should contact the system administrators to remedy the problem.

### 18.2.2 System Management

If a particular device does *not* need a form feed between reports, system administrators should set the SUPPRESS FORM FEED AT CLOSE (#11.2) field to **YES** in the device's DEVICE (#3.5) file entry. Label printers, for example, should have this flag set. This procedure prevents the Device Handler from issuing a form feed:

**Figure 210: Device Edit Option—Sample User Dialogue**

```
Select Systems Manager Menu Option: DEVICE HANDLER
Select Device Handler Option: DEVICE EDIT

Select DEVICE NAME: LABEL PRINTER
NAME: LABEL PRINTER// ^SUP <Enter> PRESS FORM FEED AT CLOSE
SUPPRESS FORM FEED AT CLOSE: YES
```

The Device Handler also checks the TERMINAL TYPE (#3.2) file to see if form feeds have been suppressed for that terminal type. It checks for the existence of the **IONOFF** variable. Thus, for certain terminal types (e.g., laser printers), system administrators can set this “**no form feed**” variable in the corresponding terminal type's CLOSE EXECUTE (#7) field.



**NOTE:** The **IONOFF** variable can also be set by the calling application to suppress form feeds.

**Figure 211: Terminal Type Edit Option—Sample User Dialogue**

```
Select Systems Manager Menu Option: DEVICE HANDLER
Select Device Handler Option: TERMINAL TYPE EDIT
Select TERMINAL TYPE NAME: P-DEC-LABEL
NAME: P-ZPK80// ^CLOSE EXECUTE
CLOSE EXECUTE: S IONOFF=" "
```

## 18.3 Magtape

### 18.3.1 System Management


Figure 212: Edit Devices by Specific Types Option

Device Management...	[XUTIO]
Edit Devices by Specific Types...	[XUDEVEDIT]
Magtape Device Edit	[XUDEVEDITMT]

The Edit Devices by Specific Types option [XUDEVEDIT] lets you edit specific types of devices using ScreenMan.

Values entered in a Magtape (MT) device for the following fields may *not* be relevant to a given application:

Table 35: Fields in the DEVICE (#3.5) and TERMINAL TYPE (#3.2) Files that May Not be Relevant for Certain Devices

File	Field	Description
DEVICE (#3.5)	SUBTYPE (#3)	Use this field to select a default terminal type for the device. This field points to the TERMINAL TYPE (#3.2) file to retrieve a standard set of characteristics that have been defined for vendor devices (e.g., Laser printers or VT320 CRTs).  <b>REF:</b> For a discussion of the TERMINAL TYPE (#3.2) file, see the " <a href="#">TERMINAL TYPE (#3.2) File</a> " section.
	MARGIN WIDTH (#9)	Data in this field overrides the RIGHT MARGIN field value from the TERMINAL TYPE (#3.2) file. Leave this field blank unless you are sure that you need to have a different RIGHT MARGIN than what is in the TERMINAL TYPE (#3.2) file.
TERMINAL TYPE (#3.2)	FORM FEED (#2)	The argument of an M <b>WRITE</b> statement that sets the top-of-form for the use of tractor-feed paper on a printer, or clears the screen of a video display terminal.
	PAGE LENGTH (#3)	This field is the number of usable lines on the output device.
	BACK SPACE (#4)	The argument of an M <b>WRITE</b> statement that causes the cursor to back space.

The data values entered in these fields may be arbitrary for Magtape devices. However, if the application plans to copy the output to a printer, the characteristics may need to be similar to that of the printer.

If an application intends to use these fields, be cautious about the type of data that is entered. When sent to the tape unit, some control codes initiate tape movement or cause tape markers to be written to the mounted tape.

Data entered in the **\$I** and OPEN PARAMETERS fields depends on the type of M system you are running, the type of tape unit, and the desired format.



**REF:** For examples of the type of data required in these fields, see the “[Device Handler: System Management](#)” section.



**REF:** For further details on Magtape devices, see your specific M implementation manuals.

## 18.4 Network Channel Devices

### 18.4.1 System Management

Network channel devices are typically high speed channel devices (e.g., TCP/IP). Currently, this network channel device support exists under the Caché and GT.M operating system. In most cases, these devices are used for specialized purposes rather than for general output. For example, network mail could use such devices to move enormous amounts of email through high speed communication channels.

The use of network channel devices requires at least two processes on each end of the communication channel, a server and a client, which can then exchange information:

- Server Process—One process *must* be available at all times. It can be actively running or triggered to run at a given moment. This process is commonly known as a server. The server waits until another process makes a request to exchange information.
- Client Process—The other process is known as the client.

The two processes can be hosted by two CPUs using network protocols.

#### 18.4.1.1 Network Channel Device Edit

**Figure 213: Network Channel Device Edit Option**

Device Management...	[XUTIO]
Edit Devices by Specific Types...	[XUDEVEDIT]
Network Channel Device Edit	[XUDEVEDITCHAN]

The Network Channel Device Edit option [XUDEVEDITCHAN] allows you to edit network channel device attributes.

When editing Network Channel devices, the contents of the fields listed in [Table 35](#) are *not* necessarily relevant for using network Channel devices. However, these fields are provided in case the application calling the Device Handler is *not* able to distinguish between a printer and a Network Channel device when sending output.

The timeout on the M **OPEN** command may *not* be applicable with Network Channel devices. Therefore, it may be necessary to answer **NO** to the USE TIMEOUT ON OPENS (#2009.5) field in the DEVICE (#3.5) file.



**REF:** For more information regarding device timeout applicability, see the appropriate Caché manual.

For Network Channel devices that use TCP/IP, data is required for the OPEN PARAMETERS (#19) field in the DEVICE (#3.5) file. For the client device setup, this field stores the remote Internet address to which the host connects.

**Figure 214: Network Channel Device Edit Option—Sample Output**

```

                                EDIT A NETWORK CHANNEL DEVICE
NAME: SDD-DIRECT                                PAGE 1 OF 1
-----
NAME: SDD-DIRECT                                LOCATION OF TERMINAL: HP-8000 near Raul
$! : |TCP|9100                                    VOLUME SET(CPU):
TYPE: NETWORK CHANNEL                            SIGN-ON/SYSTEM DEVICE: NO

SUBTYPE: P-HP8000 TCP/S                          MARGIN WIDTH:
                                                PAGE LENGTH:

ASK DEVICE: NO                                    USE TIMEOUT ON OPENS:
ASK PARAMETERS: NO                                OPEN TIMEOUT:
OPEN PARAMETERS: ("10.6.21.138":9100:"M")

USE LOCK:

```

The GLOBAL LOCK (#36) field in the DEVICE (#3.5) file stores a **YES/NO** Set of Codes. This is important, especially if the application expects that only one client at a given time is able to open the device. If this field is set to **YES** an M lock on **^%ZIS("lock",IO)** is obtained before the device is opened. It remains until a call to **^%ZISC** to close the device. It can be used with any type of device.

## 18.5 Resources

### 18.5.1 System Management

A Resource device is a type of device that can only be used by tasks. They *cannot* be used for input or output (I/O). As such, they are *not* available for user selection at the device prompt. The purpose of a resource is to provide a mechanism of limiting the number of concurrent jobs that can run at any one time.

When creating a task, a task can request the resource as an input variable for the **^%ZTLOAD** call. The resource itself, as defined in the DEVICE (#3.5) file, has a field called RESOURCE SLOTS (#35) that determines how many jobs can simultaneously own it as a resource.

The Device Handler and TaskMan work together to provide resource device functionality. The RESOURCE (#3.54) file, stored in the translated **^%ZISL** global, regulates processing and is for internal use only. The NAME (#.01) field holds the **\$!** of the resource device. Other fields hold information on jobs currently using the resource, information that is cleared when the resource is closed.

The RESOURCE (#3.54) file supports processing by maintaining a count of the number of available "slots." The ability to open and close resources is accomplished by decrementing and incrementing this count.

#### 18.5.1.1 Limiting Simultaneous Running of a Particular Task

Resources make it possible for you to control the number of a particular kind of non-I/O task that runs at any one time. If you have a particular job and you want no more than three running versions of it at any one time, you can queue the job (through the **^%ZTLOAD** interface) to a resource that had a RESOURCE SLOTS (#35) setting of **3**.

### 18.5.1.2 Running Sequences of Tasks

Resources also make it possible to run non-I/O tasks in sequential order. Non-I/O tasks ordinarily can run simultaneously because they do *not* compete for the ownership of I/O devices. If you instead queue such tasks to the same resource, and the resource has a RESOURCE SLOTS (#35) setting of 1, TaskMan runs the tasks one at a time and in the order queued. In this way, the results of one process can be used by another. This sequential processing might be appropriate, for example, for the processing of physician orders or other nested tasks involving code execution.

An additional enhancement to resource devices, called SYNC FLAGS, allows TaskMan to run the next task waiting for a resource only if the previous task using that resource has completed successfully. You can use SYNC FLAGS to ensure that subsequent jobs run only if previous jobs have completed successfully.

### 18.5.1.3 Creating Resource Devices

Figure 215: Resource Device Edit Option

```
SYSTEMS MANAGER MENU ... [EVE]
  Device Management ... [XUTIO]
    Resource Device Edit [XUDEVEDITRES]
```

The Resource Device Edit option [XUDEVEDITRES] provides a facility for editing resource devices. Software that uses a resource should include in its installation instructions the way the new resource should be defined in the DEVICE (#3.5) file. System administrators can then create one or more resource-type (RES) entries.

Figure 216: Resource Device—Sample Output

```
NAME: ZZRES      $I: ZZRES
LOCATION OF TERMINAL: NA  RESOURCE SLOTS: 1
TYPE: RESOURCE
```

The installation instructions should indicate the number of resource slots. Sequential processing should use a value of 1. The NAME and \$I should probably use the same value and be namespaced according to VistA conventions.

## 18.6 Sequential Disk Processors (Obsolete)

Though the Sequential Disk Processors (SDP) entry is still found in the DEVICE (#3.5) file, it is obsolete and users should now use Host File Server (HFS) devices.



**REF:** For more information on HFS devices, see “[Host Files](#).”



## 18.7 Slaved Printers

### 18.7.1 User Interface

If your terminal has an auxiliary printer port with a printer directly attached, you can send output normally destined for the CRT terminal directly to a printer. Output for the terminal is redirected from the host computer through the terminal's auxiliary port to the printer. Such printers are commonly called slaved printers or slaved devices.

If slaved printing is available from your terminal, you can send a printed report to your slaved printer, by entering the device name that corresponds to your slaved printer like this:

**Figure 217: Slaved Printer—Sample User Dialogue**

```
DEVICE: SLAVELA50
```



**NOTE:** Consult your local system administrators to find out if slaved printing devices are available.

### 18.7.2 System Management

There are two modes of slaved printing:

- Auto Print Mode (a.k.a. Copy Print Mode)—When Auto Print Mode is toggled on, output is displayed on the terminal as well as printed on the printer. Special escape sequences and control characters, such as those that are normally used to adjust fonts/pitches, are *not* passed to the printer; however, those used for actions like carriage return, line feed, and form feed are passed on to the printer.
- Printer Controller Mode (a.k.a. Transparent Print Mode)—When Printer Controller Mode is toggled on, output is only printed on the printer; nothing is displayed on the terminal. All escape sequences and control characters are passed to the printer. This mode is preferable to Auto Print Mode, especially when compressed mode printing is desired.

The following are the escape sequences used to toggle the slaved printing modes for DEC VT220/VT320 terminals:

**Table 36: Escape Sequences Used to Toggle the Slaved Printing Modes for DEC VT220/VT320 Terminals**

Mode	Escape Sequence
Auto print mode on.	ESC [?5i
Auto print mode off.	ESC [?4i
Printer controller mode on.	ESC [5i
Printer controller mode off.	ESC [4i

### 18.7.2.1 Device and Terminal Type File Entries

To use a slaved printer through the Device Handler, two DEVICE (#3.5) file entries along with corresponding TERMINAL TYPE (#3.2) file entries *must* be made for the following:

- Home Device
- Slaved Printer

One pair of DEVICE/TERMINAL TYPE entries is needed to describe the home (i.e., CRT) terminal attributes including the codes to open and close the printer port. The OPEN PRINTER PORT (#110) and CLOSE PRINTER PORT (#111) fields of the TERMINAL TYPE (#3.2) file can be used to store the appropriate codes.

Another pair of DEVICE/TERMINAL TYPE entries is needed to describe the attributes of the slaved printer including escape codes to adjust fonts/pitches. The OPEN EXECUTE (#6) and CLOSE EXECUTE (#7) fields of the TERMINAL TYPE (#3.2) file can be used to hold such codes. Additionally, the device entry for the slaved printer *must* have a value of **0 (zero)** entered into the \$I field. This \$I value identifies the DEVICE (#3.5) file entry as one for a slaved device.

The following examples show the setup for a home device, and the setup for slaved printers

**Figure 218: Home Device Example (VT320)—DEVICE (#3.5) File Entry**

```
NAME: TELNET DEVICE                $I: _TNA
ASK DEVICE: YES                     ASK PARAMETERS: NO
VOLUME SET(CPU): KDE                SIGN-ON/SYSTEM DEVICE: YES
LOCATION OF TERMINAL: Network         MARGIN WIDTH: 80
FORM FEED: #,$C(27,91,50,74,27,91,72) PAGE LENGTH: 24
BACK SPACE: $C(8)                   SUBTYPE: C-VT320
TYPE: VIRTUAL TERMINAL
TIMED READ (# OF SECONDS): 400
```

**Figure 219: Home Device Example (VT320)—TERMINAL TYPE (#3.2) File Entry**

```
NAME: C-VT320                       SELECTABLE AT SIGN-ON: YES
FORM FEED: #,$C(27,91,50,74,27,91,72) RIGHT MARGIN: 80
PAGE LENGTH: 24                     BACK SPACE: $C(8)
DESCRIPTION: Digital Equipment Corporation VT-320 video
OPEN PRINTER PORT: W *27," [5i"
CLOSE PRINTER PORT: W *27," [4i"
```

**Figure 220: Slaved Printer Example: DEC LA50—DEVICE (#3.5) File Entry**

```
NAME: SLAVELA50                     $I: 0
ASK DEVICE: YES                     ASK PARAMETERS: YES
SLAVED FROM DEVICE: TRM
LOCATION OF TERMINAL: SLAVE DEVICE FOR LA50
MARGIN WIDTH: 132                   FORM FEED: #
PAGE LENGTH: 64                     SUBTYPE: P-LA50
TYPE: TERMINAL
```

**Figure 221: Slaved Printer Example: DEC LA50—TERMINAL TYPE (#3.2) File Entry**

```
NAME: P-LA50                                RIGHT MARGIN: 132
FORM FEED: #                               PAGE LENGTH: 64
OPEN EXECUTE: W *27,"[4w"                 CLOSE EXECUTE: W *27,"[0w"
DESCRIPTION: LA50 132 COL/16.5 CPI
```

**Figure 222: Slaved Printer Example: Epson LQ870—DEVICE (#3.5) File Entry**

```
NAME: SLAVELQ870                            $I: 0
ASK DEVICE: YES                             ASK PARAMETERS: YES
SLAVED FROM DEVICE: TRM
LOCATION OF TERMINAL: SLAVE DEVICE FOR LQ870
MARGIN WIDTH: 132                           FORM FEED: #
PAGE LENGTH: 64                             SUBTYPE: P-LQ870
TYPE: TERMINAL
```

**Figure 223: Slaved Printer Example: Epson LQ870—TERMINAL TYPE (#3.2) File Entry**

```
NAME: P-LQ870                                RIGHT MARGIN: 132
FORM FEED: #                               PAGE LENGTH: 64
OPEN EXECUTE: W *15                         CLOSE EXECUTE: W *18
DESCRIPTION: EPSON LQ870 PRINTER--CONDENSED
```

### 18.7.2.2 Use of Slaved Printer: Processing Steps

The Device Handler manages output to slaved printers using the following steps:

1. Execute the OPEN PRINTER PORT (#110) code of the home device's terminal type.
2. Execute the OPEN EXECUTE (#6) code of the slaved printer's terminal type.
3. When the application closes the device, execute the CLOSE EXECUTE (#7) code of the slaved printer's terminal type.
4. Execute the CLOSE PRINTER PORT (#111) code of the home device's terminal type.

### 18.7.2.3 Queuing to Slaved Printers

If queuing to a slaved device is desired, then the SLAVE FROM DEVICE field of the DEVICE (#3.5) file *must* be used. This field is a pointer to the DEVICE (#3.5) file. Data *must* be entered in this field for the entry for the slaved printer. This data should point to the home device entry unless the slaved printer is attached to a terminal on a Terminal Server (i.e., a virtual terminal).

If queuing to a slaved device is being performed from a virtual terminal, then a third device entry *must* be established that fully describes the home device with a type of TRM. This device should be entered into the SLAVE FROM DEVICE field.



**NOTE:** When queuing to a slaved device from a terminal on a Terminal Server, the user *must* be fully logged off the computer system and logged off the port by the time the queued task is scheduled to run.

# IV. TaskMan

## 19 TaskMan: User Interface

The Kernel TaskMan (TM) software allows you to run tasks (e.g., VA FileMan prints and sorts) in the background and lets you continue working without interruption.

### 19.1 Creating Tasks

VistA runs in a multiprocessing environment, which means the computer can work on more than one job at a time. Each job the computer works on consumes a part of the computer's resources. Initially, you have only one job, your interactive terminal session, with which to do your work. TaskMan, however, allows you to claim more of the computer's resources by allowing you to schedule additional jobs to run in the background.

#### 19.1.1 Background Jobs

You can queue additional tasks to run through TaskMan. Once started, these additional tasks (called background tasks) can run at the same time as the foreground jobs and without further dialogue with the people who started them. Appropriate use of background tasks can cut your frustration by reducing the amount of time you *must* wait for the computer to do lengthy, repetitious work that does *not* need human intervention. Every task queued to run in the background reduces time spent waiting and also uses the computer's resources more efficiently.

#### 19.1.2 Queuing Output

Most users use TaskMan by queuing reports, labels, and other kinds of output. Because output involves no dialogue once it has begun and because it requires you to wait while it prints, it makes an ideal candidate for queuing. You can queue most output when the computer asks you to select a device to which the output should be sent. The series of prompts and responses to queue a job to a device usually looks something like this:

Figure 224: Queuing Output—Sample User Dialogue

```
DEVICE:  QUEUE TO PRINT ON
DEVICE:
Answer with name of the output device here.
Requested time to print:  NOW// <Enter>
Request queued.
```

After you answer this series of prompts, the output is queued for TaskMan to start at the requested time, and you can continue with other work while TaskMan prints the output. When many tasks need the same device at the same time, TaskMan runs them in order based on the time they were requested.

#### 19.1.3 Other Sources of Tasks

An application can create other kinds of tasks without your interaction. The application might offer to queue other kinds of work like large filing or complex data analysis jobs. Sometimes applications queue tasks without asking. For example, the delivery of MailMan messages is performed by a job running as a task. If that task is *not* running when someone uses the MailMan options, MailMan automatically uses

their foreground job to queue the task without asking them. Although people may knowingly or unknowingly queue these other kinds of tasks, output remains the most common kind of work to queue.

## 19.2 Working with Tasks

**Figure 225: TaskMan User Option**

System Command Options ...	[XUCOMMAND]
User's Toolbox ... "TBOX"	[XUSERTOOLS]
TaskMan User	[XUTM USER]

TaskMan also allows you to examine or modify your own tasks. You can do this by using the TaskMan User option [XUTM USER], located in the User's Toolbox menu on your Common menu. This option lets you monitor or manipulate one task at a time.

## 19.2.1 Selecting Tasks

When you choose the TaskMan User option, it first asks you to select a task with which to work. TaskMan displays the “Select TASK:” prompt. If you enter a single question mark (?), you get some general help about the option; if you enter two question marks (??), you can get a list of every task that you have queued to run. Typically, you would enter two question marks at this prompt so that you can get a listing of your individual tasks, listed by task number. You then choose a task from the list of tasks to work with. Using the TaskMan User option looks like the following:

**Figure 226: TaskMan User Option—Sample User Dialogue**

```
Select User's Toolbox Option: TASKMAN USER

Select TASK: ??

Please wait while I find your tasks...searching...finished!

-----
1: (Task #161325) ZTSK2^XMA02, Queued print for XUUSER,TWELVE. Device VER$LW.
   KRN,KDE. From TODAY at 14:22, By you. Scheduled for TODAY at 20:00
-----
2: (Task #161776) ZTSK^DIP4, DEVICE LIST. Device VER$LW. KRN,KDE.
   From TODAY at 14:22, By you. Scheduled for TODAY at 22:00
-----

End of listing. Press RETURN to continue: <Enter>

Select TASK: 161776 <Enter> DEVICE LIST

      Taskman User Option

          Display status.
          Stop task.
          Edit task.
          Print task.
          List own tasks.
          Select another task.

      Select Action (Task # 161776):
```

You can select tasks either by task number or list number. In the list of tasks, the list number is at the left hand side of the each task listing, and is followed by the task number for each task (in parentheses). The rest of the information helps identify where the task came from and what it does.

## 19.2.2 Tasks in the Task List

You can only select tasks that are still in TaskMan's task list. When a task finishes running, it usually removes itself from the task list. Thus, you should *not* get a listing of every task you have run in the last year! Tasks that do *not* clean up their entries usually get cleaned out by TaskMan several days after they complete. You should only have to select tasks that are still actively waiting to start, currently running, or encountered some kind of problem while running.

### 19.2.3 Display Status of Tasks

Once you've selected a task to work with, you can ask to see the status of that task, using the Display status option ("D"). TaskMan uses a task's status to try to explain how soon the task runs and why. The possible normal statuses for a task include:

- Scheduled for <date and time>.
- Being inspected by TaskMan.
- Waiting for a partition.
- Being prepared.
- Currently running.
- Completed <date and time>.



**NOTE:** Please keep in mind that TaskMan can only "guess" whether a task is currently running.

One of the following messages may show up if the task needs some system resource *not* currently available:

- Waiting for device <name of device>.
- Waiting for the link to <name of CPU> to be restored.

When you display the status of a task waiting for a device, TaskMan shows you how many tasks are in line for that device ahead of your task. Additional statuses exist for tasks that have encountered some kind of problem. For each situation it lists a different explanation of the problem. For example, if you use the Stop task option to stop a task, its status shows up as "Stopped by you."

### 19.2.4 Stopping Tasks

Under certain conditions, you may want to stop a task. The TaskMan User option allows you to do this through the Stop task option ("ST"). Your ability to stop a task depends on the task's status, however. If the task has already been stopped, is finished, or it encountered a problem while running and you try to stop it, the Stop task option tells you that the task has already stopped. If the task has *not* yet started running, on the other hand, you can always stop it. If the task has started running, the Stop task option succeeds in stopping it only if the developer who wrote the task has designed the task to be stopped by a user. At any rate, it does *not* cause any problems if you try to stop a running task.

To stop a task, use the Stop task option. Once you stop a task, it remains in the TASKS (#14.4) file until you edit it to run again or until TaskMan purges it from the Task list.

### 19.2.5 Editing Tasks

The Edit task option ("E") lets you edit a task's output device, description, and run time.

The task *must* be unscheduled before it can be edited. The Edit task option asks if it's OK to unschedule the task. To edit the task, answer **YES**. But once the task is unscheduled, it does *not* run unless you reschedule it by finishing each step of editing the task.



**NOTE:** You *cannot* edit a task that is already running.

Once the task is unscheduled, you can update the following task settings:

- When the task should start.
- Which device it should use (and whether a device is needed).
- What the description of the task should be.

Once you've had a chance to modify these three settings, you're asked whether the task should be rescheduled as shown (see [Figure 227](#)). If you answer **YES**, the task is updated to reflect the changes you specified. If you answer **NO**, however, no settings are changed, but the task remains unscheduled (and does *not* run until you use Edit Task to reschedule it).

**Figure 227: Edit Task Option—Sample User Dialogue**

```
Before you edit the task I'll make sure it's not scheduled, okay? YES// <Enter>
Task ready for editing.

Currently, this task requests output device VER$LW.
Do you want to change the output device for this task? NO// Y
Select Task's Output Device (^ for none): P236

When should this task run?: AUG 16, 2004@22:00// <Enter>

Task's purpose: DEVICE LIST// <Enter>

161776: DEVICE LIST. P236. Next run time: AUG 16, 2004@22:00.

Shall I reschedule this task as shown? YES// <Enter>
Task rescheduled.
```

## 19.2.6 Listing and Printing Tasks

You can use the List own tasks option (“L”) to review your tasks. This option displays the same list as that given when you enter two question marks (??) at the “Select Task:” prompt.

The Print task option lets you print out the description of the task that you have currently selected.

## 19.2.7 Selecting Another Task

Once in the TaskMan User option, you can choose to work with a different task by using the Select another task option (“SE”). Enter another task number to work with a different task. If you are *not* sure what task you want to work with, you can get a list of all of your tasks by entering two question marks (??).

## 19.3 Summary

Most output in VistA is performed by creating tasks that run in the background. Once you become familiar with TaskMan's queuing system, you can increase productivity by using some of TaskMan's special features, including listing your future tasks, displaying a task's status, stopping a running task, and editing a future task's run time and output device.



## 20 TaskMan: System Management—Overview

Kernel's TaskMan module provides a standardized system for initiating and managing background processing. Since TaskMan handles all background processes, system managers have a unified set of controls that apply to all background processes on their systems.

Most of TaskMan's processing does *not* involve interaction with users, rendering its operation virtually invisible. The explanations that follow provide information about the operation of TaskMan.

### 20.1 TaskMan's Division of Labor

TaskMan uses a three-step system to start and manage background processing:

#### 1. Queuers

Foreground jobs *cannot* directly start any background jobs. Instead, they call the TaskMan Application Program Interface (API) to file requests in the TASKS (#14.4) and SCHEDULE files. The program code calling the TaskMan API is called a Queuer. The TASKS (#14.4) file is VA FileMan-compatible. The SCHEDULE file is *not* VA FileMan compatible.



**REF:** For a description of the TASKS (#14.4) and SCHEDULE file structure, see the “[Troubleshooting](#)” section in “[TaskMan: System Management—Operation](#).”

#### 2. Manager

A TaskMan program called the Manager runs at all times in the background. The Manager monitors the SCHEDULE file. As needed, it initiates background jobs (called Submanagers) to perform the work requested by the foreground jobs.

#### 3. Submanagers

Each background job request is picked up by a TaskMan process called the Submanager. The Submanager is the job that actually runs each task. Submanagers handle contention for partitions and I/O devices by running the waiting tasks in order, first the oldest tasks and then the more recent ones.

### 20.1.1 Queuers

Tasks run by TaskMan begin with code in a software application that decides to perform some work in the background. This code is a queuer. Most applications in VistA respond to a user's request to queue some output, but other decisions may be involved. Two commonly used queuers are programs that create report output (by using the TaskMan API) and options that are scheduled through the OPTION SCHEDULING (#19.2) file.

#### 20.1.1.1 Programs that Use the TaskMan API

One commonly used queuer is an application's call to the TaskMan API to queue tasks. In this process the queuer defines the task and its environment. Applications are *not* allowed to do direct manipulation of the ^%ZTSCH and ^%ZTSK globals.

The TaskMan API consists of entry points that allow developers to create, manipulate, and inquire about tasks. The most widely used entry point, ^%ZTLOAD, lets developers queue tasks, which involves creating and scheduling them. First, an application sets the variables that ^%ZTLOAD needs to define the desired task. In turn, ^%ZTLOAD uses that information to create an entry in the TASKS (#14.4) file. ^%ZTLOAD then sets up a simple cross-reference to the new task in the SCHEDULE file, thereby finishing the queuing process.

After queuing the task, ^%ZTLOAD quits, returning control back to the queuer and leaving the next step in the process to the Manager routines.

### 20.1.1.2 Option Scheduling through the OPTION SCHEDULING (#19.2) File

Another commonly used queuer is the OPTION SCHEDULING (#19.2) file. Menu Manager and TaskMan work together to allow certain options to be run as TaskMan tasks. These special options can be scheduled to run just once, or they can be set up to run over and over based on a rescheduling cycle. Such cycles can even include running the task whenever the computer system boots up.

## 20.1.2 Manager

For tasks to run, at least one CPU in a configuration needs to run a Manager. Only one Manager process needs to run per CPU; the site determines how many CPUs should be configured to run a Manager. The Manager's job is to route the tasks created by queuers. It normally runs at all times in the manager UCIs. It repeats the same loop of code all day long; every 2 seconds it looks for overdue tasks, every 15 seconds it checks the environment and performs some cleanup.

The environment check allows the system manager to control the Manager even at its busiest. All of the commands to which the Manager responds (described later) take effect here, between every task processed.

The Manager looks for overdue tasks in the schedule list, comparing the current time to the start time of the tasks listed. If an overdue task is found, the Manager removes it from the schedule list and inspects it. If the task is defined with a complete task record, the Manager places it in a list of tasks ready to run. The Manager places a task on one of several different lists depending on whether the task needs ownership of a currently unavailable I/O device. As its final step in processing each overdue task, the Manager checks the number of Submanagers available to process tasks and starts up new submanagers, if needed. The Manager uses the **JOB** command (or **%SPAWN** if the Manager is running in a DCL context on a Caché system).

The only variation on this scheme happens when the Manager finds a task bound for a different Volume Set. Depending on the system configuration, such tasks may need to be run by the Manager running on that other Volume Set. In this case, the current Volume Set's Manager copies the task over to the Volume Set on which the task should run and marks it as moved in the current TASKS (#14.4) file. In this process, the task is assigned a new task number, and the Manager on that other Volume Set handles the task from there. If during this process the Manager discovers that the link between the two Volume Sets has dropped, it saves the task in a list of tasks waiting for that Volume Set and checks periodically to see whether it has been restored. When the link recovers, the Manager sends, in sequence, all the waiting tasks to the other Volume Set.

The Manager never actually runs the task but merely places it in a list as a task now available to be run by a Submanager.

### 20.1.3 Submanagers

Submanagers are the processes that actually run tasks. A Manager starts Submanagers whenever more are needed to handle the current workload of tasks, and they only last as long as they are needed. Submanagers loop back and forth between finding new tasks to run and running them.

To run each task, the Submanager first removes the task from the list of waiting tasks on which it reside (e.g., the Job or the **I/O** list). Then it looks up the task's entry in the TASKS (#14.4) file, unloading all of the information about the task. If the task needs a device, the Submanager calls the Device Handler to get ownership of it and issues a **USE** command for it. Then the Submanager sets up the partition for the task and does the following:

- Sets the priority.
- Cleans out unwanted variables.
- Sets up requested variables.
- Prints a page header on the device if one was requested, etc.

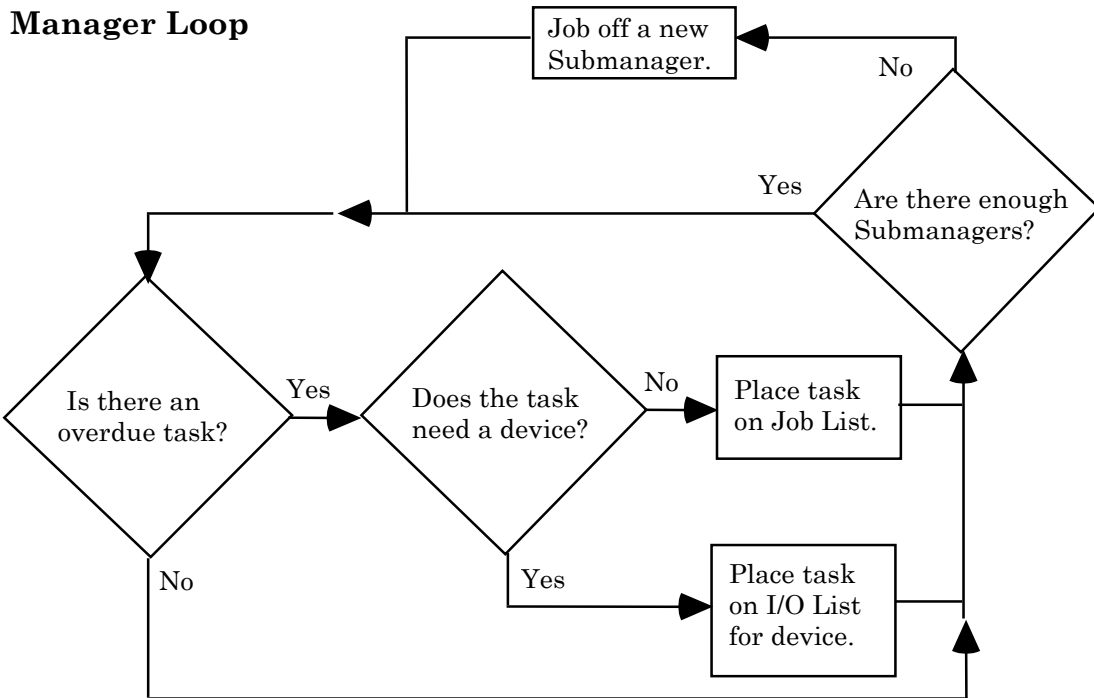
Next, the Submanager starts the task running at the task's entry point. The Submanager uses a **DO** command and runs the task's entry point in its own partition. When the task finishes, the Submanager cleans up after the task:

- Closes the output device.
- Performs any commands left for it by the task, etc.

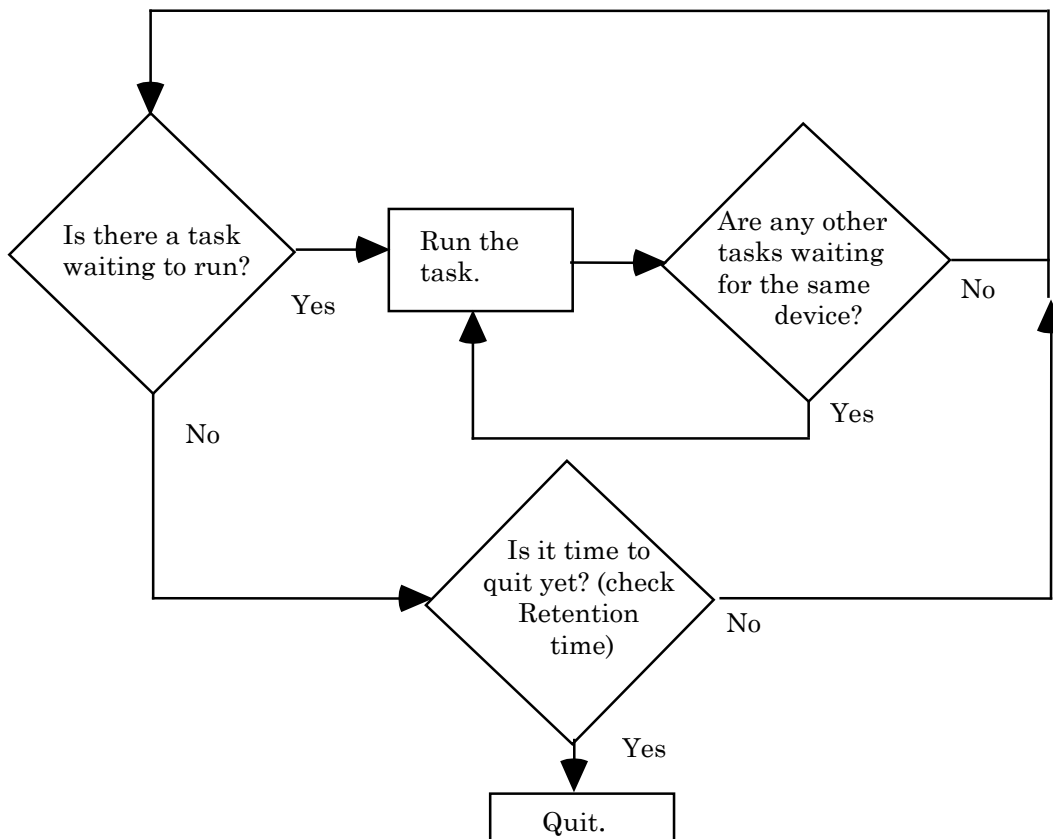
Running completely without user interaction, each task performs the work it was created to do and then quits, returning control to the Submanager that started it. The task may leave instructions for its Submanager, such as to requeue the task so that it runs again later or to delete the task's entry from the TASKS (#14.4) file, but the task itself finishes before the Submanager continues.

After Submanagers have run all available tasks, they wait an interval before quitting. This period, called Submanager retention time, allows the Submanager to keep its partition open for new tasks for a while so that the Manager need *not* start a new Submanager. Every time a new task shows up during the retention time, the Submanager starts its main loop over again, returning to retention again only after all new tasks have been run. When the Submanagers eventually reach the end of their retention time, they quit.

**Figure 228: TaskMan Manager and Submanager Process Flow Diagram**



**Submanager Loop**



## 20.2 TaskMan's Files

The two central files that facilitate task processing are:

- TASKS (#14.4) file
- SCHEDULE file (*not* VA FileMan-compatible)

TaskMan is configured by three configuration Files:

- VOLUME SET (#14.5)
- UCI ASSOCIATION (#14.6)
- TASKMAN SITE PARAMETERS (#14.7)

These files and the TaskMan routines fall within TaskMan's namespace (ZTM), and namespace. TaskMan user interface routines have been moved to the XUTM namespace beginning with Kernel 8.0 (they were previously in the ZTM namespace).

TaskMan also relies upon software components outside of its direct control. As an integral part of Kernel, TaskMan accesses several files controlled by other Kernel modules and calls many software entry points as a whole. TaskMan's main external relation, however, is with VistA software applications through the queuers and the tasks they use.

### 20.2.1 TaskMan Globals: ^%ZTSCH and ^%ZTSK

The ^%ZTSCH global holds the SCHEDULE file, and the ^%ZTSK global holds the TASKS (#14.4) file. Every environment controlled by a single Manager needs each of these globals in its library UCI. % globals are used to make these files accessible to all the UCIs in that environment so a single Manager's influence spans all of those UCIs. When the environment spans Volume Sets, ^%ZTSCH and ^%ZTSK are translated across the Volume Sets included. They are never replicated because TaskMan updates them so frequently.

The ^%ZTSK global is mostly defined by VA FileMan (beginning with Kernel 8.0), but the ^%ZTSCH is not. Historically these globals were *not* VA FileMan-compatible. Now, the inquire, search, and print capabilities of VA FileMan can be used to study the TASKS (#14.4) file. At present, all edit access to these globals is restricted to the TaskMan options that edit the tasks in various ways.



**REF:** For a description of the structure of ^%ZTSCH and ^%ZTSK, see the "[Troubleshooting](#)" section in "[TaskMan: System Management—Operation](#)" section.

## 20.2.2 SCHEDULE File

The SCHEDULE file holds all of the lists and nodes that TaskMan uses to manage itself and to schedule tasks. Some of these lists are:

- Schedule List (or Time Queue)
- Waiting List (or IO Queue)
- Job List
- Compute Server Job List (or C List)
- Link List
- Status List
- Run Node
- TaskMan Error Log
- Error Screens

The SCHEDULE file's function is split between identifying the status of active tasks and of TaskMan itself.



**REF:** For more information on these lists, see the [“TaskMan: System Management—Operation”](#) section.

Most of the lists in the SCHEDULE file describe tasks, as follows:

- Schedule List—Sorts all scheduled tasks by time, according to when they are supposed to begin running.
- Waiting List—Stores each task whose running was delayed because its I/O device was busy.
- Job List—Holds those tasks that can begin running immediately.
- Link List—Stores tasks whose running is delayed because of a dropped link to another Volume Set.
- Task List—Describes all actively running tasks.
- Compute Server Job List—Describes all tasks waiting to start on a Compute Server (cross-CPU queuing).

The role of tracking the status of TaskMan itself is split between lists of information and individual nodes and flags. The Status List is where the Manager keeps track of its current condition; it is a list because system administrators may choose to run more than one Manager in the same TaskMan environment. The **RUN** node is a place where TaskMan stamps the current time; this node reveals when TaskMan stops running. The TaskMan Error Log is a simple list in which TaskMan stores each error that occurs either within TaskMan itself or within the tasks that it runs. The Error Screens are screens that can be established by system administrators to prevent the recording of certain errors.

These lists and nodes, as well as others *not* described here, are the primary data structures that TaskMan uses to schedule and run tasks.

### 20.2.3 TASKS (#14.4) File

The TASKS (#14.4) file, unlike the SCHEDULE file, contains the tasks themselves.

Every task run by TaskMan is described by an entry in the TASKS (#14.4) file. Each entry is subscripted by a unique internal number, and `^%ZTSK(-1)` always equals the number of the most recently created task. The lists and nodes in `^%ZTSCH` store the tasks' numbers that are scheduled to run. Each task's entry consists of a `^%ZTSK(task #, 0)` node that contains most of the essential information about the task, several decimal nodes (`.1`, `.2`, `.25`, and `.26`) that store the remainder of the critical information, and a number of storage nodes under `^%ZTSK(task#,.3)` that store the names and values of parameters that TaskMan creates for the task. Left unchecked, this file tends to grow.



**REF:** For a description of the various means of controlling this growth, see the “[TaskMan: System Management—Operation](#)” section.

### 20.2.4 Other Files

The TASKS (#14.4) and SCHEDULE files, taken together, describe all the information about tasks on the system. A few more files are needed, however, to describe everything about how tasks are managed on the system.

The following three files are stored in `^%ZIS`:

- The VOLUME SET (#14.5) file—Describes the computer system's Volume Sets and how they are configured into TaskMan environments.
- The UCI ASSOCIATION (#14.6) file—Lists all the UCIs on the system and which Volume Sets they belong to. In more complicated systems, it is also used to describe how the UCIs in different environments correspond with one another.
- The TASKMAN SITE PARAMETERS (#14.7) file—Lets the system manager divide up the environments by both CPU and Volume Set. This allows a fine degree of control over such parameters as priority, partition size, and retention time.

Taken together, these files give system administrators precise and powerful control over TaskMan's behavior.

Other minor pieces of information are scattered throughout other Kernel files, especially the DEVICE (#3.5) and OPTION SCHEDULING (#19.2) files.

## 20.3 System Configuration Terminology

TaskMan operates close to the level of the system architecture. It *must* be capable of starting tasks in all the environments within a computer system. This means it *must* know about those environments; consequently, the options, routines, files, and documentation somehow *must* refer to that architecture.

One problem presented by system configuration is terminology. Such system architecture features as UCIs, directories, Volume Sets, and namespaces are *not* part of the ANSI M standard, so different vendors use different terminology. Although it would be ideal for Kernel to use a universal terminology, none exists. For historical reasons, Kernel has settled on a terminology based on that of **DSM-11** that includes the following terms:

**Table 37: TaskMan System Configuration Terminology**

Term	Definition
<b>UCI</b>	User Class Identifier. This is roughly equivalent to a “directory” or an “account”. A UCI refers to the environment limited to a particular set of routines and globals. In Caché terms, this is a “namespace.”
<b>Manager UCI</b>	Roughly equivalent to a “system UCI” or a “library UCI.” This is where the vendor’s system management routines are kept, and where all %-namespaced routines and globals reside. Currently, all Kernel % routines and globals are mapped back to the production account.
<b>Volume Set</b>	On current systems, we just set this to the string “ <b>ROU</b> ”. This is the critical definition, since this is what affects how TaskMan starts background jobs.
<b>CPU</b>	Also known as a “node” or “computer”, this designates a source of computing power and partitions. It is used both for controlling TaskMan’s behavior with parameters and for sending tasks to specific CPUs.
<b>Mounted Volume Set</b>	Obsolete; no longer used.



**NOTE:** The TaskMan chapters in this section make use of this terminology.

## 20.4 TaskMan Security Key

The TaskMan module comes with one security key, ZTMQ. The ZTMQ security key does *not* completely lock any options. Instead, it affects the behavior of the following three options:

- Dequeue Tasks [XUTM DQ]
- Requeue Tasks [XUTM REQ]
- Delete Tasks [XUTM DEL]

Those who use these options without holding this security key can manipulate only their own tasks. Only the holder of the ZTMQ security key can use these options to manipulate any task on the system.



# 21 TaskMan: System Management—Configuration

This chapter discusses the many issues surrounding the configuration of TaskMan.

## 21.1 Defining TaskMan Environments

The part of configuring TaskMan for a system that requires the most creativity is deciding how to divide the system's UCIs, Volume Sets, and CPUs into TaskMan environments. A TaskMan environment is the collection of UCIs from which entries can be made directly into a given Manager's TASKS (#14.4) and SCHEDULE files and that are within that Manager's reach. This requires looking at the system in terms of queuing and starting tasks. There are a number of options available. Many different configurations are possible.

One type of configuration has CPUs sharing the same Volume Set. Since this type of environment shares a single Volume Set among multiple CPUs, they also share a single TASKS (#14.4) and SCHEDULE file. However, the reach of Managers *cannot* span CPUs. Therefore, you *must* decide which CPUs in that environment run Managers, or whether some of them should rely on the other CPUs to run their tasks for them. Alpha clusters in VA are typically configured with Managers on only one or a few CPUs.

A different configuration allows you to limit the number of places TaskMan runs. In this scenario, you pick certain CPUs to run TaskMan and give them Managers and files to do the job. To have background processing support, the remaining Volume Sets need to be able to queue to one of the Managers on the system. This entails translating the TASKS (#14.4) and SCHEDULE files of that Manager so they are visible to the unsupported Volume Set. To tell TaskMan that the one Volume Set runs no tasks but is instead supported by the other, you *must* configure the VOLUME SET (#14.5) file as described later in this section.

Another possible configuration is to allow tasks to run everywhere, which requires that you place Managers within reach of every UCI and that you define your TaskMan environments accordingly. Under this configuration every CPU needs its own Manager, and its own TASKS (#14.4) and SCHEDULE files.

One other configuration to keep in mind, of course, is to have a standalone environment disconnected from the rest of the computer system. Such environments make excellent test areas for developers. They are configured the same regardless of the configuration of the main system.

## 21.2 Configuring TaskMan

TaskMan's three configuration files *must* be setup to properly reflect your system's layout. The three files are:

- TASKMAN SITE PARAMETERS (#14.7)
- VOLUME SET (#14.5)
- UCI ASSOCIATION (#14.6)

There are three options on the Edit TaskMan Parameters menu, one to edit each of the three configuration files.

Because the TASKMAN SITE PARAMETERS (#14.7) allows you to define parameters (e.g., TaskMan Job Limit) separately for each CPU on your system; you are able to optimize TaskMan's behavior individually for each CPU.

You no longer need to stop and then restart TaskMan in order to change the TASKMAN JOB LIMIT on a CPU. Cross-references on the relevant fields locate every TaskMan on your system and inform them that they need to update their TaskMan parameter information. Thus, within a minute or so of making the changes, TaskMan on that CPU should be operating with the new value.

## 21.2.1 TaskMan’s Reach

The key issue that defines TaskMan’s configuration is its “reach,” those places where TaskMan can start background jobs. TaskMan’s reach extends to:

- All UCIs a Submanager can access directly after using Kernel’s UCI switching facilities.
- All other Managers TASKS (#14.4) and SCHEDULE files to which a given Manager can **WRITE** using extended global reference.
- All UCIs on Print Servers with link access to the current Volume Set.

TaskMan’s reach does *not* include other sites on a wide area network, because they *cannot* be accessed through either UCI switching or through extended global reference. There are ways to simulate such a reach through the use of server options, however. For purposes of TaskMan configuration, we generally think in terms of the reach of a single Manager, which can only run tasks in the UCIs it can reach.

## 21.2.2 TASKMAN SITE PARAMETERS (#14.7) File

**Figure 229: Site Parameters Edit Option**

```

SYSTEMS MANAGER MENU ... [EVE]
Task Manager ... [XUTM MGR]
  Taskman Management Utilities ... [XUTM UTIL]
    Edit Taskman Parameters ... [XUTM PARAMETER EDIT]
      Site Parameters Edit [XUTM BVPAIR]
  
```



System managers *must* enter one set of site parameters into the TASKMAN SITE PARAMETERS (#14.7) file for each Manager that runs in a different Volume Set/CPU. This set of parameters tells each Manager how it should process tasks. The parameters are organized both by Volume Set and by CPU. This allows two CPUs that share a Volume Set to be treated differently if one is more powerful than the other.

**Table 38: TASKMAN SITE PARAMETERS (#14.7) File—Field Entries**

Field	Description
BOX-VOLUME PAIR (#.01)	<p>The BOX-VOLUME PAIR field identifies a Volume Set and the CPU on which it is available. It contains the name of a Volume Set concatenated to the CPU (“box”) name: first the Volume Set name and then the CPU name. For example, if the Volume Set name is “KRN” and the name of the CPU (e.g., box) is “ABC999,” then the BOX-VOLUME PAIR would be “KRN:ABC999.”</p> <p>For systems on which each CPU tends to have a unique Volume Set, and vice versa, you can enter just the Volume Set name (e.g., “PSA” or “AAA”). This field’s value for the current process can be found by doing GETENV^%ZOSV and checking the fourth ^-piece of Y. Since the Volume Set and CPU are identified, the TaskMan site parameters can be tuned for each specific Volume Set and CPU affected. Systems running Managers on more than one CPU need one entry for each CPU where a manager is running.</p>
LOG TASKS? (#2)	<p>Set the LOG TASKS? field to <b>YES</b> to make tasks log in and out through the signon log the way interactive users do. How to set this is up to the individual site; it does consume</p>

Field	Description
	space and resources.
TASK PARTITION SIZE (#4)	The TASK PARTITION SIZE field is used to assign partition sizes for tasks. The value from this field is plugged directly into the <b>JOB</b> command used to create new Submanagers. If this field is left blank, all tasks receive the operating system's current default value. This field should only be used by system managers who thoroughly understand how their vendor's version of M handles partition sizes with the <b>JOB</b> command.
SUBMANAGER RETENTION TIME (#5)	The SUBMANAGER RETENTION TIME number determines how many seconds Submanagers should wait while looking for new tasks. The purpose of this field is to reduce the number of <b>JOB</b> commands needed to process a site's tasks. By keeping old Submanagers around to run new tasks, new process creation is significantly reduced.
TASKMAN JOB LIMIT (#6)	If there are more active processes on the system than the number stored in the TASKMAN JOB LIMIT field, TaskMan does <i>not</i> create new Submanagers to handle tasks. Task processing is left to existing Submanagers until the number of processes falls back below this number. This number should be slightly lower than the MAX SIGNON ALLOWED (#41,2) field of the VOLUME SET (#41) Multiple field in the KERNEL SYSTEM PARAMETERS (#8989.3) file so that the system manager still has room to sign on when TaskMan is using its greatest number of partitions.
TASKMAN HANG BETWEEN NEW JOBS (#7)	<p>The TASKMAN HANG BETWEEN NEW JOBS field sets a delay between the creation of new Submanagers, in seconds. It is useful as a throttle. For systems, this delay spaces out the use of the <b>JOB</b> command to avoid slowing users' response time when the Manager needs to JOB off many new processes in rapid succession.</p> <p>For systems that create new processes cheaply, this delay is unnecessary. This delay also becomes less important when a high Submanager retention time is used since higher retention times reduce the likelihood that TaskMan needs to create new processes.</p> <p>Be sure <i>not</i> to combine a high TASKMAN HANG BETWEEN NEW JOBS value with a low SUBMANAGER RETENTION TIME value, since that increases the number of jobs per day TaskMan has to start and can cause busy systems to fall behind. The number should be the lowest value that prevents the problem and can be left blank for systems with efficient <b>JOB</b> commands.</p>
MODE OF TASKMAN (#8)	<p>The MODE OF TASKMAN field determines how each CPU (BOX-VOLUME pair entry) should process tasks. You can set it to one of four values:</p> <ul style="list-style-type: none"> <li>• <b>General Processor ("G"):</b> The <b>G</b> type should be selected when the TASKS (#14.4) and Scheduling files are seen by only one Volume Set. For example, VA's Alpha clusters have several CPUs, but each of them</li> </ul>

Field	Description
	<p>runs on the same Volume Set. The Manager on a <b>G</b> type runs tasks created on the same Volume Set, and tasks from any other Volume Set that explicitly requests the <b>G</b> type's Volume Set. The <b>G</b> type sends tasks from another Volume Set that did <i>not</i> explicitly request its Volume Set back to the originating Volume Set, however.</p> <p>To transfer tasks to a <b>G</b> type, TaskMan uses extended global references to copy the task to the destination TASKS (#14.4) and Scheduling files and then removes the task from its own side. Submanagers started on a G-type processor process tasks in the Partition Waiting List and the Busy Device Waiting List.</p> <ul style="list-style-type: none"> <li>• <b>Print Server (“P”)</b>: The P type should be selected when multiple Volume Sets map to the same TASKS (#14.4) and Scheduling files, and you want to run the Manager on the Volume Set/CPU in question.</li> </ul> <p>Like the <b>G</b> type, the Manager on a P type runs tasks created on the same Volume Set and tasks from any other Volume Set/CPU that explicitly request the P type's Volume Set/CPU. Unlike the <b>G</b> type, however, the P type also runs tasks from other Volume Sets that did <i>not</i> make an explicit Volume Set request. Tasks are transferred to a P type in the same way as to a <b>G</b> type, and Submanagers behave the same.</p> <ul style="list-style-type: none"> <li>• <b>Compute Server (“C”)</b>: The C type should be selected when multiple Volume Sets map to the same TASKS (#14.4) and Scheduling files (as with the P type), but when the Volume Set/CPU in question runs users (<i>not</i> tasks). The Manager does <i>not</i> start on a C type. Tasks that explicitly request to run on a C type are transferred to it by being placed in the Link Waiting List; a Submanager is then jobbed across to the C type Volume Set/CPU. Submanagers started on a C type only process tasks in the Link Waiting List for their Volume Set.</li> <li>• <b>Other Non-TaskMan (“O”)</b>: Neither the Manager nor the Submanager runs on <b>O</b> types. Tasks sent from or to an <b>O</b> type are rejected.</li> </ul> <p>Because of the field's crucial role in guiding TaskMan's behavior, the field is required.</p>
VAX ENVIRONMENT FOR DCL (#9)	<p>The VAX ENVIRONMENT FOR DCL field only has meaning to DSM for OpenVMS and Caché systems. It is set to the OpenVMS username of the DSM environment manager account. Setting it to this username causes the Manager to use <b>%SPAWN</b> to SUBMIT Submanagers to run. This method requires that certain DCL command files exist, along with a TASKMAN OpenVMS user account and directory.</p>

Field	Description
	 <b>REF:</b> For descriptions of the needed setups, see the <a href="#">“Running TaskMan with a DCL Context”</a> section. If the field is empty, the Manager starts Submanagers with the <b>JOB</b> command instead.
LOAD BALANCE ROUTINE (#21)	If you are running multiple Managers (one per node), use the LOAD BALANCE ROUTINE field to set up load balancing between the Managers on each node. It should be set to the name of an extrinsic function that returns a load rating for the node.   <b>REF:</b> For more information on load balancing, see the <a href="#">“Multiple TaskMan Managers and Load Balancing”</a> section.

### 21.2.3 VOLUME SET (#14.5) File

Figure 230: Volume Set Edit Option

SYSTEMS MANAGER MENU ...	[EVE]
Task Manager ...	[XUTM MGR]
Taskman Management Utilities ...	[XUTM UTIL]
Edit Taskman Parameters ...	[XUTM PARAMETER EDIT]
Volume Set Edit	[XUTM VOLUME]

TaskMan knows about a system’s configuration from the values entered into the VOLUME SET (#14.5) file using the Volume Set Edit option [XUTM VOLUME]. The information stored in this file strongly affects TaskMan’s behavior. If you inaccurately describe your system, you usually notice very quickly as TaskMan begins processing tasks in a consistently incorrect way.

You need to make one entry in this file for each Volume Set that tasks can be queued to or from. These entries are only used when:

- A Manager is running on the Volume Set and *must* look up information about its own environment.
- The Volume Set is a required volume, in which case every Manager *must* check access to it when they start up.
- A task needs to run on the Volume Set, in which case the Manager *must* look up how to get the task there.

The following is what we have set up for FORUM:

**Figure 231: Sample Volume Set Setup on FORUM**

```
VOLUME SET (14.5)

VOLUME SET: ROU                                INHIBIT LOGONS?: NO
LINK ACCESS?: NO                               TASKMAN FILES UCI: VAH
DAYS TO KEEP OLD TASKS: 1                     TYPE: GENERAL PURPOSE VOLUME SET
SIGNON/PRODUCTION VOLUME SET: Yes

UCI ASSOCIATION (14.6)

Empty


TASKMAN SITE PARAMETERS (14.7 )

BOX-VOLUME PAIR: ROU:FORFORUM1                LOG TASKS?: NO
SUBMANAGER RETENTION TIME: 60                 TASKMAN JOB LIMIT: 400
TASKMAN HANG BETWEEN NEW JOBS: 1             MODE OF TASKMAN: GENERAL PROCESSOR
OUT OF SERVICE: NO                           MIN SUBMANAGER CNT: 10
LOAD BALANCE ROUTINE: $$CACHE1()             Auto Delete Tasks: Yes
Manager Startup Delay: 30
```

The value of ^%ZOSF(“VOL”) is FOR.

**Table 39: VOLUME SET (#14.5) File—Field Entries**

Field	Description
VOLUME SET (#.01)	The VOLUME SET field should be set to the name of a Volume Set. It is used in extended global references to reach this Volume Set and can be used in UCI-switching software to move Submanagers between UCIs. If you are unsure how your Volume Sets are named, you can look at the value of ^%ZOSF(“VOL”) in the Volume Set in question.
TYPE (#.1)	<p>The TYPE field is used to help resolve where tasks should run; it should properly identify the type of the Volume Set. Typically it should be set to the same value as the MODE OF TASKMAN (#8) field for all BOX-VOLUME PAIRs associated with this Volume Set, in the TASKMAN SITE PARAMETERS (#14.7) file. This field <i>must</i> be filled in for all Volume Sets. This field can have the following values:</p> <ul style="list-style-type: none"> <li>• <b>G</b>—GENERAL PURPOSE VOLUME SET</li> <li>• <b>P</b>—PRINT SERVER</li> <li>• <b>C</b>—COMPUTE SERVER</li> <li>• <b>O</b>—OTHER NON-TASKMAN VOLUME SET</li> </ul> <p>These values have the same meanings as the equivalent values for the MODE OF TASKMAN (#8) field in the TASKMAN SITE PARAMETERS (#14.7) file, as described previously in the “<a href="#">TASKMAN SITE PARAMETERS (#14.7) File</a>” section. GENERAL PURPOSE VOLUME SET for Volume Sets is the rough equivalent of the MODE OF TASKMAN value GENERAL PROCESSOR for BOX-</p>

Field	Description
	<p>VOLUME PAIRS.</p> <p> <b>NOTE:</b> The <b>FILE SERVER</b> value has been removed; Volume Sets for File Servers should be set to a TYPE of <b>OTHER NON-TASKMAN VOLUME SET</b>.</p>
INHIBIT LOGONS? (#1)	<p>Setting the INHIBIT LOGONS? field to <b>YES</b> causes TaskMan to notify Signon that logons are now prohibited and to enter a <b>PAUSE</b> state (stopping processing of tasks) until logons are allowed again. Under ordinary circumstances, system managers should leave this field as <b>NULL</b> or <b>NO</b>.</p>
LINK ACCESS (#2)	<p>The LINK ACCESS field should always be set to <b>NULL</b> or <b>YES</b> for the usual kinds of configurations used in Vista. Answer <b>NO</b> to tell TaskMan that this Volume Set cannot be accessed by other Volume Sets using the local network links. Tasks that request a Volume Set without link access are rejected by TaskMan. Such Volume Sets are usually PC workstations linked into the larger network. They can access the core computers, but <i>cannot</i> be accessed themselves.</p> <p>Some system managers may wish to have a completely isolated computer for testing. They can cut it off from the rest of the world by making entries for all the other Volume Sets and setting this field to <b>NO</b> for each of them. This explicitly tells TaskMan it cannot reach the other Volume Sets.</p>
OUT OF SERVICE? (#3, Obsolete, see TYPE field)	<p>The OUT OF SERVICE? field is obsolete and should only be set to <b>NULL</b>; use the TYPE (#.1) field.</p>
REQUIRED VOLUME SET? (#4, Obsolete)	<p>The REQUIRED VOLUME SET? field is obsolete and should only be set to <b>NULL</b>.</p>
TASKMAN FILES UCI (#5)	<p>The TASKMAN FILES UCI field should be set to the name of the UCI that holds the <b>^%ZTSCH</b> and <b>^%ZTSK</b> globals (usually the manager UCI). The answer should <i>not</i> contain a comma and Volume Set name (e.g., <b>VAH,PSA</b>), just the UCI name (e.g., <b>VAH</b>). This field is required.</p>
TASKMAN FILES VOLUME SET (#6)	<p>The TASKMAN FILES VOLUME SET field should be set to the name of the Volume Set that holds <b>^%ZTSCH</b> and <b>^%ZTSK</b>.</p> <p>A <b>NULL</b> value means this Volume Set holds its own TaskMan files, which is usually the case.</p>
REPLACEMENT VOLUME SET (#7)	<p>The REPLACEMENT VOLUME SET field should be set to the name of a Volume Set to which tasks can be sent if this Volume Set is unavailable. A REPLACEMENT VOLUME SET should be essentially equivalent in features to the current one, since tasks that would normally run on the current one are running on the REPLACEMENT VOLUME SET instead. For many Volume Sets, no other Volume Set is equivalent, and tasks should wait for the link to be restored rather than run elsewhere. If tasks that need this</p>

Field	Description
	Volume Set should wait, leave the field blank.
DAYS TO KEEP OLD TASKS (#8)	The number stored in the DAYS TO KEEP OLD TASKS field is used by the XUTM QCLEAN option to decide which tasks to delete. The decision only affects inactive tasks, as explained in the discussion of the XUTM QCLEAN option. Values in this field <i>cannot</i> inadvertently cause TaskMan to delete scheduled or running tasks. If the field contains no value, XUTM QCLEAN keeps the last seven days' tasks. A value of <b>0</b> here keeps your file very clean.

## 21.2.4 UCI ASSOCIATION (#14.6) File

Figure 232: UCI Association Table Edit Option

SYSTEMS MANAGER MENU ...	[EVE]
Task Manager ...	[XUTM MGR]
Taskman Management Utilities ...	[XUTM UTIL]
Edit Taskman Parameters ...	[XUTM PARAMETER EDIT]
UCI Association Table Edit	[XUTM UCI]

There are two different kinds of entries made into the UCI ASSOCIATION (#14.6) file using the UCI Association Table Edit option [XUTM UCI]:

- [Partial File Entries](#)
- [Complete File Entries](#)

### 21.2.4.1 Partial File Entries

File entries with the following first two fields filled in identify the valid UCIs on the system for TaskMan:

- FROM UCI ([Table 40](#))
- FROM VOLUME SET ([Table 40](#))

Every VistA site needs one entry of this type for each UCI to which tasks can be queued or from which tasks are created.



**NOTE:** Caché sites only need to fill in these first two fields.



**REF:** For a sample configuration, see the “[Sample Configuration: Standardized VA Caché and GT.M Configuration](#)” section.



### 21.2.4.2 Complete File Entries

File entries with all four fields ([Table 40](#)) completed collectively build a UCI ASSOCIATION TABLE.

A complete UCI ASSOCIATION TABLE tells TaskMan which UCI to use for tasks that *must* switch Volume Sets in order to reach an I/O device. This situation arises when an I/O device is located in a different Volume Set than the Volume Set where the task was created. In such situations, the Manager knows exactly where the task originated and knows to which Volume Set it *must* be moved, but it does *not* know in which UCI on that Volume Set it should run the task. A UCI ASSOCIATION TABLE entry supplies the missing information by linking equivalent UCIs together. When building a full UCI ASSOCIATION TABLE, you can omit entries where the UCIs on both Volume Sets have the same name because TaskMan assumes that same-named UCIs are equivalent if no entry is present.

**Table 40: UCI ASSOCIATION (#14.6) File—Partial and Complete Field Entries**

Field	Description
FROM UCI (#.01)	<p>The FROM UCI field should be set to the name of a UCI on your system. Enter only the UCI name (e.g., <b>VAH</b>). Do <i>not</i> include the Volume Set name (e.g., <b>VAH,ROU</b>).</p> <ul style="list-style-type: none"> <li>For entries requiring only two fields, this catalogues all the UCIs on your system (and there should be an entry for each).</li> <li>For four-field entries, this represents a UCI from which tasks are being transferred in order to reach their <b>I/O</b> device.</li> </ul>
FROM VOLUME SET (#1)	<p>The FROM VOLUME SET field should be set to the name of the Volume Set that holds the UCI identified in the entry's FROM UCI (#.01) field. Every Volume Set listed in this field should be described in the VOLUME SET (#14.5) file.</p> <ul style="list-style-type: none"> <li>For four-field entries, this represents the Volume Set from which tasks are being transferred in order to reach their <b>I/O</b> device.</li> </ul>
TO VOLUME SET (#2)	<p>The TO VOLUME SET field is only used for entries that build a UCI Association Table. For such entries, it should be the name of the Volume Set to which tasks are being transferred in order to reach their <b>I/O</b> devices.</p>
TO UC (#3)I	<p>As with TO VOLUME SET(#2), the TO UCI field is only used for entries that build a UCI Association Table. For such entries, it should be the name of the UCI to which tasks are transferred whenever they <i>must</i> be moved from the UCI on the first Volume Set to the second Volume Set in order to reach their <b>I/O</b> devices. As with the From UCI field, the Volume Set name should <i>not</i> be included.</p>

## 21.2.5 Sample Configuration: Standardized VA Caché and GT.M Configuration

Sites that run Managers on their satellites should make the appropriate TASKMAN SITE PARAMETERS (#14.7) file entries for each satellite and adjust their TaskMan Job Limit to reflect each satellite's individual capacity.

**Figure 233: VOLUME SET (#14.5) File Standardized VA Caché and GT.M Configuration**

VOLUME SET	You need one entry, for ROU
TYPE	GENERAL PURPOSE VOLUME SET
INHIBIT LOGONS?	Blank or NO
LINK ACCESS?	Blank or NO
OUT OF SERVICE?	Blank or NO
REQUIRED VOLUME SET?	Blank or NO
TASKMAN FILES UCI	VAH
TASKMAN FILES VOLUME SET	Leave this blank
REPLACEMENT VOLUME SET	Leave this blank
DAYS TO KEEP OLD TASKS	Up to you; can leave blank
SIGNON/PRODUCTION VOLUME SET	Yes

**Figure 234: UCI ASSOCIATION (#14.6) File—Standardized VA Caché and GT.M Configuration**

FROM UCI	1 entries: VAH
FROM VOLUME SET	ROU
TO VOLUME SET	Blank
TO UCI	Blank



**NOTE:** You can leave this empty.

**Figure 235: TASKMAN SITE PARAMETERS (#14.7) File Standardized VA Caché and GT.M Configuration**

BOX-VOLUME PAIR	ROU:FORFORUM1 Your answer should be the volume set name concatenated with the ":" concatenated with the name of the Cache Configuration.
LOG TASKS?	Blank or NO (unless TaskMan is running in a DCL context, in which case set to YES)
DEFAULT TASK PRIORITY	Blank
TASK PARTITION SIZE	Blank
SUBMANAGER RETENTION TIME	60
TASKMAN JOB LIMIT	400 (2-5 lower than Max Signons)
TASKMAN HANG BETWEEN NEW JOBS	1
MODE OF TASKMAN	GENERAL PROCESSOR
ENVIRONMENT FOR DCL	Blank
OUT OF SERVICE	Blank
MIN SUBMANAGER CNT	2
LOAD BALANCE ROUTINE	Blank
Auto Delete Tasks	Yes
Manager Startup Delay	30

## 21.3 Manager Startup

You may want to configure your system so that, on CPUs where the Manager should run, a Manager starts up every time the CPU starts up. Otherwise, you need to manually start up the Manager each time you start up those nodes that should run the Manager.

For most sites, only one Manager is needed to cover each environment. Therefore, this section focuses on starting up only a single Manager.

Neither the Manager nor the Submanagers starts up on a BOX-VOLUME PAIR pair of the wrong type, so pay attention to how you fill in the MODE OF TASKMAN field of the TASKMAN SITE PARAMETERS (#14.7) file. If you want the Manager to start, you *must* make sure this field is set to either a Print Server or a General Processor.

Getting the Manager to start up when the system does is accomplished in the VA by the ZSTU routine in the %SYS namespace. This routine is provided by Enterprise Product Support (EPS).

## 21.4 Multiple TaskMan Managers and Load Balancing

TaskMan supports the running of multiple Manager processes; however, only one Manager process should run per CPU. Running multiple Managers is probably useful only at large sites; at a large site, doing this can enable tasks to be processed more quickly than if only one CPU runs a Manager. An added bonus with multiple Managers is that if one CPU running a Manager becomes unavailable, Managers still run on the other CPUs, with no further re-configuration required.

### 21.4.1 Configuration for Multiple Managers

Each node that runs a TaskMan Manager *must* have its own entry (BOX-VOLUME PAIR) in the TASKMAN SITE PARAMETERS (#14.7) file.

Each CPU *must* share access to a common ^%ZTSK and ^%ZTSCH global, and have access to the same devices. Because of this, all CPUs *must* run the same M implementation.

### 21.4.2 Starting Up, Pausing, and Stopping Multiple Managers

You need to start a Manager on each CPU where a Manager should run. Whatever steps you follow to start a single Manager, you need to repeat for any additional nodes on which you want to run additional Managers.

The options that place TaskMan in a WAIT state and stop TaskMan are *not* CPU-specific; they affect all running Managers across the system.

### 21.4.3 Load Balancing

The LOAD BALANCE ROUTINE field in the TASKMAN SITE PARAMETERS (#14.7) file holds the name of a function that returns a CPU's load rating. This field is only useful if you are running multiple TaskMan Managers.

To use load balancing, enter a routine name in the LOAD BALANCE ROUTINE field for each participating CPU's BOX-VOLUME PAIR entry. Kernel patch XU\*8.0\*355 added the following routine for TaskMan load balancing in Caché:

```
$$CACHE2(@com-file,logical-name) in ^ZTM6
```

If the com-file value is set, that com-file runs each time TaskMan gets the balance value. The logical-name defaults to **VISTA\$METRIC** or uses the value entered. The normal way would be to have **\$\$CACHE2()** in the field and use the following two scripts:

- **GET\_METRIC.COM**—This script sets the logical “**VISTA\$METRIC.**” It can be run by TaskMan or from the **TMS<node>** batch queue with the **METRIC\_SCHEDULE.COM** script.
- **METRIC\_SCHEDULE.COM**—This script takes a parameter of the number of seconds to reschedule itself. It defaults to **15** seconds and runs under the “**SYSTEM**” user.



**NOTE:** These scripts are located in the same directory as the TaskMan in DCL files.

Use of TaskMan in DCL is optional.

It is all right to run multiple TaskMan Managers without using load balancing; it is also all right if load balancing is set up and only one Manager is running (that Manager automatically takes all jobs itself). If one Manager’s CPU has the **LOAD BALANCE ROUTINE** field filled in, and another running Manager’s CPU does not, the Managers acts as if no load balancing is taking place. In short, the only ramification from various combinations of Managers with the **LOAD BALANCE ROUTINE** field filled in or not is that load balancing might *not* take place.

The load balancing routine *must* be an extrinsic function that returns a positive value. The CPU with the highest value is the one that runs new tasks.

Cache Algorithms:

- **\$\$Cache2()**—Returns the TCPIP metric.
- **\$\$Cache1()**—Returns the Available jobs.

Each CPU performing load balancing compares its current CPU capacity with that of the other nodes running Managers. If the current CPU has a lower rating than the other CPUs, it puts itself in a **BALANCE** state and waits to let the other CPUs take up the load before running more jobs itself.

Submanagers try and wait until there node is running before testing if they should exit.

## 21.4.4 Monitor Taskman Option

On a system where multiple managers are running, the Monitor Taskman option [**XUTM ZTMON**] shows a combined view of the operation of multiple managers.

If the current node (the one where you are running the Monitor Taskman option) has a lower rating than other nodes, Monitor TaskMan shows that the current node is in a **BALANCE** state.

## 21.5 Device Handler's Influence on TaskMan

Certain DEVICE (#3.5) file fields strongly affect TaskMan's behavior. System managers should keep these effects in mind as they configure their systems' devices.

**Table 41: DEVICE (#3.5) file—TaskMan-related Field Entries**

Field	Description
VOLUME SET(CPU) (#1.9)	If the VOLUME SET(CPU) field is <i>not</i> filled in, TaskMan considers this device to be available from all Volume Sets. If it is filled in, TaskMan makes sure all tasks that need this device start on the designated Volume Set.
TYPE (#2)	Any tasks that <i>must</i> wait for HFS- or SPL-type devices are rescheduled for ten minutes in the future, instead of being placed in a list of waiting tasks. This is because these lists are checked through repeated opens, which may contaminate the output of these two special types of devices.
PRIORITY AT RUN TIME (#25)	The PRIORITY AT RUN TIME field overrides the default priority that system managers can establish for tasks using the Site Parameters Edit option on the Edit TaskMan Parameters menu.
TASKMAN PRINT A HEADER PAGE? (#26)	<p>If the TASKMAN PRINT A HEADER PAGE? field is set to <b>YES</b> for the device being opened by the Submanager, a header page is printed. The header page distributed with TaskMan is very simple, and system managers can substitute their own locally written header pages. To do this, you <i>must</i> rename your header page routine as <b>^%ZTMSH</b>, the name of the one distributed with TaskMan.</p> <p>Whenever you install new versions of Kernel, it overwrites <b>^%ZTMSH</b> with the default copy, so you should maintain your local version by doing the following:</p> <ul style="list-style-type: none"><li>• Keep your local header page routine saved somewhere under a local name.</li><li>• After each Kernel install, re-save the locally named copy as <b>^%ZTMSH</b>.</li></ul>

The following example shows an alternative to the default header page distributed with Kernel:

**Figure 236: Customized Header Page Routine**

```
%ZZTMSH      ;SEA/RDS-Local: Sample Header Page ;3/9/92 11:17 ;
              ;;1.0;Local;;
              ;
LOCAL        ;Print The Local Header Page
              ;
B            ;build text lines
S X1=$P($G(^VA(200,DUZ,0)),U) I X1="" S X1="name unknown"
S X2=$P($G(^VA(200,DUZ,5)),U,2) I X2="" S X2="unlisted mail stop"
S X3=$P($G(^VA(200,DUZ,.13)),U,2) I X3="" S X3="unlisted phone number"
S ZZLINE1=$$FORMAT("  _X1_   (_X2_)  _X3_  ",IOM)
S ZZLINE2=$$FORMAT("  _ZTDESC_  ",IOM)
S ZZLINE3=$$FORMAT("  _ION_    _$_$HTE^XLFDT($H)_  ",IOM)
              ;
D            ;display each line three times
F X=1:1:3 W !,ZZLINE1
W ! F X=1:1:3 W !,ZZLINE2
W ! F X=1:1:3 W !,ZZLINE3
Q
              ;
FORMAT(ZZTEXT,ZZIOM) ;local extrinsic function
              ;input: text to be formatted, and margin width
              ;output: text filled out to margin width -3 with *characters
N ZZ1,ZZFILLED
S ZZ1=ZZIOM-3-$L(ZZTEXT)\2
S $P(ZZFILLED,"*",ZZ1*2+1)=" "
S $P(ZZFILLED,"*",ZZ1+1)=ZZTEXT
I $L(ZZFILLED)+3-ZZIOM S ZZFILLED=ZZFILLED_"*"
Q ZZFILLED
```

**Figure 237: Customized Header Page**

```
***** XUUSER,ONE (OIFO) FTS 555-5555 *****
***** XUUSER,ONE (OIFO) FTS 555-5555 *****
***** XUUSER,ONE (OIFO) FTS 555-5555 *****

***** SAMPLE TASK *****
***** SAMPLE TASK *****
***** SAMPLE TASK *****

***** LAT DEVICE Jun 30, 1992@14:34:01 *****
***** LAT DEVICE Jun 30, 1992@14:34:01 *****
***** LAT DEVICE Jun 30, 1992@14:34:01 *****
```

## 21.6 Running TaskMan with a DCL Context

When run from a DCL context, TaskMan runs as an OpenVMS user. The Manager runs as a job that originates from a node-specific OpenVMS batch queue and, by default, submits new Submanagers to the same queue as needed.

One advantage to running TaskMan from a DCL context is that it allows jobs to be queued to specific CPUs. When a program calls `^%ZTLOAD`, it can request that the job run on a specific CPU/node in your cluster (via the `ZTCPU` input variable). Unless you are running TaskMan in a DCL context (on Caché systems only), this request will probably fail (and possibly cause the task *not* to run). When TaskMan runs with a DCL context, however, the Manager can submit the job as a new Submanager to a given CPU's TaskMan batch queue.

Depending on the `%ZTSK` and `%ZTSCH` mapping, multiple Cache environments on the same CPU can each run TaskMan in a DCL context. Although TaskMan in each Cache environment shares the same account, directory, DCL command files, and batch queue, jobs run in the environment specified in each environment's `VAX ENVIRONMENT FOR DCL` site parameter.



**NOTE:** Kernel patch XU\*8.0\*355 added the `$$CACHE2` routine for TaskMan load balancing and provides support for DCL context in Caché.

### 21.6.1 Setup for Running TaskMan in a DCL Context in a Cache/VMS Environment

The following steps show you how to set up TaskMan to run in a DCL context in Cache/VMS (see Kernel patch XU\*8.0\*355).



**NOTE:** The following is just an example and has to be modified for your site. You need to adjust the UIC [100,20] to match your system and indicate the location of the TaskMan directory.

1. Create TASKMAN that runs the TaskMan jobs:

**Figure 238: Create TASKMAN**

```
ADD TASKMAN/OWNER="SYSTEM MANAGER" -  
/ACCOUNT=CACHE -  
/PRIV=(NETMBX,TMPMBX) -  
/DEFPRIV=(NETMBX,TMPMBX) -  
/DEVICE=USER$/DIR=[TASKMAN]/LGICMD=LOGIN.COM -  
/FLAGS=(DisCtlY,DisWelcome,DisReport,DisForce_Pwd_Change,DisPwdDic,DisPwdHis) -  
/PASS=TASK$MAN/UIC=[100,20]
```

2. Create the TASKMAN directory:

**Figure 239: Create the TASKMAN Directory**

```
Define/SYSTEM DHCP$TASKMAN USER$:[TASKMAN]
```

3. Create the system logical name for the directory with the COM files.



**NOTE:** Be sure to also add to the **STARTUP\$LOGICALS.COM** file.

**Figure 240: Create System Logical Name for the Directory with the COM Files**

```
Define/SYSTEM DHCP$TASKMAN USER$:[TASKMAN]
```

4. Create the queues, as explained in this manual.



**NOTE:** Be sure to also add to the **STARTUP\$DEFINE\_QUEUES.COM** file.

TaskMan submits jobs to the queue **TM\$<node>**. Because we use “**run loginout**” to detach the execution, we do *not* need a large **JOB** limit here.

**Figure 241: Create System Logical Name for the Directory with the COM Files**

```
INIT/QUEUE/BATCH/OWNER=[TASKMAN] -  
/prot=(S:M,O:D,G:R,W:S)/JOB=5/AUTOSTART_ON=isfva2:: TM$isfva2
```

5. Load the following DCL command files into the [TASKMAN] directory:

- **GET\_METRIC.COM**
- **LOGIN.COM**
- **METRIC\_SCHEDULE.COM**
- **ZTM2WDCL.COM**
- **ZTMS2WDCL.COM**

These command files are located in the **cache-taskman** sub-directory in the Anonymous FTP site.



**NOTE:** Get the files in ASCII mode.



**Figure 242: Sample User Dialogue to Retrieve DCL Command Files**

```
ABC999$SET DEF USER$:[TASKMAN]
ABC999$FTP FTP.FO-SITE.MED.VA.GOV
220 ABC999.ISC-SITE.MED.VA.GOV FTP Server (Version 5.3) Ready.
Connected to FTP.FO-SITE.MED.VA.GOV.

Name (FTP.FO-SITE.MED.VA.GOV:fort): ANONYMOUS
331 Guest login OK, send ident as password.
Password: XXXXXXXXXXXX
230 Guest login OK, access restrictions apply.
FTP> CD CACHE-TASKMAN
FTP> LS
150 Opening data connection for USR$:[ANONYMOUS.CACHE-TASKMAN]*.*;*

GET_METRIC.COM
LOGIN.COM
METRIC_SCHEDULE.COM
ZTM2WDCL.COM
ZTMS2WDCL.COM

FTP> ASCII
200 TYPE set to ASCII.
FTP> GET GET_METRIC.COM
FTP> GET LOGIN.COM
FTP> GET METRIC_SCHEDULE.COM
FTP> GET ZTM2WDCL.COM
FTP> GET ZTMS2WDCL.COM
FTP> BYE
221 Goodbye.
```



**NOTE:** Repeat for each node in the TASKMAN SITE PARAMETERS (#14.7) file.

## 6. Edit TaskMan Parameters:

**Figure 243: Sample User Dialogue to Edit TaskMan Parameters**

```
Select Edit Taskman Parameters Option: SITE <Enter> Parameters Edit

Select TASKMAN SITE PARAMETERS BOX-VOLUME PAIR: ISC
  1  ISC:ISCABC999
  2  ISC:ISCABC999

namespace:configname.

CHOOSE 1-2: 1 <Enter> ISC:ISCABC999
...
VAX ENVIROMENT FOR DCL: ABC999
node name.
...
Balance Interval: 30// <Enter>
Have TaskMan call the script.

LOAD BALANCE ROUTINE: $$CACHE2("@DHCP$TASKMAN:GET_METRIC.COM")
LOAD BALANCE ROUTINE: $$CACHE2()
Submit the METRIC_SCHEDULE.COM file.
```

## 21.6.2 How to Restart TaskMan when Running in a DCL Context

To manually restart TaskMan when TaskMan is running in a DCL context, you can either:

- Sign in as OpenVMS user TASKMAN and DO RESTART^ZTMB.
- Sign in from an OpenVMS account that has the OPER and SYSPRV privileges and DO RESTART^ZTMB. This submits the Manager to run under the username TASKMAN.

In either case, however, do *not* use the Restart TaskMan option in the Kernel menus; it is *not* compatible with TaskMan in a DCL context.

Figure 244: ZTM2WDCL.COM Command File

```
$!-----
$! ZTM2WDCL.COM - Cache Run Taskman in a DCL Context
$! * KERNEL 8 *
$!
$! P1 is the Cache config that taskman should start in.
$! P2 is the namespace that taskman should start in.
$! P3 = null to START and 1 to RESTART
$!
$! This file is submitted to the queue to run and it
$! builds and runs the TMP_pid.* files
$!
$! Build the file to run, can't pass arguments with RUN
$ pid = F$GETJPI("", "PID")
$ infile="TMP_" + pid + ".ZTM"
$ outfile = "TMP_" + pid + ".log"
$ SAY = "write output"
$!
$ entry="START"
$ if p3 .eq. 1 then entry="RESTART"
$!
$! open and build the input file
$ OPEN/write output 'infile'
$ SAY "$! Taskman temp file to run the Manager"
$ SAY "$! Delete this file if it is not open."
$ SAY "$ set verify"
$ SAY "$ csession ""'p1'" "" -U"" ""'p2'" "" ""'entry'^%ZTM0""
$ SAY "$ exit"
$ Close output
$!
$! If a log file is needed change _NLA0: to 'outfile'
$ name = "ZTMS_" + pid
$ run sys$system:loginout.exe -
    /input='infile' -
    /output=_NLA0: -
    /detach /process='name'
$!
$! Wait for loginout to run it then delete the file.
$ wait 00:01
$!
$ del TMP_*.ZTM;1
$ exit
```

**Figure 245: ZTMS2WDCL.COM Command File**

```
$!-----
$! ZTMS2WDCL.COM - Cache Start Submanager with a DCL Context
$! * KERNEL 8 *
$! p1 is the Cache config name
$! p2 is the namespace to start.
$! p3 is NOT used. (VOL for DSM)
$!
$! This file is submitted to the queue to run and it
$! builds and runs the TMP_pid file
$!
$! Build the file to run, can't pass arguments with RUN
$ pid = F$GETJPI("", "PID")
$ infile = "TMP_" + pid + ".ZTMS"
$ outfile = "TMP_" + pid + ".log"
$ SAY = "write output"
$!
$! open and build the input file
$ OPEN/write output 'infile'
$ SAY "$! Taskman temp file to run a submanager"
$ SAY "$! Delete this file if it is not open."
$ SAY "$ set verify"
$ SAY "$! ``p1' and ``p2'"
$ SAY "$ csession ""`p1'"" ""-U"" ""`p2'"" ""START^%ZTMS""
$ SAY "$ exit"
$ Close output
$!
$! If a log file is needed change _NLA0: to 'outfile'
$ name = "ZTMS_" + pid
$ run sys$system:loginout.exe -
    /input='infile' -
    /output=_NLA0: -
    /detach /process='name'
$!
$!     Wait for loginout to run it then delete the file.
$ wait 00:01
$!
$ del TMP_*.ZTMS;1
$ exit
```

**Figure 246: Example of OpenVMS User TASKMAN on ALPHA AXP Systems**

```
Username: TASKMAN                               Owner:
Account:                                         UIC:   [50,20] ([DEV,TASKMAN])
CLI:      DCL                                   Tables: DCLTABLES
Default:  USER$:[TASKMAN]
LGICMD:   LOGIN
Flags:    DisCtly Restricted DisWelcome DisReport
Primary days:  Mon Tue Wed Thu Fri
Secondary days:                Sat Sun
No access restrictions
Expiration:          (none)   Pwdminimum: 6   Login Fails: 0
Pwdlifetime:        180 00:00   Pwdchange: 19-NOV-1992 14:12
Last Login: 20-NOV-1992 10:34 (interactive), 20-NOV-1992 10:44 (non-
interactive)
Maxjobs:           0   Fillm:      300   Byt1m:      64000
Maxacctjobs:       0   Shrfillm:    0   Pbyt1m:      0
Maxdetach:         0   BI01m:     300   JTquota:     4096
Prclm:             14  DI01m:     900   WSdef:       2048
Prio:              4   AST1m:     600   WSquo:       4096
Queprio:           0   TQElm:     10   WSextent:   16384
CPU:               (none)  Enqlm:    4096   Pgflquo:    100000
Authorized Privileges:
  CMKRNL TMPMBX OPER NETMBX
Default Privileges:
  CMKRNL TMPMBX OPER NETMBX
```

**Figure 247: Example of OpenVMS TASKMAN Queue**

```
ABC999$ SH QUE/FULL TM$ABC999

Batch queue TM$ABC999, available, on ABC999:
  /BASE_PRIORITY=4 /JOB_LIMIT=50 /OWNER=[DEV,TASKMAN]
  /PROTECTION=(S:E,O:D,G:R,W:W)

ABC999$
```

## 22 TaskMan: System Management—Operation

This chapter describes how to operate TaskMan. This chapter discusses the following:

- [TaskMan Management Menu](#)
- [Taskman Management Utilities](#)
- [Scheduling Options](#)
- [Taskman Error Log Menu](#)
- [Troubleshooting](#)

### 22.1 TaskMan Management Menu

The Taskman Management menu [XUTM MGR] is the main point of entry into the TaskMan options. It contains the following options:

- Schedule/Unschedule Options
- One-time Option Queue
- Taskman Management Utilities ...
- List Tasks
- Dequeue Tasks
- Requeue Tasks
- Delete Tasks
- Print Options that are Scheduled to run
- Cleanup Task List
- Print Options Recommended for Queueing

The TaskMan Management Utilities submenu and the scheduling-related options are discussed later in this chapter. The options for listing, dequeuing, requeuing, deleting, and cleaning up tasks are discussed first.

#### 22.1.1 List Tasks Option

Figure 248: List Tasks Option

SYSTEMS MANAGER MENU ...	[ EVE ]
Taskman Management ...	[ XUTM MGR ]
List Tasks	[ XUTM INQ ]

Beginning with Kernel 8.0, the TASKS (#14.4) file (in ^%ZTSK) is VA FileMan compatible (i.e., you can use VA FileMan to print out information about a task). However, the List Tasks option [XUTM INQ] also provides a way to examine tasks in the TASKS (#14.4) file. The List Tasks option allows you to choose between several useful ways of selecting tasks. When you choose this option, it presents you with the following menu:

**Figure 249: List Tasks Option Submenu Options**

```

List Tasks Option

    All your tasks.
    Your future tasks.
    Every task.
    List of tasks.
    Unsuccessful tasks.
    Future tasks.
    Tasks waiting for a device.
    Running tasks.

Select Type Of Listing:

```

Several choices only appear on the list when there are tasks in those collections to be displayed. Remember, the TASKS (#14.4) file can be Volume Set/CPU-specific. This means that the option can only display tasks from the TASKS (#14.4) file on the current Volume Set/CPU.

Holders of the ZTMQ security key see a slightly different list of selections. Instead of “All your tasks” and “Your future tasks” they see “All of one user’s tasks” and “One user’s future tasks.” These two selections are generic versions of those available to normal users. They allow the holder to see any user’s tasks and start by prompting the holder for the user whose tasks should be shown. Other than that, they are identical to the selections used by normal users.

Although each submenu option choice shows a different set of tasks, the format for the output is the same. Here is a sample display from the All your tasks suboption:

**Figure 250: All your tasks Suboption—Sample of TaskMan Tasks Running**

```

All tasks that you created...

2572: ALIVE^XINDEX, XINDEX of 1 routine. Device QMS-17P. VAH,KXX.
      From TODAY at 10:55, By you. Scheduled for TODAY at 12:05

End of listing. Press RETURN to continue:

```

In the upper left-hand corner of each entry is the task number. What follows the task number is either an option name (e.g., XUTM QCLEAN) or a routine entry point (e.g., ERROR^ZTMZT) depending on whether the task was a queued routine or a queued option. This is generally followed by a description of the task. The device to which the task was queued (if any), along with the account in which the task was/is scheduled to run, complete the first line. The next line contains the time the task was created followed by an identification of the creator. In the case of tasks that requeue themselves, this date and time represents when the task was last requeued.

When the creator’s **DUZ** number is *not* listed in the NEW PERSON (#200) file, the phrase “USER #” followed by the **DUZ** is substituted. Finally, the status of the task is shown.



**REF:** For a list and description of the status messages, see the “[Troubleshooting](#)” section.

Each of these submenu options are described in the topics that follow.

### **22.1.1.1 All your tasks Option**

The All your tasks option (see [Figure 250](#)) displays every task in the TASKS (#14.4) file on the current Volume Set/CPU that you created. If you have no tasks scheduled, the option gives you the message “You have no tasks in this Volume Set’s TASKS file.”

### **22.1.1.2 Your future tasks Option**

The Your future tasks option displays those tasks you created that are currently scheduled to run. If there are none, the option tells you.

“Every task” lists every task in the TASKS (#14.4) file.

### **22.1.1.3 List of tasks Option**

The List of tasks option allows you to list one or more tasks by task number. You can specify individual tasks separated by commas along with ranges of tasks using a hyphen.

### **22.1.1.4 Unsuccessful tasks Option**

The Unsuccessful tasks option lists three kinds of tasks:

- Rejected by the Manager’s validation process.
- Encountered an error while they were running.
- Unscheduled through the Dequeue Tasks option.

### **22.1.1.5 Future tasks Option**

The Future tasks option shows all tasks that are in the Schedule List or the Waiting List. It does *not* show the tasks that are in the Job List. In other words, it shows all tasks that are scheduled to run but *not* those that are currently being run or those that are ready to be run. “Future Tasks” is *not* offered by the List Tasks option if the Schedule List and Waiting List are empty (an unlikely occurrence at most sites).

### **22.1.1.6 Tasks waiting for a device Option**

The Tasks waiting for a device option shows just the Waiting List, which can be a useful way of isolating problem printers. If there are no tasks currently waiting for output devices to become available, the List Tasks option does *not* show this choice.

### **22.1.1.7 Running tasks Option**

The Running tasks option shows tasks that are currently running.



**REF:** For a discussion of how TaskMan knows a task is running, see the [“Troubleshooting”](#) section.



## 22.1.2 Dequeue Tasks Option

Figure 251: Dequeue Tasks Option

```
SYSTEMS MANAGER MENU ... [EVE]
Taskman Management ... [XUTM MGR]
  Dequeue Tasks [XUTM DQ]
```

The Dequeue Tasks option [XUTM DQ] allows you to unschedule a task so that the task still exists in the TASKS (#14.4) file but is no longer in the Schedule, Waiting, or Job List. The process of unscheduling a task is called “dequeueing”. This option allows you to dequeue any one task or range of tasks. A task that you dequeue has a status of **NOT QUEUED** in a List Tasks display.

The option first prompts you for the task number. Entering one question mark (?) gets you a short explanatory message, but entering two question marks (??) puts you in the List Tasks option to find the task you are interested in dequeueing. When you leave the List Tasks option, you automatically return to the task number prompt.

If you enter the number of a nonexistent task, List Tasks tells you and then prompts you for another task number. If you enter the number of a task that does exist, the option displays the task and asks you if you are sure. Answering **NO** returns you to the task number prompt, whereas a **YES** dequeues the task and then returns you to the task number prompt.

You can also enter a list of tasks to be dequeued. The list can include single tasks separated by commas and ranges of tasks consisting of two numbers separated by a hyphen. After you enter the list, you are asked if you want to know the actual number of tasks in the list. You are then asked if you want a display of the actual tasks that are about to be dequeued.

Only holders of the ZTMQ security key can dequeue any task. Others can only dequeue their own tasks as identified by their **DUZ**.

## 22.1.3 Requeue Tasks Option

Figure 252: Requeue Tasks Option

```
SYSTEMS MANAGER MENU ... [EVE]
Taskman Management ... [XUTM MGR]
  Requeue Tasks [XUTM REQ]
```

A benefit of the Dequeue Tasks option is that it is completely non-destructive. If you dequeue a task and subsequently change your mind, you can use the Requeue Tasks option [XUTM REQ] to requeue the task exactly the way that it was. You can also use this option to change some of the details of a task that is already queued.

As with XUTM DQ, you are first prompted for a Task Number with the same help available. Here, you can only enter a single task, *not* a range. The task is then displayed, and you are asked for a new run time with the default being either the original or current run time (whichever applies). The next question is “Do you wish to requeue this task to a device?”, with the default depending on whether the task originally requested an output device. If you answer **YES**, the option asks you to specify an output device using the original output device (if there was one) as a default. The option also allows you to adjust the task’s priority.

The task is requeued according to your specifications. Requeuing involves completely dequeuing the task so that your task does *not* run twice, making the changes you requested, and placing the task back on the Schedule List. Notice that the task is *not* dequeued until after you specify the changes you want to make. If you want to modify a task that may start running soon, it is usually a good idea to dequeue it first.

The ZTMQ security key affects this option in two ways

- Users who do *not* hold the security key are limited to requeuing only their own tasks.
- Users are *not* prompted to change the priority.

## 22.1.4 Delete Tasks Option

Figure 253: Delete Tasks Option

SYSTEMS MANAGER MENU ...	[EVE]
Taskman Management ...	[XUTM MGR]
Delete Tasks	[XUTM DEL]

The Delete Tasks option [XUTM DEL] has the same structure as the Dequeue Tasks option. The only difference is that where dequeuing a task just removes it from the lists (unschedules it); the Delete Tasks option also deletes the task from the TASKS (#14.4) file. When you have deleted a task, there is no reference to that task anywhere in TaskMan's files.

Only holders of the ZTMQ security key can delete any task. Others can only delete their own tasks as identified by their **DUZ**.

## 22.1.5 Cleanup Task List Option

Figure 254: Cleanup Task List Option

SYSTEMS MANAGER MENU ...	[EVE]
Taskman Management ...	[XUTM MGR]
Cleanup Task List	[XUTM TL CLEAN]

You can use the Cleanup Task List option [XUTM TL CLEAN] to remove a task entry from a task list for a job that is no longer running. This might happen when a process is forcibly exited, but TaskMan still believes the task is running. You can use this option to tell TaskMan which tasks you forcibly exited. TaskMan then removes those tasks from its list of running tasks.

## 22.2 Taskman Management Utilities

A submenu on the Taskman Management menu, called TaskMan Management Utilities menu [XUTM UTIL], provides several options to set up, monitor, and modify the TaskMan environment.

The Taskman Management Utilities menu contains the following options:

- [Monitor Taskman](#) [XUTM ZTMON]
- [Check Taskman's Environment](#) [XUTM CHECK ENV]
- Edit Taskman Parameters ... [XUTM PARAMETER EDIT]
- [Restart Task Manager](#) [XUTM RESTART]
- [Place Taskman in a WAIT State](#) [XUTM WAIT]
- [Remove Taskman from WAIT State](#) [XUTM RUN]
- [Stop Task Manager](#) [XUTM STOP]
- Taskman Error Log ... [XUTM ERROR]
- [Clean Task File](#) [XUTM CLEAN]
- [SYNC flag file control](#) [XUTM SYNC]

These options are discussed in the topics that follow.

### 22.2.1 Monitor Taskman Option

**Figure 255: Monitor Taskman Option**

SYSTEMS MANAGER MENU ...	[EVE]
Taskman Management ...	[XUTM MGR]
Taskman Management Utilities ...	[XUTM UTIL]
Monitor Taskman	[XUTM ZTMON]

The Monitor Taskman option [XUTM ZTMON] gives you a screen of information about the current state of TaskMan and offers you several ways to get more information. The monitor focuses on the current state of the Manager itself and on the contents of the SCHEDULE file.

As you use this option, you acquire an intuitive understanding of how these lists should look and behave when your system is healthy. Spending the time using this option to get that intuition saves you troubleshooting time by helping you to notice problems sooner.

### 22.2.1.1 RUN Node

The first section of the Monitor TaskMan screen reports whether the Manager is currently running on your machine, and if so, whether or not it is being delayed. This is accomplished by comparing TaskMan's **RUN** node to the M **\$HOROLOG** variable. Under normal circumstances they should be within **15** seconds of each other, though certain conditions can cause a difference of up to **two** minutes. Any difference greater than that, however, is a sign that the Manager is being delayed, typically by a problematic device or a recurring error. Of course, the Manager is also likely to fall behind if the system is saturated to the point where all of the jobs on the system are slow. The last line of the first section evaluates the difference and guesses at the Manager's current condition. The **\$HOROLOG** values are translated into an external format for your convenience in understanding the values.

**Figure 256: Sample Monitor TaskMan Screen**

```
Checking TaskMan.  Current $H=54180,45147  (MAY 04, 1989 @12:32:27)
                  RUN NODE=54180,45145  (MAY 04, 1989 @12:32:25)

TaskMan is current.

Checking the Status List:
  TaskMan job 4 status 54180,45145^RUN^Main Loop.
  There are 3 idle submanagers

Checking the Schedule List:
  TaskMan has 29 tasks in the Schedule List.
  None of them are overdue.

Checking the IO Lists:  Last TM scan: 54180,45146^_TNA9995:
  Device: _TNA9995: is not available, and there are 7 tasks waiting.

Checking the Job List:
  There are no tasks waiting for partitions.
  For KDE:ISC6V2 there are 2 tasks.  Not responding

Checking the Task List:
  There are 5 tasks currently running.

Enter monitor action: UPDATE//
```

### 22.2.1.2 Status List

The Status List is where each Manager periodically reports its current status. The job number of the Manager is reported both for ease of location on a system status report and also to distinguish between multiple Managers (if there are more than one). Under normal circumstances, the Manager removes its entry from the Status List when it shuts down, but if a Manager stops abnormally (e.g., RJD or FORCEX) its entry is usually left on the list. The list is updated and cleaned out whenever a new Manager is started or restarted.

The status of a Manager consists of three parts:

- Date and time—This date and time should equal the **RUN** node's date and time, and like that node, it should be close to the current **\$HOROLOG**.
- Manager's state.
- Description of special circumstances.

The Manager can be in one of five states at any given time:

- **BALANCE**
- **ERROR**
- **PAUSE**
- **RUN**
- **WAIT**

**RUN** is the normal state, with a description of “Main Loop.”

The Manager’s status is the most important piece of information the monitor gives, and it should always be the first thing checked when troubleshooting problems.



**REF:** For a detailed list and description of the possible state messages, see the “[Troubleshooting](#)” section.

### 22.2.1.3 Schedule List

The Schedule List always shows the number of tasks currently scheduled to run and checks the times for which they are scheduled to determine whether any of them should already have started. When many tasks are queued to run at the same time, it is *not* unusual for the Manager to be a little late in sending off the last few.

When most of the tasks on the Schedule List are overdue, however, the Manager is probably having problems keeping up. This is *not* a normal condition. If the problem is *not* a recurring error or a difficult output device, the most likely culprit is your default setup in the TASKMAN SITE PARAMETERS (#14.7) file. Another possible problem is that TaskMan is trapping many errors or trying to access a very slow link between Volume Sets. If the problem is error trapping, the Status List should regularly show the Manager in an **ERROR** state. Also, remember that if the machine is saturated, all of the jobs on the system, including the Manager, run slowly.

### 22.2.1.4 IO List

The **IO** List first shows the last time (**\$H**) a Submanager checked the list and the last device checked. The check generally shows how many tasks are waiting for each device in the **IO** List. The occasional remark “Allocated” means that a Submanager has already noticed that the device is available and has allocated the device to a task using the Device Allocation List. Devices should only be allocated for a short time before the Submanager opens the device, making it unavailable.

Understanding how the **IO** List works can make this particular check very useful. Submanagers handle the Device **IO** Lists. Unusual behavior in these lists usually points to device or Submanager problems.

There are three fundamental things to look for with this check:

- When a device becomes available—The Submanagers should notice and start a task running on that device. If the Submanagers do *not* do this, it is probably time to start looking for problems with the Submanagers.
- When a device is allocated—A Submanager should quickly make it unavailable. If this fails to occur, the Submanagers may be having problems. There can be extenuating circumstances (e.g., the system being very slow) that explain these occurrences.
- When many tasks are backed up waiting for the same device—Sometimes it is just because that device is busy. However, sometimes the device is off-line or out of paper.

### 22.2.1.5 Job List

The Job List is where tasks wait for partitions, so if many tasks are backed up here you know the Submanagers are *not* picking them up. This can be caused by any of the following:

- A slow system.
- TaskMan reaching its job limit.
- TaskMan assigning tasks a priority that is too low for them to run.

Systems that are too busy back up in the Job List *not* the Schedule List. The Compute Server Job List is checked here and lets you know about tasks waiting to run on other CPUs and if the Submanagers are *not* starting.

### 22.2.1.6 Task List

The Task List is where TaskMan keeps track of the tasks it has started running. Entries are set into this list when the Submanagers start their tasks and are cleared when the tasks quit or cause errors to be trapped. **KILL**ing a task by forcing its process to exit in the middle of execution (using such vendor-specific tools as RJD, RESJOB, FORCEEX, KILLJOB, etc.) does *not* give the Submanager a chance to clear the task from the Task list, so the Task List can become inaccurate. If you frequently **KILL** jobs but want to keep your Task List accurate, you need to manually remove the obsolete entries. The exit action of the **KILL** off a users' job option [XURESJOB] helps you identify and remove from the list of running tasks those you have forcibly exited.

### 22.2.1.7 Monitor Action Prompt

After summarizing the status of the Manager and the principal lists of the SCHEDULE file, the monitor offers you a choice of actions. They are displayed if you enter a single question mark (?) at the "Enter monitor action:" prompt:

**Figure 257: TaskMan Monitor Actions**

```
Enter <RET> to update the monitor screen.  
Enter ^ to exit the monitor.  
Enter E to inspect the TaskMan Error File.  
Enter S to see a system status listing.  
Enter ? to see this message.  
Enter ?? to inspect the tasks in the monitor's lists.
```

These actions (see [Figure 257](#)) attempt to bring together those utilities used most often in response to seeing a monitor screen. Updating is the most commonly used choice since you often want to watch how the lists change over time. The TASKMAN ERROR file needs to be easily accessible, not only in case the Manager enters an **ERROR** state, but also if a task that should take a long time to run leaves the Job List but never shows up in the Task List. This usually means the task hit an error and quit, which can be confirmed or disproved by a quick glance at the TaskMan Error Log. The System Status Report can be used to verify that tasks, Submanagers, and the Manager are indeed running as the monitor suggests.

Some actions at the Monitor Action prompt are *not* accessible when monitoring TaskMan from the manager's account (using the direct-mode utility **D ^ZTMON**).

### 22.2.1.8 Inspecting the Tasks in the Monitor's Lists

If you are in a non-library account, you can directly inspect the contents of the various lists. Do this by entering two question marks (??) at the “Enter monitor action:” prompt. You get the following list of choices:

**Figure 258: Options for Inspecting Tasks in the TaskMan Monitor's Lists**

```
Help For Monitor Taskman Option

Schedule List.
Waiting Lists.
One Waiting List.
Job List.
Task List.
Link Lists.

Select Type Of Listing:
```

These listings use the same format as that of the List Tasks option, and show you the contents of the lists at the time you look at them. The One Waiting List listing prompts you to select a device, and the help for that prompt lets you see those devices that have tasks waiting. Many of these lists change very quickly. Thus, it is *not* unusual to enter the help with the intention of seeing the task that was shown by the main screen to be in the Job List, only to be informed by the help software that the Job List is now empty. These kinds of experiences are simply part of troubleshooting TaskMan.

While these monitor actions are useful, there are still times when you *must* leave the monitor to follow up on information you saw there. For example, you may want to check the list of unsuccessful tasks or to list a specific task; both these actions require using the List Tasks option.

Taken as a whole, the checks that make up the monitor can save you a lot of time in trying to evaluate TaskMan's status. The example shown in [Figure 256](#) is of a healthy, and *not* very busy, Manager. Monitors at sites usually show considerably more activity, especially in the Waiting Lists.

### 22.2.2 Check Taskman's Environment Option

**Figure 259: Check Taskman's Environment Option**

```
SYSTEMS MANAGER MENU ... [EVE]
Taskman Management ... [XUTM MGR]
  Taskman Management Utilities ... [XUTM UTIL]
    Check Taskman's Environment [XUTM CHECK ENV]
```

The Check Taskman's Environment option [XUTM CHECK ENV] presents two screens of information about TaskMan's environment on the current CPU. The first screen (see [Figure 260](#)) performs all of the checks that the Manager does whenever it starts, restarts, or encounters an error. The second screen (see [Figure 261](#)) shows what values the Manager is using for its definition variables. This information can be very useful in pinpointing startup problems, in verifying that the Manager is using the information you want it to use and in getting a general feel for how you have defined your system's task management.

**Figure 260: Check TaskMan's Environment Option—First Screen**

```
Checking Task Manager's Environment.

Checking TaskMan's globals...
  ^%ZTSCH is defined!
  ^%ZTSK is defined!
  ^%ZTSK(0) is defined!
  ^%ZIS(14.5,0) is defined!
  ^%ZIS(14.6,0) is defined!
  ^%ZIS(14.7,0) is defined!

Checking the ^%ZOSF nodes required by TaskMan...
  All ^%ZOSF nodes required by TaskMan are defined!

Checking the links to the required volume sets...
  There are no volume sets whose links are required!

Checks completed...TaskMan's environment is okay!

Press RETURN to continue or '^' to exit:
```

This first screen (see [Figure 260](#)) goes through each step that the Manager goes through when it starts or restarts and reports the results. If your Manager is failing to start, this screen should identify any problem with the environment.



**Figure 261: Check TaskMan's Environment Option—Second Screen**

```
Here is the information that TaskMan has:
Operating System: OpenM-NT
Volume Set: ROU
Cpu-volume Pair: ROU:KDAABC999
TaskMan Files UCI and Volume Set: VAH,ROU
```

**This group identifies the current TaskMan operating environment.**

```
Log Tasks? N
Submanager Retention Time: 30
Min Submanager Count: 10
Taskman Hang Between New Jobs: 1
TaskMan running as a type: GENERAL
TaskMan is using VAX DSM environment: ABC999
TaskMan is using '$$CACHE@()' for load balancing
Balance Interval: 10
```

**This group reports the values of some Kernel site parameters that are important to TaskMan.**

```
Logons Inhibited?: N
Taskman Job Limit: 35
Max sign-ons: 40
Current number of active jobs: 25
```

**This group shows if logons are being inhibited and how many partitions are available.**

End of listing. Press RETURN to continue:

The second screen (see [Figure 261](#)) reports more information about the current TaskMan environment. The first group of four items identifies the current TaskMan operating environment. The next group of items reports the values of some Kernel site parameters that are important to TaskMan.



**REF:** These parameters, as well as all the other parameters that TaskMan uses, are described in detail in the “[TASKMAN SITE PARAMETERS \(#14.7\) File](#)” section in “[TaskMan: System Management—Configuration](#).”

The last four items show if logons are being inhibited and how many partitions TaskMan currently has to work with. These values show how busy your system is, as well as how busy it can become. Their importance is also described in the discussion of parameters.

## 22.2.3 Restart Task Manager Option

Figure 262: Restart Task Manager Option

```
SYSTEMS MANAGER MENU ... [EVE]
Taskman Management ... [XUTM MGR]
  Taskman Management Utilities ... [XUTM UTIL]
    Restart Task Manager [XUTM RESTART]
```

The Manager generally starts automatically when your system comes up. If the Manager crashes or is stopped, you can use the Restart Task Manager option [XUTM RESTART] to restart it. The option first checks the **RUN** node and calculates whether it thinks the Manager is currently running. If this option believes the Manager is running, it asks you if you are sure you want to restart another TaskMan; you *must* answer **YES** to start the Manager. If XUTM RESTART thinks the Manager has stopped, it asks you for confirmation before jobbing out a new Manager. If XUTM RESTART believes the Manager to be active when you know for sure that it has failed, you can invoke XUTM STOP to prove to XUTM RESTART that the Manager really has stopped. Then you are able to restart it.

## 22.2.4 Place Taskman in a WAIT State Option

Figure 263: Place Taskman in a WAIT State Option

```
SYSTEMS MANAGER MENU ... [EVE]
Taskman Management ... [XUTM MGR]
  Taskman Management Utilities ... [XUTM UTIL]
    Place Taskman in a WAIT State [XUTM WAIT]
```

The **WAIT** state (as described in the “[Troubleshooting](#)” section) is a condition in which the Manager does nothing but wait for you to release it. Putting a stop to the Manager’s activities without actually shutting down the Manager can often be very useful. For example, with the Manager in a **WAIT** state, you can look at the tasks after they are queued but before the Manager has a chance to validate them. This can help you isolate problems caused by the queuing process from those caused by the validation process. Another time you may want to create a **WAIT** state is before restarting a manager that has stopped. This prevents the Manager from processing any tasks when it first starts up; the Manager checks out its environment and then waits for your command to continue. The Place Taskman in a WAIT State option [XUTM WAIT] gives you a way to switch the Manager’s activities on and off without having to completely shut down and restart the Manager.

When you select the XUTM WAIT option, you are also prompted with the question “Should active submanagers shut down after finishing their current tasks?”:

- If you answer **YES**, the Submanagers on the current Volume Set/CPU quits when they finish a task instead of recycling.
- If you answer **NO**, the Manager enters a **WAIT** state and the Submanagers continue with their business.

If you also want to keep the Submanagers from searching the Waiting List and the Job List for tasks, you need to explicitly say so at this prompt. This inhibition of the Submanagers’ recycling remains in effect either until you remove the **WAIT** state or until a new Manager starts or restarts, whichever comes first.

## 22.2.5 Remove Taskman from WAIT State Option

Figure 264: Remove Taskman from WAIT State Option

SYSTEMS MANAGER MENU ...	[EVE]
Taskman Management ...	[XUTM MGR]
Taskman Management Utilities ...	[XUTM UTIL]
Remove Taskman from WAIT State	[XUTM RUN]

The Remove Taskman from WAIT State option [XUTM RUN] simply undoes the effects of XUTM WAIT, allowing the Manager to process tasks and allowing the Submanagers to recycle (if recycling had been inhibited).

## 22.2.6 Stop Task Manager Option

Figure 265: Stop Task Manager Option

SYSTEMS MANAGER MENU ...	[EVE]
Taskman Management ...	[XUTM MGR]
Taskman Management Utilities ...	[XUTM UTIL]
Stop Task Manager	[XUTM STOP]

The Stop Task Manager option [XUTM STOP] gives you a clean way to stop the Manager from within the menu system. This option also asks if you want the Submanagers to shut down when they finish what they are doing.



**NOTE:** The **WAIT** state takes precedence. While the Manager is in a **WAIT** state, not even XUTM STOP affects it until after you invoke XUTM RUN to release it from the **WAIT** state; after it is released, it shuts down.

This option should always be used to shut down TaskMan, rather than simply **KILLING** the TaskMan process, which can leave the TaskMan globals in an improper state and even lose tasks.

## 22.2.7 SYNC flag file control Option

Figure 266: SYNC flag file control Option

SYSTEMS MANAGER MENU ...	[EVE]
Taskman Management ...	[XUTM MGR]
Taskman Management Utilities ...	[XUTM UTIL]
SYNC flag file control	[XUTM SYNC]

With the SYNC flag file control option [XUTM SYNC], for any SYNC FLAG entry, you can remove it from the file and delete all waiting tasks with the same SYNC FLAG. You can also choose START NEXT, which resumes running the series of tasks associated with that SYNC FLAG. This is useful when one task in a series of tasks that is synchronized with SYNC FLAG fails.

## 22.2.8 Clean Task File Option

The TASKS (#14.4) file grows every time a new task is queued. While the SAC requires applications to delete their tasks' entries when they complete, it is possible that older applications may *not* do this. Other tasks abort with errors; still others are rejected. The result is that **^%ZTSK** is always growing. Options are available that clean up the **^%ZTSK** global.

Figure 267: Clean Task File Option

```
SYSTEMS MANAGER MENU ... [EVE]
Taskman Management ... [XUTM MGR]
  Taskman Management Utilities ... [XUTM UTIL]
    Clean Task File [XUTM CLEAN]
```

In unusual circumstances, you may need to clean the **^%ZTSK** global manually. Kernel provides the called Queuable Task Log Clean Up option to regularly clean up the TASKS (#14.4) file in the background.

Only rarely are you *not* able to rely on the queued cleanup to perform this function. However, when necessary, you can use the interactive Clean Task File option [XUTM CLEAN]. First, XUTM CLEAN asks you if you are sure you want to clean out the old entries from the TASKS (#14.4) file. If you respond that you are, the option asks you how far back you want to keep old entries. The default is to keep old entries going back a week and to delete the older ones. After you provide this value, the option queues a task to do the cleanup. XUTM CLEAN *cannot* be queued.

## 22.2.9 Queuable Task Log Clean Up Option

The Queuable Task Log Clean Up option [XUTM QCLEAN], resides on the ZTMQUEUEABLE OPTIONS menu. This option allows you to purge all of the entries for tasks that are no longer queued (for whatever reason) and to purge the TaskMan Error Log. It is very useful to be able to queue the cleanup to run automatically each night; XUTM QCLEAN has been distributed to provide this feature. XUTM QCLEAN should *not* be run interactively; indeed, it is *not* available from any of TaskMan's menus. To queue this option, use Schedule/Unschedule Options to queue it to run.

The date XUTM QCLEAN starts purging the TASKS (#14.4) file is controlled by the DAYS TO KEEP OLD TASKS parameter in the VOLUME SET (#14.5) file. A value of seven days is recommended. XUTM QCLEAN does *not* need an output device; therefore, you can leave that field blank. Once set up, the task automatically runs periodically, cleaning out inactive task entries that are older than the time period specified in the DAYS TO KEEP OLD TASKS parameter. If you want to run this on all of your machines, create an entry in the OPTION SCHEDULING (#19.2) file for each machine on which you want to run it.

## 22.3 Scheduling Options

TaskMan lets you, the site manager, schedule options that run regularly as tasks. Menu Manager and TaskMan work together to give you this ability. All you have to do is tell TaskMan which option you want to queue and how you want to queue it.

### 22.3.1 Which Options to Queue

The first requirement for queuing regards the option type. Only the run, print, and action types of options can be queued. The second requirement is that the option (if a run or action type) *must not* involve user input! There is nothing to prevent you from queuing an option of the wrong type or from queuing one that prompts the user for input, but doing so results in a failed task. You *must* be conscious of the nature of the task when you consider creating one that performs an option. If the option itself does *not* run in the background, then queuing it is pointless. Even options that themselves queue tasks probably cannot be queued, because most of these ask the user for an output device or a run time.

Software applications can make recommendations for scheduling of options. This is a great help to site managers.



**REF:** Recommendations for scheduling Kernel options can be found in the *Kernel Installation Guide* and the *Kernel 8.0 & Kernel Toolkit 7.3 Technical Manual*.

#### 22.3.1.1 PARENT OF QUEUABLE OPTIONS Menu

Some options that are intended to be queued are *not* intended to be run interactively, so placing such options on a user menu could cause problems. The PARENT OF QUEUABLE OPTIONS menu [ZTMQUEUABLE OPTIONS], a menu-type option, has no parent in the menu tree and is intended to be used as the parent of all such options.

#### 22.3.1.2 Printing Options Recommended to Run and Scheduled to Run

**Figure 268: Print Options Recommended for Queuing and Print Options that are Scheduled to Run Options**

```
SYSTEMS MANAGER MENU ... [EVE]
Taskman Management ... [XUTM MGR]
  Print Options Recommended for Queuing [XUTM BACKGROUND RECOMMENDED]
  Print Options that are Scheduled to run [XUTM BACKGROUND PRINT]
```

The Print Options Recommended for Queuing option [XUTM BACKGROUND RECOMMENDED] displays all options in the OPTION SCHEDULING (#19.2) file that are recommended for scheduling by the option's developer.

The Print Options that are Scheduled to run option [XUTM BACKGROUND PRINT] lists all currently scheduled options on your system. By comparing these two reports, you can see if any options recommended for scheduling are *not* scheduled on your system (and vice-versa).

### 22.3.1.3 Schedule/Unschedule Options

Figure 269: Schedule/Unschedule Options Option

SYSTEMS MANAGER MENU ...	[EVE]
Taskman Management ...	[XUTM MGR]
Schedule/Unschedule Options	[XUTM SCHEDULE]

The Schedule/Unschedule Options option [XUTM SCHEDULE] is a straightforward VA ScreenMan edit option, and allows you to schedule and unschedule options. After you select the option to schedule, you are prompted for information about the task you want to set up. You can edit the following fields in the OPTION SCHEDULING (#19.2) file:

- QUEUED TO RUN AT WHAT TIME (#2) (see Section [22.3.1.4](#))
- DEVICE FOR QUEUED JOB OUTPUT (#3) (see Section [22.3.1.7](#))
- QUEUED TO RUN ON VOLUME SET (#5) (see Section [22.3.1.8](#))
- RESCHEDULE FREQUENCY (#6) (see Section [22.3.1.9](#))
- SPECIAL QUEUEING (#9) (see Section [22.3.1.11](#))
- TASK PARAMETERS (#15) (see Section [22.3.1.10](#))

The cross-references on these fields make calls to TaskMan's API to update the TASKS (#14.4) file and ^%ZTSCH.



**NOTE:** In order to queue a task, its SCHEDULING RECOMMENDED (#209) field in the OPTION (#19) file *must* be set to **YES**.

#### 22.3.1.4 Queued to Run At What Time

To queue an option, select the option and enter a time at least two minutes in the future into the QUEUED TO RUN AT WHAT TIME (#2) field in the OPTION SCHEDULING (#19.2) file. When you enter a time (and date) for the task to run, the task is immediately put on the Schedule List for that time.

#### 22.3.1.5 How to Delete a Regularly Scheduled Task

Deleting a scheduled task is as simple as entering the at-sign (@) at the QUEUED TO RUN AT WHAT TIME (#2) field. TaskMan then searches the current TASKS (#14.4) file for the task that corresponds to the entry in the OPTION SCHEDULING (#19.2) file and deletes it.

If your system has multiple copies of the TaskMan globals, you *must* use Schedule/Unschedule Options on the same Volume Set/CPU where your task originated, when you delete the task. Otherwise, the future task in the TASKS (#14.4) file is *not* found (and deleted) when you enter an at-sign (@) in the QUEUED TO RUN AT WHAT TIME (#2) field.

#### 22.3.1.6 How to Requeue a Regularly Scheduled Task

Requeuing merely involves placing a new value in the QUEUED TO RUN AT WHAT TIME (#2) field. When you do this, the currently scheduled task is deleted (exactly as described above when deleting a scheduled task). Then, a new task is created at the new time to replace the previously scheduled task.

If your system has multiple copies of the TaskMan globals, you *must* use Schedule/Unschedule Options on the same Volume Set/CPU where your task originated, when you requeue the a task. Otherwise, the

existing future task in the TASKS (#14.4) file is *not* found (and deleted) when you enter a new time in the QUEUED TO RUN AT WHAT TIME (#2) field.

### 22.3.1.7 Device For Queued Job Output

The DEVICE FOR QUEUED JOB OUTPUT (#3) field in the OPTION SCHEDULING (#19.2) file is where you can give the task an output device. For print (Report) type options this is obviously mandatory; for run or action types you need to consider if the option needs an output device. Modifying this value for an already-scheduled task merely causes a direct change to the currently scheduled task.

Tasks with an output device are assigned a process name of “Task #####”; where ##### is the task number; tasks with no output device are assigned a process name of “BTask #####” (with **B** meaning background).

### 22.3.1.8 Queued To Run On Volume Set

Use the QUEUED TO RUN ON VOLUME SET (#5) field in the OPTION SCHEDULING (#19.2) file to designate a Volume Set or CPU for the task other than your current one. This field is only useful for options that do *not* have a device selected because most devices are tied to a CPU, and thus, the task *must* run on the CPU that has that device.

Modifying this value for an already-scheduled task merely causes a direct change to the currently scheduled task.

Running a task on each CPU for a given option may at times be useful (e.g., XQBUILDTREEQUE option). In such cases, make multiple entries in the OPTION SCHEDULING (#19.2) file, and use the QUEUED TO RUN ON VOLUME SET (#5) field to specify the Volume Set/CPU where each scheduled task should run.

If you leave the DEVICE FOR QUEUED JOB OUTPUT (#3) field blank, the task that performs the option runs without a device (or tries to). If you also leave the QUEUED TO RUN ON VOLUME SET (#5) field blank, the task runs on the current CPU without a device. If you fill in both fields, TaskMan uses the value of the QUEUED TO RUN ON VOLUME SET (#5) field, unless overridden by the VOLUME SET(CPU) (#1.9) field in the DEVICE (#3.5) file entry of the selected device.

### 22.3.1.9 Reschedule Frequency

Whenever a task starts running an option, it looks to see what is in the RESCHEDULE FREQUENCY (#6) field in the OPTION SCHEDULING (#19.2) file. If the field is blank, the option does *not* reschedule itself. If you have filled in this field, the task uses the value you placed in the field to figure out when you want it to run next. Then it updates the QUEUED TO RUN AT WHAT TIME (#2) field to reflect the new scheduled time. When this field is updated, the next task in the sequence is scheduled.

If you change the existing value in the RESCHEDULE FREQUENCY (#6) field, the new increment is used beginning after the next time the option runs.

There are several formats you can use in this field:

- Every “**n**” seconds.
- Hours.
- Days.
- Months (incremental).
- A particular day of the month.
- A list of times every “**n**” months.



**REF:** For a list of the code formats for the RESCHEDULE FREQUENCY (#6) field, see the [“Special Queueing”](#) section.

For the incremental scheduling frequencies (every n seconds, hours, days, or months), the increment is added to the scheduled date and time in the QUEUED TO RUN AT WHAT TIME (#2) field to determine when the task should run next. As of Kernel 8.0, if the incremented time is in the past, however, TaskMan keeps adding the increment until a future time is reached, only then does it reschedule the task.

### 22.3.1.10 Task Parameters

Use the TASK PARAMETERS (#15) field in the OPTION SCHEDULING (#19.2) file to pass data to a scheduled option. TASK PARAMETERS holds a string that is passed to scheduled jobs through the ZTQPARAM variable. Ideally, the developer of an option that uses the TASK PARAMETERS string should describe the format and meaning of the string in the option’s DESCRIPTION field.

### 22.3.1.11 Special Queueing

Use the SPECIAL QUEUEING (#9) field in the OPTION SCHEDULING (#19.2) file to designate which option is scheduled to be run by TaskMan.



**NOTE:** In order to queue a task, its SCHEDULING RECOMMENDED (#209) field in the OPTION (#19) file *must* be set to **YES**.

Valid values are:

**Table 42: Special Queueing Field Settings**

Value	Option Description
<b>S</b>	<b>STARTUP</b> —TaskMan queues the job to run whenever the TaskMan/computer is started (i.e., at System Boot). If you want to run the startup option on multiple CPUs, make multiple entries in the OPTION SCHEDULING (#19.2) file, and use the QUEUED TO RUN ON VOLUME SET (#5) field to specify on what Volume Set/CPU each should run.
<b>SP</b>	<b>STARTUP/PERSISTENT</b> —TaskMan queues the job as it does for “STARTUP. It marks it as a “PERSISTENT” task to be restarted if it stops unexpectedly.
<b>P</b>	<b>PERSISTENT</b> —TaskMan runs it on its normal schedule, marking it as Persistent. TaskMan restarts the task if it stops unexpectedly. If the task completes in a normal fashion it is treated like any other regularly scheduled task and it is rescheduled based on the value in the RESCHEDULE FREQUENCY (#6) field in the OPTION SCHEDULING (#19.2) file.



**Table 43: Option Scheduling Frequency Code Formats**

Code	Frequency										
nS	Every <i>n</i> seconds.										
nH	Every <i>n</i> hours.										
nD	Every <i>n</i> days.										
nM	Every <i>n</i> months.										
day[@time]	Day of week (for Day codes, see <a href="#">Table 44</a> ).										
D[@time]	Every weekday.										
E[@time]	Every weekend day (Sat,Sun).										
nM(entry[,entry[,...]])	<p>Every <i>n</i> months, at each entry in the parameter list; the entries in the parameter list (for every <i>n</i> months only) can be:</p> <table border="1"> <thead> <tr> <th>Entry Format</th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td>dd[@time]</td> <td>Day of month (e.g., 15).</td> </tr> <tr> <td>nday[@time]</td> <td>Nth day of week in month (e.g., 1W,3W).</td> </tr> <tr> <td>L[@time]</td> <td>Last day of month.</td> </tr> <tr> <td>Lday[@time]</td> <td>Last specific DAY in month, (e.g., LM,LT,LW...).</td> </tr> </tbody> </table>	Entry Format	Frequency	dd[@time]	Day of month (e.g., 15).	nday[@time]	Nth day of week in month (e.g., 1W,3W).	L[@time]	Last day of month.	Lday[@time]	Last specific DAY in month, (e.g., LM,LT,LW...).
Entry Format	Frequency										
dd[@time]	Day of month (e.g., 15).										
nday[@time]	Nth day of week in month (e.g., 1W,3W).										
L[@time]	Last day of month.										
Lday[@time]	Last specific DAY in month, (e.g., LM,LT,LW...).										

**Table 44: Day Codes Used in Option Scheduling Frequency Code Formats**

Day Code	Description
M	Monday
T	Tuesday
W	Wednesday
R	Thursday
F	Friday
S	Saturday
U	Sunday

**Table 45: Examples of Option Scheduling Frequency Code Formats**

Code	Frequency
12H	Every 12 hours.
14D	Every 14 days.
1M(1,15)	First and 15th of the month.
1M(L@23:45)	Last day of the month at 11:45 pm.
1M(LS)	The last Saturday of the month.
3M(15@12:00,L@12:00)	Noon (on the 15th and last days), every 3 months.
W@4pm	Each Wednesday at 4 pm.
D	Each weekday.

### 22.3.1.12 Problems with Scheduled Options

Once an option has been put on a schedule, it stays on that schedule unless one of the following happens:

- You delete the task.
- The running task aborts while setting up the next task in the sequence; the schedule sequence is broken.
- You dequeue the task that is scheduled to run the option. You *must* either requeue the task or use the Schedule/Unschedule Options option to start the cycle over.
- You change the value in the RESCHEDULING FREQUENCY (#6) field in the OPTION SCHEDULING (#19.2) file. The new increment is used beginning after the next time the option runs.
- You change the value in the QUEUED TO RUN AT WHAT TIME (#2). The currently scheduled task is unscheduled and a new one is scheduled for the time you specify.

Another peculiarity in this process involves using a monthly scheduling frequency. What should happen if on January 31st you queue an option and give it a monthly scheduling frequency? Other months lack a 31st day. In this situation, the task pretends there is a 31st day in every month. To avoid this, you can use the RESCHEDULING FREQUENCY (#6) field in the OPTION SCHEDULING (#19.2) file code **1M(L@time)**.

### 22.3.1.13 One-time Option Queue Option

**Figure 270: One-time Option Queue Option**

SYSTEMS MANAGER MENU ...	[EVE]
Taskman Management ...	[XUTM MGR]
One-time Option Queue	[XU OPTION QUEUE]

To run the One-time Option Queue option [XU OPTION QUEUE] at a special time one day without affecting its established schedule, use the One-time Option Queue option. It queues a task to run once, without affecting the option's normal schedule in any way. This lets you handle the condition where you have an option queued to run periodically and you would like to queue it once to run at an irregular time without affecting its normal periodic schedule.

## 22.4 Taskman Error Log Menu

The Manager and Submanagers keep track of all errors caused by their own software or by the tasks they start. They log their own errors in two places:

- ERROR LOG (#3.075) file
- TaskMan Error Log

Those errors caused by tasks are also recorded in the entries of the tasks themselves and can be seen with any of the various task listing options (List Tasks, TaskMan User, etc.). Just as there are options to display and purge the ERROR LOG (#3.075) file, there are options to do the same for the TaskMan Error Log.

When the XUTM QCLEAN option cleans tasks from the TASKS (#14.4) file, it also cleans any corresponding entries in the TaskMan Error Log since it is hard to make sense of an error log entry without the task data.

Kernel strongly recommends that you report new errors to your OIFOs and follow up to ensure expeditious patching. If you do this, over time the number of errors occurring on your system diminishes. This also improves the value of the various error logging systems as indicators of significant events deserving investigation.

Allocation and store errors are often *not* logged in Kernel's ERROR LOG (#3.075) file because the process of logging errors is complicated and usually requires the use of local variables. Local variables take up space and there is no excess space when these errors occur. However, TaskMan makes its simple entries in the TaskMan Error Log prior to calling the Kernel error logging utility. Thus, these errors are often recorded in the TaskMan Error Log, but *not* Kernel's. You are encouraged to carefully monitor both places.

### 22.4.1 Show Error Log Option

Figure 271: Show Error Log Option

```
SYSTEMS MANAGER MENU ... [EVE]
Taskman Management ... [XUTM MGR]
  Taskman Management Utilities ... [XUTM UTIL]
    Taskman Error Log ... [XUTM ERROR]
      Show Error Log [XUTM ERROR SHOW]
```

The Show Error Log option [XUTM ERROR SHOW] displays the errors currently stored in the TaskMan Error Log, showing the date and time that the error occurred in a readable format and showing the error message. After the listing, the option gives the number of errors in the error log.

Errors stored in the TaskMan Error Log historically are also cross-referenced to the TASKS (#14.4) file, linking tasks to the errors they cause.

## 22.4.2 Clean Error Log Over Range Of Dates Option

Figure 272: Clean Error Log Over Range Of Dates Option

```
SYSTEMS MANAGER MENU ... [EVE]
Taskman Management ... [XUTM MGR]
  Taskman Management Utilities ... [XUTM UTIL]
    Taskman Error Log ... [XUTM ERROR]
      Clean Error Log Over Range Of Dates [XUTM ERROR LOG CLEAN RANGE]
```

After prompting for a “First date to purge:” and a “Final date to purge:”, the Clean Error Log Over Range Of Dates option [XUTM ERROR LOG CLEAN RANGE] removes the entries for all errors that occurred on and between the two dates. It prints the number of entries removed. If the first date is *not* earlier than the final date, no entries are removed.

Use this option to delete all but recent errors that deserve your attention. It is better to resolve specific kinds of errors as you encounter them. However, if there is a period during which you *cannot* resolve them fast enough to keep the log clean, this option helps you focus on the recent ones.

## 22.4.3 Purge Error Log Of Type Of Error Option

Figure 273: Purge Error Log Of Type Of Error Option

```
SYSTEMS MANAGER MENU ... [EVE]
Taskman Management ... [XUTM MGR]
  Taskman Management Utilities ... [XUTM UTIL]
    Taskman Error Log ... [XUTM ERROR]
      Purge Error Log Of Type Of Error [XUTM ERROR PURGE TYPE]
```

With the Purge Error Log Of Type Of Error option [XUTM ERROR PURGE TYPE] you can delete from the TaskMan Error Log all entries for an error of a specific type. In fact, this option uses the M contains operator (“[”); therefore, it removes every error whose message contains your input as a substring. For example, you can remove every error that occurred in a certain routine or even every error whose message contains a “Q.” After performing the purge, the option shows you how many entries were removed.

This option is the best way to keep the log clean. As you resolve certain kinds of errors and prevent them from happening again, you can remove all errors of that kind from the log. This leaves behind only those errors you have *not* resolved, helping you focus on the problems that remain.

## 22.4.4 Delete Error Log Option

Figure 274: Delete Error Log Option

```
SYSTEMS MANAGER MENU ... [EVE]
Taskman Management ... [XUTM MGR]
  Taskman Management Utilities ... [XUTM UTIL]
    Taskman Error Log ... [XUTM ERROR]
      Delete Error Log [XUTM ERROR DELETE]
```

The Delete Error Log option [XUTM ERROR DELETE] completely deletes all errors in the TaskMan Error Log. If the error log is cleaned and purged as described above, you rarely need to use this option.

## 22.5 Troubleshooting

The information given in this section *cannot* be used by application developers in their code. It is provided to help site managers troubleshoot problems with tasks and TaskMan. Consider this section a reference to TaskMan’s global structure and messages.

### 22.5.1 SCHEDULE File

**^%ZTSCH** holds the *non-VA* FileMan-compatible SCHEDULE file, which consists of independent lists and nodes. This is where TaskMan processes tasks. This structure is *not* supported for use by application software. All task manipulation *must* be done through approved options and entry points. These structures *must* be free to change from version to version to easily adapt and meet the changing needs of VistA. On the following pages is an example of a global that contains one of each type of node used by TaskMan:

The initial node was used to create **^%ZTSCH** before TaskMan was active, so that the global type and protection could be assigned.

**Table 46: ^%ZTSCH (SCHEDULE File) Nodes**

^%ZTSCH Node	Description
^%ZTSCH(next run time, task #)	This node stores the Schedule List. The task # corresponds to an entry in the TASKS (#14.4) file, and the next run time is computed from the value in the sixth ^-piece of the entry’s <b>0</b> node (and is the total number of seconds contained in the next run time’s <b>\$H</b> translation). If the Schedule List entry equals a device name, the entry was <i>not</i> created through the Program Interface.
^%ZTSCH(“C”)	This node stores the Compute Server Job List (C list). This list holds tasks that are ready to be run by Submanagers on specific Compute Servers. A Submanager cross-Volume Set jobbed to a Compute Server only runs tasks under this list for the Compute Server on which it is running, and does <i>not</i> process the Device Waiting List or the Job List. The Volume Set, next run time, task #, and device <b>\$IO</b> are stored here.
^%ZTSCH(“DEV”)	This node stores the Device Allocation List. This list is used by TaskMan to coordinate its allocation of devices to tasks. The presence of a node indicates that TaskMan has already allocated this device to a specific task that has <i>not</i> yet gained ownership of it. It tells TaskMan <i>not</i> to give the device to another task. When the task for whom the allocation node was established gains ownership of the device or fails due to possession by some interactive job, the node is <b>KILLED</b> off. The <b>\$H</b> value is used in case the task fails to remove its own node for some reason; after two minutes TaskMan <b>KILLS</b> the node on its next idle loop.
^%ZTSCH(“ER”)	This node stores the TaskMan Error Log.
^%ZTSCH(“ES”)	This node stores the Error Screens.
^%ZTSCH(“IDLE”)	This node is used to ensure that the Manager’s idle loop activities are spaced out correctly in case multiple Managers are being run in the same environment.

^%ZTSCH Node	Description
^%ZTSCH("IO")	This node stores the Device Waiting List. The device <b>\$IO</b> value is the value for the task's device and should <i>not</i> be the <b>\$IO</b> of a spool or host file device. The run time subscript (the total number of seconds contained in the run time's <b>\$H</b> translation) prioritizes the tasks that should have started the longest time ago. The Submanagers use the top node to space out access to the list, and the last device so that only one Submanager at a time is checking the list, and so that checks that find all devices still busy are followed by a short waiting period before the list is checked again.
^%ZTSCH("JOB")	This node stores the Job List. This list holds tasks that are ready to be run by Submanagers. The run time is the total number of seconds contained in the run time's <b>\$H</b> translation, and task # and device <b>\$IO</b> are what you would expect.
^%ZTSCH("LINK")	This node stores the Link Lists. The <b>LINK</b> node itself is only present when a link is down. It is used to time the checks that occur every fifteen minutes. The second level nodes should always be present with the current information on each of the CPUs and Volume Sets.
^%ZTSCH("LOAD", load rating)	This node is used to balance the CPU load among the various Managers that work out of the current TASKS and Schedule files. It identifies the CPU that most recently checked its rating and decided to run. Managers more loaded (a lower rating) than this one wait to allow this Manager to pick up more of its share of the load.
^%ZTSCH("LOADA")	This node stores the Load List. This list records the ratings for all the CPUs with Managers processing this TASKS file. The first ^-piece, which flags the Managers that decide to wait to balance the load, is used to tell the Submanagers on those CPUs that they, too, should wait.
^%ZTSCH("LOGRSRC")	This node flags whether Submanagers should log resources for the capacity management software. This node is set for every Volume Set whenever the LOG RESOURCE USAGE? field of the KERNEL SYSTEM PARAMETERS (#8989.3) file is edited. A cross-reference keeps the ^%ZTSCH("LOGRSRC") node in synchronization with the LOG RESOURCE USAGE? field.
^%ZTSCH("NO-OPTION")	If set, this node stops the Submanagers from running any scheduled options. This is for the KIDS install process.
^%ZTSCH("RUN")	This node is where the Manager periodically stamps the current time, leaving a way to determine whether it is currently active. Invoking the XUTM STOP option removes this node (see <a href="#">Figure 275</a> ).

^%ZTSCH Node	Description
^%ZTSCH("STARTUP", UCI, option #)	This node holds the Startup List. This list holds the internal number of all options that are specially queued to run every time the Manager starts up. The <b>\$HOROLOG</b> value reflects when the option was placed on this list.
^%ZTSCH("STATUS", \$J of Manager)	This node holds the Status List. This list holds the periodically updated entries for each Manager active on your machine and reflects each Manager's own perception of its current state.
^%ZTSCH("STOP")	This node prevents Submanagers from running. While it is present, Managers do <i>not</i> start new Submanagers, Submanagers waiting for tasks quit immediately, and those currently running tasks quit as soon as the tasks finish.
^%ZTSCH("SUB")	This node counts the number of Submanagers waiting for new tasks. It is updated regularly by Submanagers as they run tasks. The Manager uses this value to decide whether to <b>JOB</b> out new Submanagers and adjusts its value during the idle loop whenever it believes it to be inaccurate.
^%ZTSCH("TASK", task #)	This node holds the tasks TaskMan believes are currently running. Since entries are cleaned up when tasks quit or encounter errors, those that are forcibly exited by the system manager are left on the list even though they are <i>not</i> running. The Manager clears the list whenever the system starts up, and the system manager can manually remove inaccurate entries by using the exit action of the <b>KILL</b> off a users' job option [XURESJOB]. The task data stored at each node allows TaskMan to list the tasks even when they clean out their TASKS (#14.4) file records when they start instead of when they quit.
^%ZTSCH("UPDATE", \$J of Manager)	This node, records when the Manager last updated its local information about the site parameters. This node is <b>KILLED</b> whenever the Manager should update (e.g., site parameters are changed).
^%ZTSCH("WAIT")	This node puts the Manager into a <b>WAIT</b> state.

**Figure 275: ^%ZTSCH Global Structure**

```
^%ZTSCH= ""
^%ZTSCH(next run time, task #)= ""
^%ZTSCH(next run time, task #)= (D1) device IOP value
^%ZTSCH("C", volume set)= count
^%ZTSCH("C", volume set, next run time, task #) = device $IO
^%ZTSCH("DEV", device $IO)= $H when device was allocated for a specific
                                ==>task
^%ZTSCH("ER")= "A1" or ""
^%ZTSCH("ER", $H when error happened)= error message
^%ZTSCH("ER", $H when error happened, 0)= context of error
^%ZTSCH("ES", error screen, 0)= ""
^%ZTSCH("ES", error screen, 1)= screened errors count
^%ZTSCH("IDLE")= $H when the Manager's idle loop checks were last performed
^%ZTSCH("IO")= $H when device waiting list was last checked without finding
                                ==> an available device^ $IO of last device tried
^%ZTSCH("IO", device $IO)=device type
^%ZTSCH("IO", device $IO, run time, task #)= ""
^%ZTSCH("JOB", run time, task #) = device $IO
^%ZTSCH("LINK")= "" or $H when dropped link was last checked
^%ZTSCH("LINK", volume set)= 1 if link has dropped
^%ZTSCH("LINK", volume set, next run time, task #)= ""
^%ZTSCH("LOAD", load rating) = cpu ^ $H when rating was checked
^%ZTSCH("LOADA", cpu) = whether TM should wait ^ load rating ^ $H
                                ==>when rating was checked ^ $J of Manager
^%ZTSCH("LOGRSRC") = ""
^%ZTSCH("NO-OPTION")= ""
^%ZTSCH("RUN")= $H when Manager last checked in
^%ZTSCH("STARTUP", UCI, option #)= $H when option was first queued for
                                ==>startup
^%ZTSCH("STATUS", $J of Manager)= $H when Manager last checked in [1] ^
                                ==>status [2] ^ description of status [3]
^%ZTSCH("STOP")= ""
^%ZTSCH("SUB")= count of Submanagers waiting for tasks
^%ZTSCH("TASK", task #)= (A2) entry point [1] ^ (A3) routine [2] ^ (A4)
                                ==>option # [3] ^ (A5) option name [4] ^ (C6)
                                ==>description [5] ^ device name [6] ^ (E1) UCI [7] ^
                                ==>(C3) creation time [8] ^ (C1) creator DUZ or (C2)
                                ==>creator name [9] ^ $J of running task [10] ^ $H
                                ==>when task actually started running [11]
^%ZTSCH("UPDATE", $J of Manager)= $H when the Manager last updated its
                                ==>parameters
^%ZTSCH("WAIT")= ""
```



## 22.5.2 TASKS (#14.4) File

The `^%ZTSK` global holds this partially-VA FileMan-compatible file of tasks. It is structured with a descriptor node followed by sequential entries. The data dictionary for this file is 14.4, TASKS. It is a read-only file. The TASKS (#14.4) file has no cross-references, *not* even a top-level **B** cross-reference, and its descriptor node is updated by the purge option (XUTM QCLEAN).

Each entry itself contains a **zero** node and several decimal nodes followed by a number of storage nodes. Like the SCHEDULE file, the TASKS (#14.4) file is *not* available for direct manipulation or examination by application software. Site managers, however, can print out information on entries in the TASKS (#14.4) file using VA FileMan.

The following diagram ([Figure 276](#)) describes the nodes **0** through **.26** for each entry in the TASKS (#14.4) file:

**Figure 276: TASKS (#14.4) File Nodes (1 of 2)**

```
^%ZTSK(task #, 0)= (#.01) Entry Point [1F] ^ (#2) Routine Name [2F] ^ (#3) User
==>[3P:200] ^ (#4) Requested UCI [4F] ^ (#5) Creation Time ($H)
==>[5F] ^ (#6) Scheduled Run Time ($H) [6F] ^ (#7) Type of Task
==>[7F] ^ (#8) Option Number [8N] ^ (#9) Option Name [9F] ^ (#10)
==>Creator Name [10F] ^
==> (#11) Creation UCI [11F] ^ (#12) Creation Volume Set [12F] ^
==>(#13) RESERVED [13F] ^ (#14) Requested Volume Set [14F] ^ (#15)
==>Priority [15N] ^ (#16) Original Create date ($H) [16F]
^%ZTSK(task #, .01)= (#21) Original Destination UCI [1F] ^ (#22) Original
==>Destination Volume [2F] ^
^%ZTSK(task #, .02)= (#31) Current Destination UCI [1F] ^ (#32) Current
==>Destination Volume Set [2F] ^ (#33) Hop Count [3N] ^
^%ZTSK(task #, .03)= (#41) Task Description [E1,240F]^%ZTSK(D0,.04)= (#42) Schedule
Time Seconds [1N] ^
^%ZTSK(task #, .1)= (#51) Status Code [1F] ^ (#52) Last Update $H [2F] ^ (#53)
==>Status Notes [3F] ^ (#54) Job [4N] ^ ^ ^ ^ (#59.8) Remember
==>Until [8F] ^ ^ (#59.1) Stop Flag [10F]^
^%ZTSK(task #, .12, (#71) Error Count [1N] ^ (#72) Error $H [2F] ^ (#73) Error
==>Message [3F] ^
^%ZTSK(task #, .2)= (#81) Device IOP value [1F] ^ (#82) $IO value [2F] ^ (#83)
==>Device Type [3F] ^ (#84) Device Sub-Type [4F] ^ (#85) Device
==>%IS modifier [5F] ^ (#86) Host File Address [6F] ^ (#87) Sync Flag
[7F] ^ (#88) IO
==>Reschedule Count [8N] ^
^%ZTSK(task #, .21)= (D8) device file entry # [1] ^
^%ZTSK(task #, .25)= (D7) device parameters [1] ^
```

The remaining nodes of each entry are used to pass variables to the task. If the task has been manipulated only using TaskMan's Program Interface, then the entries look like this:

**Figure 277: TASKS (#14.4) File Nodes (2 of 2)**

```
^%ZTSK(task #, .3, "name")= (F2) value of saved variable
^%ZTSK(task #, .3, "array(", node #)= (F2) value of saved variable
^%ZTSK(task #, .3, "array", node #)= (F2) value of saved variable
```

The distinguishing characteristic here is the fact that the variables to be passed are all subscripted under the **.3**-node.

## 22.5.3 Task Status Codes


This section lists the various codes that may be found in the first ^-piece of the .1 node, the text displayed for that code by the List Tasks option, and the meaning of that code. These codes are set into the tasks at every point in processing where the status changes, along with a time stamp and an explanation where necessary.

Several of the codes correspond to the status of the SCHEDULE file entry for the task. If all applications used the Program Interface, the status code would always agree with the task's real status. In fact, many applications still directly manipulate ^%ZTSCH and ^%ZTSK, and they often neglect to update the status codes. Whenever the SCHEDULE file disagrees with the status code, the SCHEDULE file is correct. This is the reason many of the codes listed in [Table 47](#) have multiple meanings.

Status codes **1** through **6** represent one of two common paths a task takes through TaskMan. The other common path replaces code **3** with **A**, where the task's device is *not* immediately available.

**Table 47: TaskMan Task Status Codes**

Status Code	Description
<b>0</b>	Incomplete or still being created.
<b>1</b>	Scheduled for <i>&lt;date and time&gt;</i> . TaskMan uses this status in every option and entry point that schedules a task. If the task fails or errors out and TaskMan <i>cannot</i> trap the error, this status has a different meaning: "Stopped irregularly while scheduled."
<b>2</b>	Being inspected by TaskMan. The Manager sets this status when the time comes for a task to run. As it removes the task from the SCHEDULE file, it sets this code into the task.
<b>3</b>	Waiting for a partition. When the Manager places a task in the Job list of the SCHEDULE file, it gives the task this code. If the task fails or errors out, and TaskMan <i>cannot</i> trap the error, this status has a different meaning: "Stopped irregularly while waiting for a partition."
<b>4</b>	Being prepared. The Submanager gives a task this code when it removes the task from the Job list or Busy Device Waiting list in order to run it.
<b>5</b>	Currently running. The Submanager gives a task this status just before it starts the task at its entry point. If the task fails or errors out, and TaskMan <i>cannot</i> trap the error, this status has a different meaning: "Started running <i>&lt;date &amp; time&gt;</i> and stopped irregularly."
<b>6</b>	Completed <i>&lt;date and time&gt;</i> . The Submanager gives a task this status after the task quits.
<b>A</b>	Waiting for device <i>&lt;device name or \$I&gt;</i> . The Manager or the Submanager gives a task this status when it places the task in the Busy Device Waiting list. If the task fails or errors out and TaskMan <i>cannot</i> trap the error, this status has a different meaning: "Stopped irregularly while waiting for a device."

Status Code	Description
<b>B</b>	Rejected. <rejection message>. The Manager or the Submanager gives a task this status if it fails one of the basic validation tests. (The rejection messages are contained in the <a href="#">“Task Rejection Messages”</a> section.)
<b>C</b>	Error <date and time>. <error message>. The Submanager gives a task this status if it traps an error after starting the task. The error message records the vendor-specific <b>\$ZE</b> text.
<b>D</b>	Stopped by user. The Manager or the Submanager gives a task this status if, when TaskMan removes the task from the SCHEDULE file for processing, it finds that the user has asked the task to stop. The Submanager also assigns this status if, just before starting the task, it finds the stop request has been made. Finally, the Submanager gives a task this status if the task uses the <b>ZTSTOP</b> output variable to report that it stopped in response to a user’s request.  <b>REF:</b> For an explanation of ZTSTOP, see the description of \$\$\$^%ZTLOAD API in the “TaskMan: Developer Tools” section in the <i>Kernel 8.0 &amp; Kernel Toolkit 7.3 Developer’s Guide</i> . Kernel and Kernel Toolkit APIs are also available in HTML format at a VA Intranet website.
<b>E</b>	Interrupted while running. At startup, the Manager gives this status to any task listed in the Task list of the SCHEDULE file as still running.
<b>F</b>	Unscheduled by <user name or “you”>. The Dequeue Tasks [XUTM DQ] and TaskMan User [XUTM USER] options and the DQ^%ZTLOAD entry point use this status for tasks they unschedule.
<b>G</b>	Waiting for the link to <volume set name> to be restored. The Manager uses this status for tasks that would have been transferred to a different TaskMan environment and deleted from this one, if the local area network link to the remote environment were functioning properly. If the task fails or errors out, and TaskMan <i>cannot</i> trap the error, this status has a different meaning: “Stopped irregularly while waiting for a link.”
<b>H</b>	Edited without being scheduled. The Requeue Tasks [XUTM REQ] and TaskMan User [XUTM USER] options and the REQ^%ZTLOAD entry point use this status when edited tasks are <i>not</i> subsequently rescheduled.
<b>I</b>	Discarded by TaskMan because its record was incomplete. The Manager or the Submanager uses this status for tasks listed in the SCHEDULE file that lack critical information in the corresponding TASKS (#14.4) file entries.
<b>J</b>	Currently being edited. This status has been set aside for possible use in future versions of TaskMan.
<b>K</b>	Created without being scheduled. The ^%ZTLOAD entry point uses this status for tasks when the application passes <b>ZTDTH=“@”</b> . Kernel Toolkit utility ^%ZTMOVE uses this value for the tasks it creates to transfer routines between Volume Sets manually.

Status Code	Description
<b>L</b>	<p>Preparing this task caused the Submanager an error &lt;date and time&gt;. &lt;error msg&gt;. The Submanager uses this status when it traps an error after claiming a task but before starting it.</p> <p>The Manager does <i>not</i> yet record a corresponding status for the analogous situation. Tasks that never start, that are left with a status of <b>2</b>, have usually caused the Manager an error while it tried to examine them.</p>
<b>M</b>	<p>Waiting for a partition on a Compute Server.</p> <p>The Manager gives a task this code when it places the task in the Compute Server Job List.</p> <p>If the task fails or errors out, and TaskMan <i>cannot</i> trap the error, this status has a different meaning: "Stopped irregularly while waiting for a partition on a Compute Server."</p>

## 22.5.4 Task Rejection Messages

Under certain conditions TaskMan can avoid trapping obvious errors by checking the tasks themselves for internal consistency. Whenever it finds tasks with bad data, it rejects them. This involves unscheduling them, setting their status codes to **B**, and adding a brief explanatory message. These messages can help identify bugs in application queuing software, in the local system configuration, or in TaskMan itself.

**Table 48: TaskMan Rejection Messages**

TaskMan Rejection Message	Description
BAD DESTINATION UCI	<p>The Manager rejects a task for this reason under three different conditions:</p> <ul style="list-style-type: none"> <li>• If the task is bound for the Manager's own Volume Set, whatever value has been passed for the destination UCI <i>must</i> be a valid UCI on the current Volume Set. If <b>^%ZOSF("UCICHECK")</b> rejects the UCI, TaskMan rejects the task.</li> <li>• If the task is bound for a different Volume Set and the destination UCI is <i>not</i> listed in the UCI ASSOCIATION (#14.6) file under that Volume Set, the UCI <i>must</i> be accepted as a valid UCI on the current Volume Set so TaskMan can use File #14.6 to determine where the task should run. If <b>^%ZOSF("UCICHECK")</b> rejects the UCI, TaskMan rejects the task.</li> <li>• If the task is bound for a different Volume Set and that Volume Set's link is down and its REPLACEMENT VOLUME SET is the current Volume Set, TaskMan rejects the task.</li> </ul>
BAD DESTINATION VOLUME SET	<p>Every task's destination Volume Set <i>must</i> be listed in the VOLUME SET (#14.5) file.</p>
BAD IO DEVICE <\$I>	<p>If a port goes bad while many tasks wait for it in the Busy Device Waiting list, TaskMan traps an error whenever the port is tested for availability. When the Submanager traps such an error, it rejects every task waiting for that device.</p>

TaskMan Rejection Message	Description
INVALID OUTPUT DEVICE	The Manager performs a lookup on the devices that tasks request. If the ^%ZIS call indicates that the device does <i>not</i> exist, TaskMan rejects the task.
INVALID ROUTINE NAME	If a task's entry point is in a %-routine, the Manager tests for that routine's existence in the library UCI. If the routine does <i>not</i> exist there, TaskMan rejects the task.
NO DESTINATION UCI	When older applications bypassed the Program Interface, they sometimes scheduled tasks without specifying the destination UCI. The Manager rejects all such tasks.
NO LINK ACCESS TO VOLUME SET	If the VOLUME SET (#14.5) file entry for a task's destination Volume Set indicates there is no link access to that Volume Set, the task is rejected.
NO ROUTINE AT DESTINATION	If a task's entry point is in a <i>non</i> -%-routine, then the check for the routine's existence is done by the Submanager prior to starting the task.

## 22.5.5 TaskMan State Messages

When the Manager does *not* run, all background processing grinds to a halt. For this reason, the Manager's condition is of vital importance to system managers. When problems are detected with background processing at a site, checking the Manager's condition should be the first step. The Manager periodically records its state in the Status List. The Monitor TaskMan option [XUTM ZTMON] displays this list near the top of the screen. The various states and their meanings are described in the topics that follow.

### 22.5.5.1 BALANCE State

The Manager lists itself in this state if other Managers (that are processing the same files) appear to have more CPU capacity available than the current Manager. While in the **BALANCE** state, the Manager does *not* process any tasks or start any new Submanagers. The Manager removes itself from the **BALANCE** state when it appears to have at least as much CPU capacity as the active Manager. In general, when many Managers are working out of the same TASKS (#14.4) and SCHEDULE files, most of them are in the **BALANCE** state at any given time, with only the one or two least loaded Managers actually processing tasks.



**REF:** For more information about TaskMan load balancing, see the "[Multiple TaskMan Managers and Load Balancing](#)" section in "[TaskMan: System Management—Configuration](#)."

### 22.5.5.2 ERROR State

The Manager lists itself in the **ERROR** state after trapping errors. On some systems the process of recording an error is slow, so the presence of a distinct state helps identify the source of delay to the system manager. A troubleshooter who sees this state for TaskMan should immediately check the TaskMan Error list to see what kind of error is being recorded. Because TaskMan's code is structured as a series of nested loops, it can very easily generate thousands of errors a day under certain conditions.

### 22.5.5.3 PAUSE State

The **PAUSE** state means that some external condition is preventing the Manager from processing tasks. The description always indicates the cause. While in the **PAUSE** state, the Manager waits until the problem is resolved, checking once every **60** seconds. The pause states are as follows:

**Table 49: TaskMan PAUSE States**

PAUSE State	Description
The following required <b>^%ZOSF</b> nodes are undefined, <list of nodes>	When the Manager starts, restarts, or recovers from a trapped error, its first order of business is to drop through some setup code that checks TaskMan's environment. If any critical <b>^%ZOSF</b> nodes are missing, it enters a <b>PAUSE</b> state and waits until the system manager restores the nodes.
Required link to <volume set name> is down	The other key check in the setup code is to ensure that all Volume Sets listed in the VOLUME SET (#14.5) file as required can actually be reached. The Manager tests each required link and enters the <b>PAUSE</b> state if any tests cause an error. The Manager remains in the <b>PAUSE</b> state, periodically testing the links, until they are restored.
Logons Inhibited	When the system manager sets the INHIBIT LOGONS? field of the VOLUME SET (#14.5) file, TaskMan enters a <b>PAUSE</b> state and waits until the flag is cleared.
No Signons Allowed	The system manager can use the software switch to stop logons, which places TaskMan in the <b>PAUSE</b> state.

### 22.5.5.4 RUN State

The **RUN** state indicates that the Manager is going about its business in a relatively normal manner, managing background tasks on your system.

**Table 50: TaskMan RUN States**

RUN State	Description
Start	The Manager sets this value before and after executing the setup code at system startup.
Setup	The Manager identifies when it executes the setup code to test its environment.
Restart	The Manager sets this value after executing the setup code during a restart.
Main Loop	This should be the Manager's usual state. This indicates the Manager is executing the main loop that checks the environment, processes the Schedule list, and performs idle loop activities when appropriate.
TaskMan Job Limit Reached	When the total number of processes on the Manager's CPU exceeds the TaskMan Job Limit given in the VOLUME SET (#14.5) file, the Manager can continue to process the Schedule list but <i>cannot</i> start any new Submanagers.

### 22.5.5.5 WAIT State

While in the **WAIT** state, the Manager does *not*:

- React to changes in its environment.
- Process tasks.
- Enter **PAUSE** states.
- Stop after the Stop TaskMan option has been used.

You have two options (described above) that let you create or undo the **WAIT** state. TaskMan *cannot* enter this state on its own; it can only be initiated manually. This is essentially a tool for you to tightly control the processing of tasks on your machines. The description for this state always reads “TaskMan Waiting”.

# V. Kernel Installation and Distribution System

## 23 KIDS: System Management—Installations

Kernel Installation and Distribution System (KIDS) was introduced with Kernel 8.0. Previously, software was exported using a utility called **DIFROM**, and installed by running **INIT** routines that the **DIFROM** utility created. KIDS is the replacement for **DIFROM**; it introduces significant revisions to the software distribution and installation processes. This chapter introduces KIDS, and describes some of the changes to the software export process.

[Table 51](#) lists the definitions that apply throughout the KIDS documentation:

**Table 51: KIDS-related Terms and Definitions**

Term	Definition
<b>Transport Global</b>	An exported software application, stored in a global. KIDS exports software (i.e., package) based on its definition in a build entry. The transport global also contains the build entry and the PACKAGE (#9.4) file entry (if any) for a given software application.
<b>Build Entry</b>	An entry in the BUILD (#9.6) file that defines the parts of a software application to export. Also known as a build.
<b>Component</b>	An element of one of the following types: template (PRINT, SORT, and INPUT); form; function; bulletin; help frame; routine; option; security key; and protocol.
<b>Distribution</b>	A Host File Server (HFS) file containing transport globals. If a distribution contains multiple transport globals, KIDS treats them as a single installation when installing from the distribution.
<b>Package</b>	A cohesive set of files, data, and components that together form a set of computing activities related to a functional area (i.e., software).



## 23.1 KIDS Options

To get to the KIDS: Kernel Installation & Distribution System menu [XPD MAIN] (locked with the XUPROG security key) choose the Programmer Options menu option [XUPROG] on the Kernel Systems Manager Menu [EVE], as shown below:

Figure 278: KIDS Menu Options

```
Select Systems Manager Menu Option: PROGRAMMER OPTIONS

KIDS  Kernel Installation & Distribution System ...           [XPD MAIN]
      **> Locked with XUPROG
      PG  Programmer mode                                     [XUPROGMODE]
          **> Locked with XUPROGMODE
          Delete Unreferenced Options                       [XQ UNREF'D OPTIONS]
          Error Processing ...                               [XUERRS]
          General Parameter Tools ...                       [XPAR MENU TOOLS]
          Global Block Count                                [XU BLOCK COUNT]
          List Global                                       [XUPRGL]
          **> Locked with XUPROGMODE
          Routine Tools ...                                 [XUPR-ROUTINE-TOOLS]
          Test an option not in your menu                   [XT-OPTION TEST]
          **> Locked with XUMGR
Select Programmer Options Option: KIDS <Enter> Kernel Installation & Distribution
System

      Edits and Distribution ...                             [XPD DISTRIBUTION MENU]
      Utilities ...                                         [XPD UTILITY]
      Installation ...                                       [XPD INSTALLATION MENU]
          **> Locked with XUPROGMODE
      Patch Monitor Main Menu ...                           [XTPM PATCH MONITOR MAIN MENU]
      Patchman ...                                          [XPD AUTOMATIC PATCHING MENU]
```

As indicated by its name (i.e., KIDS = Kernel Installation and Distribution System), KIDS supports two major functions:

- [Distributions](#)
- [Installations](#)



**REF:** In addition, KIDS also provides other utilities. For more information on KIDS utilities, see the “[KIDS: System Management—Utilities](#)” chapter.

## 23.1.1 Distributions

The distribution related options are located on the Edits and Distribution menu [XPD DISTRIBUTION MENU] (see [Figure 279](#)). The distribution portion of KIDS allows developers to:

- Define the contents of a software application in a build entry.
- Create transport globals from build entries.
- Export transport globals by creating distributions.

**Figure 279: Edits and Distribution Menu Options**

```
Select Kernel Installation & Distribution System Option: EDITS AND DISTRIBUTION

Create a Build Using Namespace
Copy Build to Build
Edit a Build
Transport a Distribution
Old Checksum Update from Build
Old Checksum Edit
Routine Summary List
Version Number Update

Select Edits and Distribution Option:
```



**REF:** For a description on how application developers use the KIDS build and distribution options, see the “KIDS: Developer Tools” chapter in the *Kernel 8.0 & Kernel Toolkit 7.3 Developer’s Guide*.

## 23.1.2 Installations

The installation related options are located on the Installation menu [XPD INSTALLATION MENU] (see [Figure 280](#)). The installation portion of KIDS allows sites to:

- Load transport globals from KIDS distributions.
- Load transport globals from KIDS PackMan messages.
- Print out the contents of loaded transport globals before installing them.
- Compare the contents of loaded transport globals to the current system before installing them.
- Install loaded transport globals.

**Figure 280: Installation Menu Options**

```
Select Kernel Installation & Distribution System Option: INSTALLATION

1      Load a Distribution
2      Verify Checksums in Transport Global
3      Print Transport Global
4      Compare Transport Global to Current System
5      Backup a Transport Global
6      Install Package(s)
       Restart Install of Package(s)
       Unload a Distribution

Select Installation Option:
```

KIDS introduced two files into Kernel:

- BUILD (#9.6) file
- INSTALL (#9.7) file

KIDS also makes use of the existing PACKAGE (#9.4) file, but its role in exporting and installing software is diminished.

## 23.2 Build Entries and the BUILD (#9.6) File

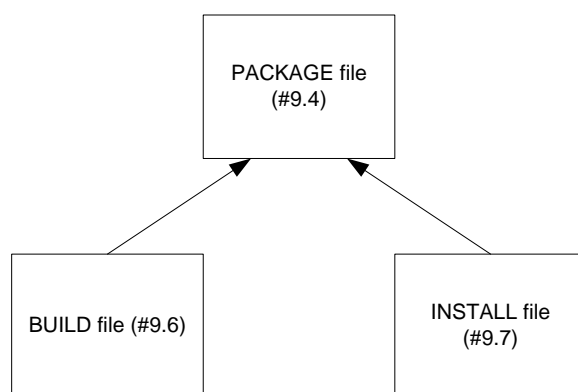
Build entries, stored in the BUILD (#9.6) file, are where developers define a software application. This build entry defines the set of files, data, components, installation questions, national software information, pre- and post-install routines, and other settings that comprise the exported software.

Software components are no longer tied to namespace, as they were previously with DIFROM and the PACKAGE (#9.4) file. Developers can select any components available on the current system and include them in their build entries as software components.

The format of the NAME (#.01) field of a build entry *must* be the software name concatenated with a space, and then a version number. This means that there is a separate entry for every version of a software application that a developer exports.

Also, a software application's build entry is sent to installing sites as part of the software; after an installation, the site can examine the build entry to see the software definition.

**Figure 281: KIDS File Diagram**



### **23.3 INSTALL (#9.7) File**

The INSTALL (#9.7) file stores a record of each installation a site performs. The INSTALL (#9.7) file allows KIDS to store a separate installation entry for each installation. A new version of software no longer overwrites the installation information of a previous version, and developers' installation history no longer overwrites the sites' installation history. The national PACKAGE (#9.4) file is now static at its top level.

The three main items recorded in the INSTALL (#9.7) file for each installation are the installing site's answers to installation questions, any installation output, and the installation's timing information.

### **23.4 Changes in the Role of the PACKAGE (#9.4) File**

The PACKAGE (#9.4) file still plays a role in installations with KIDS, albeit a diminished one. KIDS provides a link from the build entry of a package to the PACKAGE file, so that developers can link a package to a PACKAGE (#9.4) file entry.

The top level of a PACKAGE (#9.4) file entry for a package now stores static package information. The only part of the PACKAGE (#9.4) file entry that installations update automatically now is the VERSION Multiple field. A patch sent with KIDS does *not* transport the entire PACKAGE (#9.4) file entry. It only sends the information that is needed to update the PACKAGE (#9.4) file. Patch installations updates the PATCH APPLICATION HISTORY Multiple field, which is within the VERSION Multiple field. KIDS saves patch names along with their sequence numbers in this multiple. Most other fields have been designated for removal at the top level of the PACKAGE (#9.4) file. The PACKAGE (#9.4) file now stores mainly static software information that is *not* version specific, as well as the patch history of the software.

## 23.5 Transport Mechanism: Distributions

Distributions are the mechanism KIDS uses to export software. They are more flexible than the previous mechanism (**INIT** routines).

Distributions are usually in the form of an HFS file. The developer creates transport globals from build entries. KIDS stores transport globals in a global. KIDS can **WRITE** the global (in a format readable only by KIDS) to an HFS file; the HFS file is the distribution. The HFS file can then be distributed by a variety of methods, including FTP (file transfer protocol), diskette, and tape. For example, if your system is a PC, you can also move the Transport Global to a new medium (i.e., to multiple floppy disks so you can install on other PCs):

- Select the Load a Distribution option (*Do not* run the Environment Check routine).
- Under the Utilities Menu, select the Convert Loaded Package for Redistribution option.
- Under the Edits and Distribution Menu, select the Transport a Distribution option.
- At the “Enter a Host File:” prompt, enter the floppy drive and file name. For example:

```
Enter a Host File: A:\KRN8.KID)
```

One advantage to using distributions over **INIT** routines is that there is no limit to the size of a software application you can export. Another advantage is that during installations, you no longer have to overwrite a software application’s existing routines with the new routines before running the installation.

Alternatively, a KIDS distribution can be sent via a PackMan message in MailMan. But transporting software as host files, especially large ones, avoids slowing down MailMan.

### 23.5.1 Two Kinds of Distributions

KIDS supports two kinds of distributions:

- **Standard Distribution**—This type of distribution contains transport globals for what are traditionally thought of as software applications, including files, data, and all components. A standard distribution can contain one or more transport globals. If there is more than one transport global, KIDS treats each one as a single installation unit.
- **Global Distribution**—This type of distribution contains one transport global only, and that transport global can export M globals only.

The transport globals in both types of distributions also contain the corresponding build entry, and (if linked to a PACKAGE [#9.4] file entry) the corresponding PACKAGE (#9.4) file entry. However, a patch sent with KIDS does *not* transport the entire PACKAGE (#9.4) file entry. It only sends the information that is needed to update the PACKAGE (#9.4) file.

## 23.6 What Happens to DIFROM?

Developers should no longer use the DIFROM entry point to export software. Developers should use KIDS. The DIFROM method is still supported, but only for the support of sites that use standalone VA FileMan (VA FileMan without Kernel).



**REF:** For more information on using DIFROM, see the *VA FileMan Programmer Manual*.

## 23.7 Installing Standard Distributions

As noted previously, KIDS supports two types of distributions:

- Standard
- Global

This section describes how KIDS installations work when installing standard distributions.

### 23.7.1 Installation Sequence

KIDS installs standard distributions in three phases:

1. Loading transport globals from the distribution.
2. Answering installation questions for each transport global.
3. Installing each transport global in the distribution.

#### 23.7.1.1 Phase 1: Loading Transport Globals from a Distribution or PackMan Message

1. Using the Load a Distribution option, the installer chooses the HFS file from which to load distributions. If loading from a PackMan message, choose the message and invoke the INSTALL/CHECK MESSAGE PackMan option.
2. For each transport global, KIDS makes an entry in the INSTALL (#9.7) file for the transport global.
3. KIDS loads transport globals from distribution into **^XTMP**.
4. KIDS prompts the user to see if they want to run the environment check for each transport global (if unsuccessful, the process quits here; the developer may or may *not* **KILL** INSTALL (#9.7) file entries and transport globals from **^XTMP**.)
5. The installer can print the contents of the transport global, compare the contents to the current system, and verify checksums of the transport global.

#### 23.7.1.2 Phase 2: Answering Installation Questions for Transport Globals in a Distribution

1. Using the Install Package(s) option, the installer selects a distribution to install by choosing an entry from the INSTALL (#9.7) file.
2. KIDS runs the environment check for the first transport global; the environment check can allow KIDS to install the transport global, cancel installation of the transport global, or cancel installation of all transport globals in the distribution.
3. The installer answers pre-installation questions for the first transport global.
4. The installer answers standard KIDS questions for the first transport global.
5. The installer answers post-installation questions for the first transport global.
6. The installer repeats Steps #2-5 for the remaining transport globals, if there are any more transport globals to process.
7. The installer chooses a device for the installation to run on. The installer can queue the installation or run it directly; entering a caret (^) aborts the installation.

### 23.7.1.3 Phase 3: KIDS Installation of Software

1. KIDS disables any options and protocols the site has asked to be disabled for this install. However, KIDS does *not* disable options and protocols which have an Action of USE AS LINK FOR MENU ITEMS.
2. KIDS waits for the time period (from 0 to 60 minutes) the site specifies, if they chose to disable options and protocols.
3. KIDS suspends the running of queued options by TaskMan for this install, if the site chooses to do so.
4. The pre-install routine is run for the first transport global.
5. All components are installed for the first transport global.
6. The post-install routine is run for the first transport global.
7. KIDS repeats Steps 4-6 for any remaining transport globals to install in the distribution.
8. Options and protocols that were disabled for this install (if any) are re-enabled.
9. Queued options are removed from suspense (if the site chose to suspend queued options).

### 23.7.2 Installation Menu

The KIDS Installation Menu [XPD INSTALLATION MENU] contains the following options:

**Figure 282: KIDS Installation Menu Options**

```
Select Kernel Installation & Distribution System Option: INSTALLATION
**> Locked with XUPROGMODE

1      Load a Distribution                                [XPD LOAD DISTRIBUTION]
2      Verify Checksums in Transport Global              [XPD PRINT CHECKSUM]
3      Print Transport Global                            [XPD PRINT INSTALL]
4      Compare Transport Global to Current System        [XPD COMPARE TO SYSTEM]
5      Backup a Transport Global                         [XPD BACKUP]
6      Install Package(s)                               [XPD INSTALL BUILD]
Restart Install of Package(s)                          [XPD RESTART INSTALL]
Unload a Distribution                                  [XPD UNLOAD DISTRIBUTION]
```

The number next to the options indicates the order of the option entries you should follow when performing a KIDS installation.

### 23.7.3 Loading a Standard Distribution

The first step in installing a standard distribution is to load the transport globals from the Distribution. The Load a Distribution option [XPD LOAD DISTRIBUTION] does the following:

- Lists what transport globals are contained in the distribution and asks you if you want to continue.
- Creates entries in the INSTALL (#9.7) file for each transport global in the distribution that passed its environment check.
- Loads transport globals from the distribution (HFS file) into the **^XTMP** global (if you answer **YES** to continue).
- Prompts the user to see if they want to run the environment check for each transport global. If a transport global does *not* pass its environment check, KIDS may purge it from **^XTMP**; otherwise, the transport global stays in **^XTMP**. KIDS tells you the result of each environment check.
- Checks the version number of the incoming software against any existing software of the same name at the site. If the incoming version number is *not* greater than the existing version, KIDS aborts the installation for the transport global in question.
- Echoes the name of the first transport global to pass environment check (i.e., “Use transport global name to install this Distribution”). The name of the first transport global to pass its environment check is the name you use to install the distribution, in the next phase.

Loading a distribution is the first of three phases to install VistA software. The second phase is answering installation questions, including scheduling the installation; the third and final phase is the actual running of the installation.

When loading from a PackMan message, load the distribution using the INSTALL/CHECK MESSAGE PackMan option in MailMan. For KIDS PackMan messages, this option through MailMan is equivalent to the Load a Distribution option [XPD LOAD DISTRIBUTION].

**Figure 283: Load a Distribution Option—Sample User Dialogue**

```
Select Installation Option: LOAD A DISTRIBUTION
Enter a Host File: ZXG_EXPT.DAT

Distribution saved on Oct 13, 2004@09:29:08
Comment: TEST PKGS

This Distribution contains Transport Globals for the following Package(s):
    TEST 2.1

Want to Continue with Load? YES// <Enter>
Loading Distribution...

Want to RUN the Environment Check Routine? YES// <Enter>
    TEST 2.1

Use INSTALL NAME: TEST 2.1 to install this Distribution.

Select Installation Option:
```

#### 23.7.3.1 When the Distribution is Split across Diskettes

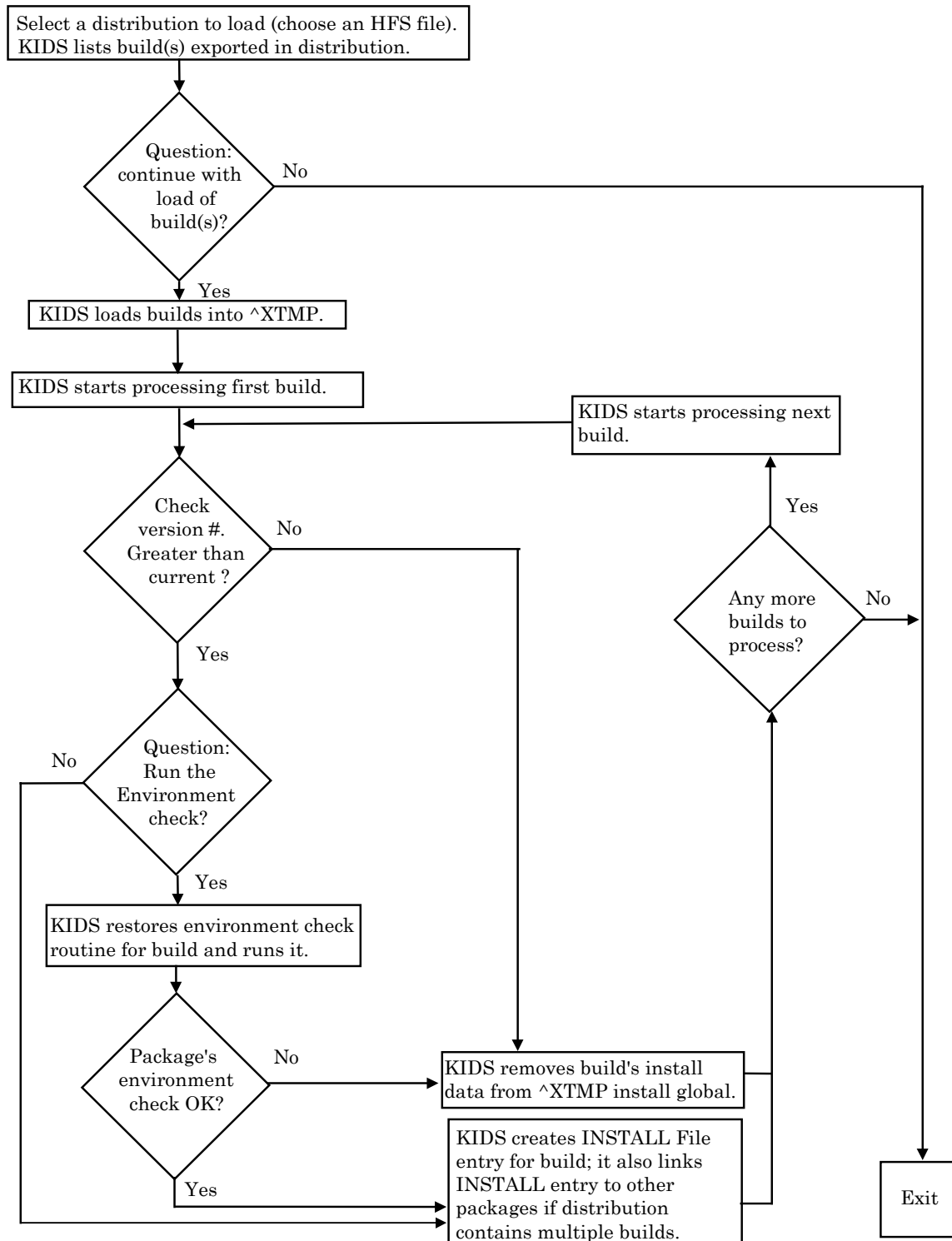
Distributions can come in a single host file (see [Figure 283](#)); alternatively, they can come on diskettes, with the host file split up among the diskettes. If you are installing from a distribution that is spread



across diskettes, the Load a Distribution option [XPD LOAD DISTRIBUTION] asks you for subsequent diskettes (e.g., "Insert the next diskette, #2, and Press the return key", etc.). Insert the appropriate disk and press the <Enter> key, and continue until the distribution is loaded.

## 23.7.4 Loading Transport Globals from a Distribution

Figure 284: Loading Transport Globals from a Distribution—Flowchart



## 23.7.5 Verifying Checksums in a Transport Global

You can verify the checksums for a loaded transport global in advance of installing from it, using the Verify Checksums in Transport Global option [XPD PRINT CHECKSUM]. This option verifies all checksums of routines in the transport global, reporting any discrepancies. In the future, the ability to verify checksums will be extended to other KIDS components besides routines.

As of Kernel patch XU\*8.0\*369, the integrity checking CHECK1^XTSUMBLD routine supports the Compare local/national checksums report option [XU CHECKSUM REPORT].

As of Kernel patch XU\*8.0\*393, KIDS was modified to send a message to a server on FORUM when a KIDS build is sent to a Host File Server (HFS) device. This message contains the checksums for the routines in the patch. The server on FORUM matches the message with a patch if the sending domain is authorized on FORUM. There is no longer a need for developers to manually include routine checksums (either CHECK^XTSUMBLD or CHECK1^XTSUMBLD routines) in the patch description. The patch module includes the before and after CHECK1^XTSUMBLD values in the Routine Information section at the end of the patch document.

With changes in the National Patch Module (NPM) on FORUM, when the patch is released the checksums for the routines are moved to the ROUTINE (#9.8) file on FORUM. The checksum “before” values come from the FORUM ROUTINE (#9.8) file and are considered the GOLD standard for released checksums. The local site’s Compare local/national checksums report option [XU CHECKSUM REPORT] uses the FORUM ROUTINE (#9.8) file as its source to create reports showing any routines that do *not* match.

This patch also modified the KIDS BUILD (#9.6) file by adding the TRANSPORT BUILD NUMBER (#63) field used to store a build number that is incremented each time a build is made. This build number is added to the second line of each routine in the **7th** “;” piece. This makes it easy to tell if a site is running the current release during testing and afterward. The leading “B” found in the checksum tells the code what checksum routine to use.

## 23.7.6 Printing Loaded Transport Globals

Once you have loaded transport globals from a standard distribution onto your system, you can print out the definitions of the transport globals, using the Print Transport Global option [XPD PRINT INSTALL]. This way, you can see every component exported in each transport global, before you install them.

**Figure 285: Print Transport Global Option—Sample Printed Transport Global**

```
PACKAGE: ZXG DEMO 1.0                                     PAGE 1
-----
NATIONAL PACKAGE:
DESCRIPTION:

ENVIRONMENT CHECK : ZXGENV
PRE-INIT ROUTINE  : ZXGPRE
POST-INIT ROUTINE : ZXGPOS
-----

ROUTINE:
ZXGC00           SEND TO SITE
ZXGC01           SEND TO SITE
ZXGC02           SEND TO SITE
ZXGCMOVE         SEND TO SITE
ZXGCTEST         SEND TO SITE
ZXGCTW1         SEND TO SITE
ZXGCWE           SEND TO SITE
ZXGCXMP1         SEND TO SITE
ZXGCXMPL         SEND TO SITE
ZXGDEMO          SEND TO SITE
ZXGKC            SEND TO SITE
ZXGLMSG          SEND TO SITE
ZXGLOAD          SEND TO SITE
ZXGTMP           SEND TO SITE

INSTALL QUESTIONS:
  SUBSCRIPT: PRE1
DIR(0)=YA^^
DIR("A")=Do you want to run the pre-install conversion?
DIR("B")=YES
DIR("?")=Answer YES to run the pre-install conversion, NO to skip it...
```

## 23.7.7 Comparing Loaded Transport Globals to the Current System

When you have loaded transport globals from a standard distribution onto your system, you can also compare a transport global to the matching software already installed on your system (if any), using the Compare Transport Global to Current System option [XPD COMPARE TO SYSTEM]. This way, you can compare the software you are about to install with the current version of the software on your system.

When this option finds differences, it notes the change by displaying the differences between the current software and the transport global on two lines, one line labeled **\* OLD \*** and the other **\* NEW \***.



**NOTE:** Pointers are converted to FREE TEXT when exporting VA FileMan entries, so these converted free pointers show up as differences when using the compare feature.

**Figure 286: Compare Transport Global to Current System Option—Sample Comparison Output**

```
Compare ZXP 1.0 to current site
```

```
-----  
  
Routine: ZUVXD
```

```
File # 3.2 Data Dictionary
```

```
File # 3.2 Data
```

```
* OLD *   ^%ZIS(2,9,8) =  
$C(27)_"[A"^^$C(27)_"[B"^^$C(27)_"[C"^^$C(27)_"[D"^^3^^$C(27)_"[L"  
* NEW *   ^%ZIS(2,9,8) = $C(27)_"[A"^^$C(27)_"[B"^^$C(27)_"[C"^^$C(27)_"[D"^^3  
* OLD *   ^%ZIS(2,44,13) = ^$C(26)^^^$J("",X)_$C(27,93,($X+32-X))  
* NEW *   ^%ZIS(2,44,13) = ^$C(26)^^^  
* OLD *   ^%ZIS(2,60,8) =  
$C(27)_"[A"^^$C(27)_"[B"^^$C(27)_"[C"^^$C(27)_"[D"^^3^^$C(27)_"[L"  
* NEW *   ^%ZIS(2,60,8) = $C(27)_"[A"^^$C(27)_"[B"^^$C(27)_"[C"^^$C(27)_"[D"^^3  
* ADD *   ^%ZIS(2,93,21) = ^
```

```
HELP FRAME
```

```
BULLETIN
```

This option was updated with Kernel patch XU\*8.0\*393 to add a side-by-side comparison in columnar format, which only works if Kernel Toolkit patch XT\*7.3\*93 has also been installed, as shown below:

**Figure 287: Compare Transport Global to Current System Option—Sample Comparison Output in Columnar Format**

```
Select Kernel Installation & Distribution System Option:

1      Load a Distribution
2      Verify Checksums in Transport Global
3      Print Transport Global
4      Compare Transport Global to Current System
5      Backup a Transport Global
6      Install Package(s)
       Restart Install of Package(s)
       Unload a Distribution

Select Installation Option: 4 <Enter> Compare Transport Global to Current System
Select INSTALL NAME: XU*8.0*381 <Enter> Loaded from Distribution
Loaded from Distribution 9/14/06@12:39:52
=> DEMO COMPARE ;Created on Sep 14, 2006@12:39:17

This Distribution was loaded on Sep 14, 2006@12:39:52 with header of
DEMO COMPARE ;Created on Sep 14, 2006@12:39:17
It consisted of the following Install(s): XU*8.0*381

Select one of the following:

1      Full Comparison
2      Second line of Routines only
3      Routines only
4      Columnar Routine compare

Type of Compare: 4 <Enter> Columnar Routine compare
DEVICE: HOME// <Enter> Telnet terminal

Compare XU*8.0*381 to current site      Routines Only
-----

Compare of routines from KIDS XU*8.0*381, and disk

Routine XU8P381 not on disk
-----
Routine XUTMTP
  KIDS                                Disk
-----
1{XUTMTP ;SEA/RDS - TaskMan:ToolKit} 1{XUTMTP ;SEA/RDS - TaskMan: ToolKit}
  {, Print, Part 1 ;04/18/2006 16:19} {, Print, Part 1 ;04/24/2003 11:06}
      ^                               ^
2{ ;8.0;KERNEL;**20,86,169,242,381*}2{ ;8.0;KERNEL;**20,86,169,242**;Ju}
      ^                               ^
-----
```

## 23.7.8 Backing Up Transport Globals

The Backup a Transport Global option [XPD BACKUP] creates a MailMan message that backs up all current routines on your system that would be replaced by a KIDS patch. This option is under the Installation menu of the KIDS menu. It works on a patch that has been loaded on your system, but *not* installed.

## 23.7.9 Running Installations

Once you have loaded the transport globals from a standard distribution, you can install them. Do this using the Install Package(s) option [XPD INSTALL BUILD].

When you load a distribution, KIDS tells you which transport global name to use to install the distribution (e.g., “Use PACKAGE 1.0 to install this Distribution”). This is always the first transport global to successfully load from the distribution. When you use the Install Package(s) option [XPD INSTALL BUILD], select the transport global name reported when you loaded the original distribution. Once you’ve done that, you can answer the installation questions for each transport global in the distribution.

### 23.7.9.1 Processing Each Transport Global

When you select a distribution to install, the Install Package(s) option processes the installation questions for each transport global in the distribution. For each transport global, you’re asked:

- Pre-Install questions.
- Standard KIDS Questions.
- Post-Install Questions.
- Whether to disable any options or protocols. By typing three question marks (???) at this prompt KIDS lists all of the options and protocols it will disable. If you answer **YES**, all incoming options and protocols are disabled. You are also prompted to add to or delete from the list of options and protocols to disable. However, KIDS does *not* disable options and protocols which have an Action of USE AS LINK FOR MENU ITEMS. All scheduled options on the system are also disabled. Finally, you are asked a time period for installation:

```
Delay Install(Minutes): (0-60): 0//"
```

You can delay before starting the installation after disabling options and protocols from 0 to 60 minutes. This is to allow users already in (disabled) options time to exit the options before the installation starts.

### 23.7.9.2 Scheduling Installations

The final question you are asked when using the Install Package(s) option to load software is upon what device to run the installation. Your choices at the “DEVICE:” prompt are:

- Run the installation directly by selecting a device without queueing. The installation runs immediately, on the device you specify.
- Queue the installation.
- Abort the installation of the distribution by entering a caret (^).

## 23.7.10 When the Installation is Queued

If you queued the installation, you can look up the installation task in TaskMan. A KIDS installation task looks like:

**Figure 288: Queued KIDS Installation—Sample Installation Task**

```
3: (Task #1179950) EN^XPDIJ, KIDS install. Device VER$LW. KRN,KDE.  
From TODAY at 16:24, By you. Scheduled for TODAY at 22:00
```

You can cancel a queued installation (before it has started) by deleting the task. KIDS also allows you to restart an install if the install is queued and you get an error during the installation.

### **23.7.11 Re-answering Installation Questions**

If you queued an installation, you can re-answer installation questions, if you so choose, using the Install Package(s) option. To be able to re-answer the questions, however, you need to locate the task that was queued for the installation and delete it first. Once you delete the installation's queued task, you can re-answer the install questions. When you re-answer questions, your answers from the previous time come up as default responses.

Also, if you abort an installation after answering its installation questions (i.e., by entering a caret [^]), your responses are again used as the defaults the next time you try to install.

### **23.7.12 Information Stored in the INSTALL (#9.7) File**

KIDS exports the definition of a software application in the BUILD (#9.6) file. KIDS records installations of software in the INSTALL (#9.7) file. The installation records in the INSTALL (#9.7) file provide a record of the start time, timing for each checkpoint, and completion time (if any) for an installation.

When an installation aborts, the contents of the INSTALL (#9.7) file determine where the install starts up again when you use the Restart Install of Package(s) option (checkpoint information is stored in the INSTALL [#9.7] file).

As well as being sent to the installation's principal device, all output from the installation is also stored in the INSTALL (#9.7) file, in the MESSAGES word-processing-type field.

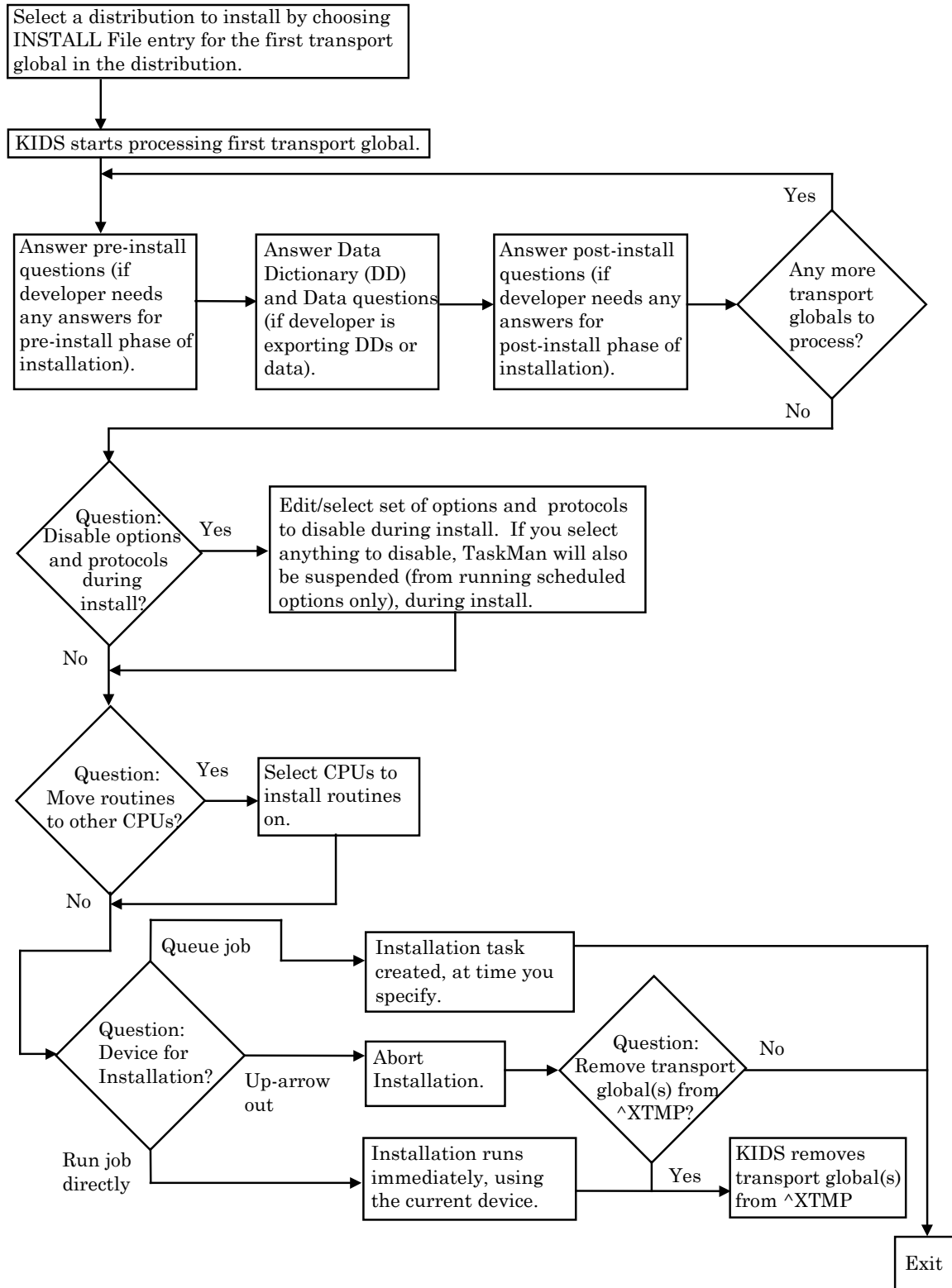
The installation questions (and your answers to them) are stored in the INSTALL ANSWERS Multiple field of the INSTALL (#9.7) file.

You can print entries from the INSTALL (#9.7) file with the Install File Print option.



## 23.7.13 Answering Installation Questions for a Distribution

Figure 289: Answering Installation Questions for a Distribution—Flowchart



## 23.7.14 Installation Progress

If the device selected for output is a VT100-compatible (or higher) terminal, KIDS displays the installation output in a virtual window on the terminal. Below the virtual window, a progress bar graphically illustrates the percentage complete that the current part of the installation has reached. KIDS is able to report progress for the installation of files and for all components (PRINT templates, forms, help frames, routines, options, etc.) KIDS lists those compiled cross-references, INPUT templates, and PRINT templates that were created during the install process. KIDS does *not* show progress for installing data, nor for pre- and post-install tasks.

On all other devices, progress is reported using dots.

**Figure 290: Installation Progress—Sample Output**

```
TEST 1.1
-----
Installing Routines:
      Oct 07, 2004@15:00:02

Installing PACKAGE COMPONENTS:

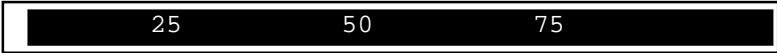
Installing PRINT TEMPLATE
      Oct 07, 2004@15:00:04

Updating Routine file...

The following Routines were created during this install:
      ZZR4

Updating KIDS files...

TEST 1.1 Installed.
      Oct 07, 2004@15:00:05
-----

100%
Complete 
```

## 23.7.15 Once the Installation Finishes

When the installation runs, its output is sent to the device you specified when you answered the installation questions. If, for example, you queued the installation to a printer, the output is sent to the printer.

You can find out whether an installation finished by looking up the entry in the INSTALL (#9.7) file for that installation (use the Install File Print option). You should check whether an installation completed successfully or not. If the install completed successfully, the STATUS field in the INSTALL (#9.7) file entry is set to “Install Completed.” If the install errored out, the STATUS field in the INSTALL (#9.7) file entry is still set to “Install Started.” If it errored out, you need to find out what went wrong, and restart the installation.



**REF:** For information on restarting an installation, see the “[Restarting Aborted Installation](#)” section.

If you disabled scheduled options, options, and protocols, KIDS should have re-enabled those (unless the install errored out).

You should refer to the instructions that came with the software you installed to see what post-installation tasks, if any, you should perform.

### 23.7.16 Restarting Aborted Installations

A feature of KIDS is the ability to restart an aborted installation. KIDS uses a checkpoint system to keep track of how many phases of an installation it completed. When an installation aborts for some reason, you can restart the installation (using the Restart Install of Package(s) option [XPD RESTART INSTALL]). KIDS does *not* automatically re-run the entire installation from the beginning; instead, it re-runs the installation only from the last completed checkpoint.

As well as some standard checkpoints built into KIDS (e.g., completion of pre-install, completion of each component type, and completion of post-install), KIDS lets developers create checkpoints for use within their pre- and post-install routines. So depending on how the developer has designed a pre- or post-install, it is possible that, when re-started, the pre- or post-install does *not* have to be re-run in its entirety either (if the error occurred there). Instead, KIDS only re-runs the pre- or post-install from the last completed developer checkpoint (if any) within the pre- or post-install.

Before restarting an installation, you should try to determine what caused the installation to abort. If an error occurred, any error messages are in the INSTALL (#9.7) file entry, in the MESSAGES word-processing-type field. Once you've fixed the problem, you can use the Restart Install Of Package(s) option [XPD RESTART INSTALL] to continue with the installation. KIDS also allows you to restart an install if the install is queued and you get an error during the installation.

### 23.7.17 Recovering from an Aborted Distribution Load

If you encounter an error while loading a distribution (using the KIDS option to load a distribution from the export medium into the **^XTMP** global), you are unable to re-load the distribution until you clear out what was stored during the aborted load attempt.

To clear out the previously loaded distribution, use the Unload a Distribution option [XPD UNLOAD DISTRIBUTION]. To unload a distribution, enter the name of the *first* transport global that was loaded when you loaded the distribution. The entries in the INSTALL (#9.7) file for all transport globals in the distribution are removed, and the transport globals themselves are purged from the **^XTMP** global.

Once you delete entries in the INSTALL (#9.7) file and entries in the **^XTMP** global with the Unload a Distribution option [XPD UNLOAD DISTRIBUTION], you should be able to reload the distribution in question. If the install was already started and you choose to unload the distribution, you first *must* edit the INSTALL (#9.7) file and set the STATUS field to Load From Distribution (i.e., **0**) prior to using the Unload a Distribution option [XPD UNLOAD DISTRIBUTION].

## 23.8 Installing Global Distributions

The second type of distribution supported by KIDS is called a global distribution. This type of distribution, unlike standard distributions, is used to only export globals.

You still use the Load a Distribution option to install global distributions. Unlike loading a standard distribution, however, KIDS installs global distributions immediately from the Load a Distribution option. Also, there is no queuing of the installation.

A global distribution can only contain one transport global, and the transport global can only export globals. You know that the distribution you're installing is a global distribution rather than a standard distribution, because when you load it with the Load a Distribution option, KIDS indicates the following:

**Figure 291: KIDS Global Distribution—Sample Message**

```
This is a Global Distribution. It contains Global(s) that will
update your system at this time. The following Global(s) will be installed:
```

The Load a Distribution option lists each global that will be installed from the distribution. Each global in the list is marked **OVERWRITE** or **REPLACE**:

- **OVERWRITE**—Load the global *without* purging the site's version of the global beforehand.
- **REPLACE**—Purge the site's version of the global first, and then load the global.

You are given two chances to abort the installation of the global distribution. If you answer **YES** to both questions, the globals in the global distribution are installed immediately.

## 23.9 Purging the BUILD and INSTALL Files

Each KIDS installation adds one entry to the BUILD (#9.6) and INSTALL (#9.7) files for every transport global installed from the distribution.



**REF:** For information about purging these files, see the discussion of the Purge Build or Install Files option in the “[Purge Build or Install Files](#)” section in “[KIDS: System Management—Utilities](#).”

**Figure 292: Installation of a Global Distribution—Load a Distribution Option**

```
Select Installation Option: LOAD A DISTRIBUTION
Enter a Host File: [DMANAGER]XGGLOBAL.DAT

KIDS Distribution save on Jan 26, 2004@12:58:25
Comment: GLOBAL PACKAGE

This Distribution contains the following Transport global(s):
    GLOBAL PACKAGE 1.0

This is a Global Distribution. It contains Global(s) that will
update your system at this time. The following Global(s) will be installed:
^XGRON(1)      Overwrite
^XGRON("PX")  Replace
^XGRON("TX")  Overwrite

If you continue with the Load, the Global(s) will be
Installed at this time.

Want to Continue with Load? YES// <Enter>
Loading Distribution...

Globals will now be installed, OK? YES// <Enter>

Installing Globals...
    Jan 26, 2004@13:04:16

GLOBAL PACKAGE 1.0 Installed.
    Jan 26, 2004@13:04:17

Select Installation Option:
```

## 23.10 Alpha/Beta Tracking

Kernel provides a mechanism for tracking and monitoring installation and option usage during the alpha and beta testing phases of VistA software applications. This tool is primarily intended for application developers to use in monitoring the testing process at local test sites.



**NOTE:** In VA terminology “Alpha” and “Beta” testing are defined as follows:

- Alpha Testing—VistA test software application is running in a site’s Test account.
- Beta Testing—VistA test software application is running in a site’s Production account.

Alpha/Beta Tracking provides the following services to both developers and system administrators:

- Notification when a new alpha or beta software version is installed at a site.
- Periodic option usage reports for alpha or beta options being tracked.
- Periodic listings of errors in the software’s namespace that are currently in alpha or beta test at the site.

The following options are provided on the Alpha/Beta Test Option Usage Menu [XQAB MENU], which is located on the Operations Management menu [XUSITEMGR]. These options allow developers and system administrators to monitor Alpha/Beta Tracking at a site:

- Errors Logged in Alpha/Beta Test (QUEUED) option [XQAB ERROR LOG XMIT]
- Actual Usage of Alpha/Beta Test Options option [XQAB ACTUAL OPTION USAGE]
- Low Usage of Alpha/Beta Test Options option [XQAB LIST LOW USAGE OPTS]
- Print Alpha/Beta Errors (Date/Site/Num/Rou/Err) option [XQAB ERR DATE/SITE/NUM/ROU/ERR]
- Send Alpha/Beta Usage to Programmers option [XQAB AUTO SEND]



**REF:** For more detailed information about and description of the Alpha/Beta Tracking functionality (e.g., starting, stopping, and monitoring options), see the “Alpha/Beta Tracking” section in the “KIDS: Developer Tools” section in the *Kernel 8.0 & Kernel Toolkit 7.3 Developer’s Guide*.

## 24 KIDS: System Management—Utilities

KIDS provides the following utility options:

**Figure 293: KIDS Utilities Menu Options**

```
Kernel Installation and Distribution System...           [XPD MAIN]
Utilities...                                           [XPD UTILITY]
  Build File Print                                     [XPD PRINT BUILD]
  Install File Print                                   [XPD PRINT INSTALL FILE]
  Edit Install Status                                  [XPD EDIT INSTALL]
  Convert Loaded Package for Redistribution            [XPD CONVERT PACKAGE]
  Display Patches for a Package                       [XPD PRINT PACKAGE PATCHES]
  Purge Build or Install Files                        [XPD PURGE FILE]
  Rollup Patches into a Build                         [XPD ROLLUP PATCHES]
  Update Routine File                                [XPD ROUTINE UPDATE]
  Verify a Build                                      [XPD VERIFY BUILD]
  Verify Package Integrity                            [XPD VERIFY INTEGRITY]
```

These utilities can be used both by developers and by sites who install software created by KIDS.

## 24.1 Build File Print Option

The Build File Print option [XPD PRINT BUILD] prints out the build entry for a software application. It lists the complete definition of the software, including all files, components, install questions, and the environment, pre-install, and post-install routines.

**Figure 294: Build File Print Option—Sample Output**

```

PACKAGE: ZXG DEMO 1.0                                     PAGE 1
-----
NATIONAL PACKAGE:
DESCRIPTION:
Package containing demonstration of ZXG* functions.

ENVIRONMENT CHECK : ZXGENV
PRE-INIT ROUTINE  : ZXGPRE
POST-INIT ROUTINE: ZXGPOS

                                UP   SEND  DATA
                                DATE  SEC.  COMES  SITE   RSLV  USER
FILE #      NAME                DD   CODE W/FILE DATA  PTS  OVER
-----
662105      ZXG DEMO                YES  YES  NO

PRINT TEMPLATE:
  ZXG PRINT      FILE #662105                SEND TO SITE

ROUTINE:
  ZXGC00                SEND TO SITE
  ZXGC01                SEND TO SITE
  ZXGC02                SEND TO SITE
  ZXGC03                SEND TO SITE
  ZXGC04                SEND TO SITE
  ZXGC05                SEND TO SITE
  ZXGC06                SEND TO SITE
  ZXGC07                SEND TO SITE
  ZXGC08                SEND TO SITE

OPTION:
  ZXG TEST                SEND TO SITE

INSTALL QUESTIONS:

```



## 24.2 Install File Print Option

The Install File Print option [XPD PRINT INSTALL FILE] prints out the results of an installation, as stored in the INSTALL (#9.7) file. Use this option to check on the status of an installation in progress or to print out the results of a completed installation.

Figure 295: Install File Print Option—Sample Output

```
PACKAGE: ZXG DEMO 1.0                                     PAGE 1
                                                    COMPLETED ELAPSED
-----
STATUS: Install Completed                               DATE LOADED: FEB 07, 2004@07:51:59
NATIONAL PACKAGE:

INSTALL STARTED: FEB 07, 2004@07:52:14                07:52:23          0:00:09

ROUTINES:                                             07:52:15          0:00:01

PRE-INIT CHECK POINTS:
XPD PREINSTALL STARTED                               07:52:15
XPD PREINSTALL COMPLETED                             07:52:15

FILES:
ZXG DEMO                                             07:52:16          0:00:01

PRINT TEMPLATE                                       07:52:17          0:00:03
OPTION                                               07:52:21          0:00:02

POST-INIT CHECK POINTS:
XPD POSTINSTALL STARTED                              07:52:21
XPD POSTINSTALL COMPLETED                            07:52:21

INSTALL QUESTION PROMPT                               ANSWER
XPZ1  Want to DISABLE Scheduled Options, Options and Protocols  NO
MESSAGES:

  Install Started for ZXG DEMO 1.0 :
      Feb 07, 2004@07:52:14

  Installing Routines:
      Feb 07, 2004@07:52:15

  Running Pre-Install Routine: ^ZXGPRE

  Installing Data Dictionaries:
      Feb 07, 2004@07:52:16

  Installing PACKAGE COMPONENTS:

  Installing PRINT TEMPLATE

  Installing OPTION
      Feb 07, 2004@07:52:21

  Running Post-Install Routine: ^ZXGPOS

  Updating Routine file...

  Updating KIDS files...

  ZXG DEMO 1.0 Installed.
```

## 24.3 Edit Install Status Option

The Edit Install Status option [XPD EDIT INSTALL], released with Kernel patch XU\*8.0\*539, lets you edit the STATUS (#.02) and the INSTALL COMPLETE TIME (#17) fields in the INSTALL (#9.7) file. Use this option to change the status of a patch that was de-installed.

**Figure 296: Edit Install Status Option—Sample User Dialogue**

```
Select Utilities Option: EDIT INSTALL <Enter> Status

Select INSTALL NAME: USER TEST
 1  USER TEST 1.0      Install Completed      5/14/08@11:21:04
=> TEST ;Created on May 14, 2008@11:03:58
 2  USER TEST 1.0      Loaded from Distribution      7/8/09@10:33:16
=> TEST ;Created on Jul 08, 2009@10:31:50
CHOOSE 1-2: 1 <Enter> USER TEST 1.0      Install Completed      5/14/08@11:21:04
=> TEST ;Created on May 14, 2008@11:03:58
STATUS: Install Completed// ???
      This is the status of this package at this site.

Choose from:
 0      Loaded from Distribution
 1      Queued for Install
 2      Start of Install
 3      Install Completed
 4      De-Installed
STATUS: Install Completed// <Enter>
INSTALL COMPLETE TIME: MAY 14,2008@11:21:04//
```

## 24.4 Convert Loaded Package for Redistribution Option

Use the Convert Loaded Package for Redistribution option [XPD CONVERT PACKAGE] to add software to an existing distribution.

A KIDS distribution can transport one or more software applications. What if you want to add additional software to an existing distribution? For example, suppose you have a distribution for a software application. Further suppose that patches are transported as individual KIDS software, and you want to add all existing patches to the software's distribution? The Convert Loaded Package for Redistribution option [XPD CONVERT PACKAGE] lets you do this.

In [Figure 297](#) and [Figure 298](#), distributions for a software application (i.e., ZXG 1.0) and a patch (i.e., ZXG\*1.0\*1) are both loaded. The Convert Loaded Package for Redistribution option is used to build a new distribution combining both original distributions.

Follow these steps to create a new distribution from existing distributions:

1. Load the original distributions (there is no need to install them, however).

In this example, we would load the distributions for ZXG 1.0 and ZXG\*1.0\*1 (but we would *not* install them).

2. Use the Convert Loaded Package for Redistribution option. It lets you choose loaded transport globals, and transfers them into a format ready for export. Also, it creates build entries for each software application contained in the distributions. This allows you to create a new distribution containing the transport globals from the existing distributions. Kernel patch XU\*8.0\*44 added

the “Want to make the Transport Globals Permanent? NO//” prompt, answering **YES** to this prompt flags the global so that it is *not* deleted after the transportation. This provides a “Gold” account or library of software and patches that are included in a Transport Global.

In this example, we would first convert the loaded distribution ZXG 1.0 into a form ready to re-distribute:

**Figure 297: Convert Loaded Package for Redistribution—Sample User Dialogue (1 of 2)**

```
Select Utilities Option: CONVERT LOADED PACKAGE FOR REDISTRIBUTION
Select INSTALL NAME: ZXG 1.0 <Enter>          Loaded from Distribution

This distribution was loaded on Feb 28,2004@08:15:05 with header of

It consisted of the following Install(s):
ZXG 1.0

Want to make the Transport Globals Permanent? NO// YES
Want to continue with the conversion of the package(s)? NO// YES
** DONE **

Select Utilities Option:
```

Then we would convert the patch distribution, ZXG\*1.0\*1, into a form ready to re-distribute:

**Figure 298: Convert Loaded Package for Redistribution—Sample User Dialogue (2 of 2)**

```
Select Utilities Option: CONVERT LOADED PACKAGE FOR REDISTRIBUTION
Select INSTALL NAME: ZXG*1.0*1 <Enter>      Loaded from Distribution

This distribution was loaded on Feb 28,2004@08:15:35 with header of

It consisted of the following Install(s):
ZXG*1.0*1

Want to make the Transport Globals Permanent? NO// YES
Want to continue with the conversion of the package(s)? NO// YES
** DONE **
```

3. Create the new distribution with the Transport a Distribution option. Select each build from the original distributions that you want to be part of the new distribution. For each build that you select, you should be told that the transport global already exists and be asked if you want to use this transport global. Answer **YES** in each case to use the current transport global.

Once you have selected all of the builds for the new distribution, go ahead and create the new distribution.

In this example, we create a new distribution containing both ZXG 1.0 (the original software application) and ZXG\*1.0\*1 (an added software application):

**Figure 299: Transport a Distribution—Sample User Dialogue**

```
Select Edits and Distribution Option: TRANSPORT A DISTRIBUTION

Enter the Package Names to be transported. The order in which they are
entered will be the order in which they are installed.

First Package Name: ZXG 1.0 <Enter> **Transport Global exists**
  Use this Transport Global? YES
Another Package Name: ZXG*1.0*1 <Enter> **Transport Global exists**
  Use this Transport Global? YES
Another Package Name: <Enter>

Order
  1  ZXG 1.0      **will use current Transport Global**
  2. ZXG*1.0*1   **will use current Transport Global**

OK to continue? NO//YES

Enter a Host File: ZXG1.KID
Header Comment: PATCHED DISTRIBUTION ZXG 1.0

    ZXG 1.0...
    ZXG*1.0*1...

Package Transported Successfully
```



**NOTE:** Changing a distribution's build entries before redistributing is *not* recommended.

## 24.5 Display Patches for a Package Option

The Display Patches for a Package option [XPD PRINT PACKAGE PATCHES] prints all patches installed for a software application. It displays the Date Installed and who installed the patches. It optionally prints the description of the patch. All the displayed information comes from the PACKAGE (#9.4) file.

Figure 300: Display Patches for a Package Option—Sample User Dialogue

```
Select Utilities Option: DISPLAY PATCHES FOR A PACKAGE
Select PACKAGE NAME: KERNEL
Select VERSION: 8.0// <Enter>          07-29-95
Do you want to see the Descriptions? NO// <Enter>
DEVICE: HOME// <Enter> SYSTEM
```

```
PACKAGE: KERNEL          Oct 09, 2004 1:32 pm          PAGE 1
PATCH #                INSTALLED                      INSTALLED BY
-----
VERSION: 8.0           JUL 29, 2004                      XUUSER,TEN
28                      APR 25, 2004                      XUUSER,NINE
20 SEQ #23             FEB 09, 2004                      XUUSER,NINE
32 SEQ #24             MAY 15, 2004                      XUUSER,NINE
23 SEQ #25             MAY 17, 2004                      XUUSER,TEN
39 SEQ #26             JUL 19, 2004                      XUUSER,ELEVEN
26 SEQ #27             JUN 01, 2004                      XUUSER,TEN
27 SEQ #28             JUN 13, 2004                      XUUSER,NINE
24 SEQ #29             JUN 30, 2004                      XUUSER,TEN
40 SEQ #30             AUG 28, 2004                      XUUSER,ELEVEN
41 SEQ #31             AUG 29, 2004                      XUUSER,TEN
29 SEQ #32             AUG 30, 2004                      XUUSER,NINE
```

## 24.6 Purge Build or Install Files Option

Each KIDS installation adds one entry to the BUILD (#9.6) and INSTALL (#9.7) files for every transport global installed from the distribution. You can use the Purge Build or Install Files option [XPD PURGE FILE] to purge entries in these files.

The first question the option asks is which file to purge, the BUILD (#9.6) or INSTALL (#9.7) file. Choose one of these files.

The next question asked is the number of versions to retain.

### 24.6.1 Versions to Retain

When you choose to retain some number entries for a software application, the option *must* decide which entries are most recent. The Purge Install or Build Files option uses numeric order based on software version number to decide which entries are the most recent. When there are multiple entries for the same version number (e.g., alpha or beta installs took place), the following order of precedence is used:

1. Released Version is the most recent (version number contains no letters, such as 8.0)
2. Beta Test Version (version number contains V, such as 8.0V10)
3. Alpha Test Version (version number contains T, such as 8.0T10)

## 24.6.2 Selecting Software Names for Purging

After versions to retain, the next prompt is “Package Name.” You can enter a partial or full software application name. You continue to be prompted for additional software names until you simply press the <Enter> key without making any further entries at the “Package Name” prompt.

- **Packages (Software)**—To select software entries for purging, at the “Package Name” prompt, enter a partial or full software application name. You can optionally enter partial or full version numbers. The list of candidates for purging contains all entries (excluding patch entries) whose first characters match all characters in the software name that you specify. If you enter “ALL”, all software (but *not* patches) are selected for purging.
- **Patches**—Patches are a special case. To select patch entries for purging, you *must* enter the full namespace of the patch, the full version number, and an asterisk. You can optionally add a partial or full patch number after the asterisk. The list of candidates for purging contain all entries whose first characters match all characters in the string you specify.

**Figure 301: Purge or Install Files Option—Sample User Dialogue**

```
Select Utilities Option: PURGE OR INSTALL FILES

      Select one of the following:

          B          Build
          I          Install

Purge from what file: B
Versions to Retain: (0-100): 1// 0
Package Name: ALL// ZXG
Another Package Name: <Enter> ...

Package(s) in Build file, Don't retain any versions           Page 1
-----
ZXG 1.0
ZXG 2.0
ZXG 3.0

OK to DELETE these entries? NO// YES

Select Utilities Option:
```

## 24.6.3 Purging Selected Entries

Based on the software name you enter and the number of entries you ask to retain, the option lists the software it finds to purge. If you answer **YES** to the “OK to DELETE these entries? NO//” prompt, the option purges the listed entries.

## 24.6.4 Reasons to Retain BUILD and INSTALL File Entries

- **BUILD file**—Entries in the BUILD (#9.6) file are created by the software developers and identify every component in the software. BUILD (#9.6) file entries also contain the checksums for a software application's components. You may want to retain the build entry for the most recent versions of installed software, so that you can verify the checksums of the loaded software against its original checksums.
- **INSTALL file**—Each entry in the INSTALL (#9.7) file contains a record of the installation for a given software application. This information is useful as a record of each installation.

## 24.7 Rollup Patches into a Build Option

The Rollup Patches into a Build option [XPD ROLLUP PATCHES] finds all the patches for a software application and add their individual BUILD (#9.6) file definitions to the software's BUILD (#9.6) file definition. This enables you to create a single BUILD (#9.6) file entry that contains the definition for the patched software.

KIDS checks the BUILD (#9.6) file and lists all KIDS patches with a matching software name and version number. The list of patches is *not* necessarily displayed in patch sequence number.

This list only includes KIDS patches. Also, it does *not* include any pre- or post-install routines. You can use the Edit a Build option to further modify the build and add any additional patches.

**Figure 302: Rollup Patches into a Build Option—Sample User Dialogue**

```
Select Utilities Option:  ROLLUP PATCHES INTO A BUILD

Rollup patches into Build:  KERNEL 8.0T20 <Enter>      KERNEL
This package already contains the following patches:
    XU*8.0T20*4

The following patches can be rolled into Package RON 8.0T20
    XU*8.0T20*5
    XU*8.0T20*6
    XU*8.0T20*7
    XU*8.0T20*8
    XU*8.0T20*11

OK to continue? YES//  <Enter>
...SORRY, HOLD ON.....
.....Done.
```

## 24.8 Update Routine File Option

The Update Routine File option [XPD ROUTINE UPDATE] updates the ROUTINE (#9.8) file to match the routine set stored on the current system.

Ideally, the ROUTINE (#9.8) file would contain an entry for every routine on the current system. However, the ROUTINE (#9.8) file does *not* get updated automatically when routines are added to or deleted from the system. But KIDS needs the ROUTINE (#9.8) file so that it can store the list of routines in a software application as pointers to the ROUTINE (#9.8) file (rather than relying on namespace alone).

Developers should use this option to update the ROUTINE (#9.8) file before editing the routine component in a build entry, to ensure that all the routines they want to include in a software application can be selected by the routines' matching entries in the ROUTINE (#9.8) file.

If you answer **YES** to the question “Want me to clean up the Routine file before updating?”, the option goes through the ROUTINE (#9.8) file and deletes any entries across all namespaces that have no matches with an actual routine on the current system. As of Kernel patch XU\*8.0\*393, however, any routine that has been marked in the CHECKSUM REPORT (#6) field in the ROUTINE (#9.8) file as “National” is *not* deleted during the clean up the Routine File phase of the update.

Then, the Update Routine File option re-populates the ROUTINE (#9.8) file with all routines currently on the system for the namespaces you enter (you can exclude parts of a namespace if you want, as well).

**Figure 303: Update Routine File Option—Sample User Dialogue**

```
Select Utilities Option: UPDATE ROUTINE FILE

Routine Namespace: XU
Routine Namespace: -XUI
Routine Namespace: <Enter>

NAMESPACE   INCLUDE           EXCLUDE
-----
              XU              XUI

OK to continue? YES// <Enter>

Want me to clean up the Routine File before updating? YES// <Enter>
...SORRY, THIS MAY TAKE A FEW MOMENTS...      ...Done.
```

## 24.9 Verify a Build Option

The Verify a Build option [XPD VERIFY BUILD] checks whether a build entry's listed components actually exist on the current system. This is useful for developers who are preparing to create a transport global. They can check that there are actual components on the system matching the components requested in the build entry, in advance of trying to create a transport global. Therefore, developers should use the Verify a Build option *before* creating transport globals from build entries.

For any component in the build entry that does *not* actually exist on the system, the option outputs a one-line message identifying the missing component, with the appellation **\*\*NOT FOUND\*\***. The developer is also prompted with “Do you want to remove the missing Files? NO//”. This allows you to verify if the missing component should in fact be removed from the build. If the missing component is required, the developer should create the missing component for the build entry before creating a transport global.



Figure 304: Verify a Build Option—Sample User Dialogue

```
Select Utilities Option:  VERIFY A BUILD
Select BUILD NAME:      XU*8.0*11 <Enter>      KERNEL
File #8995  ** NOT FOUND **
Do you want to remove the missing Files? NO//  <Enter>

** DONE **

Select Utilities Option:
```

## 24.10 Verify Package Integrity Option

You can use the Verify Package Integrity option [XPD VERIFY INTEGRITY] to compare checksums of software components on the system against the checksums of the components when they were originally transported. Any discrepancies are reported. Currently, routines are the only components that are checked, but checksums are extended to other software components in the future.

The checksums of components for the currently installed software are verified against checksums stored in the BUILD (#9.6) file entry for the software. If the most recent version of the BUILD (#9.6) file entry for a software application has been purged, the Verify Package Integrity option is no longer able to verify checksums for the loaded software. Because of this, in most cases you should *not* purge the most recent build entry for a software application.

As of Kernel patch XU\*8.0\*369, the integrity checking CHECK1^XTSUMBLD routine supports the Compare local/national checksums report option [XU CHECKSUM REPORT].

As of Kernel patch XU\*8.0\*393, KIDS was modified to send a message to a server on FORUM when a KIDS build is sent to a Host File Server (HFS) device. This message contains the checksums for the routines in the patch. The server on FORUM matches the message with a patch if the sending domain is authorized on FORUM. There is no longer a need for developers to manually include routine checksums (either CHECK^XTSUMBLD or CHECK1^XTSUMBLD routines) in the patch description. The patch module includes the before and after CHECK1^XTSUMBLD values in the Routine Information section at the end of the patch document.

With changes in the National Patch Module (NPM) on FORUM, when the patch is released the checksums for the routines are moved to the ROUTINE (#9.8) file on FORUM. The checksum “before” values come from the FORUM ROUTINE (#9.8) file and are considered the GOLD standard for released checksums. The local site’s Compare local/national checksums report option [XU CHECKSUM REPORT] uses the FORUM ROUTINE (#9.8) file as its source to create reports showing any routines that do *not* match.

This patch also modified the KIDS BUILD (#9.6) file by adding the TRANSPORT BUILD NUMBER (#63) field used to store a build number that is incremented each time a build is made. This build number is added to the second line of each routine in the 7th “;” piece. This makes it easy to tell if a site is running the current release during testing and afterward. The leading “B” found in the checksum tells the code what checksum API to use.

# VI. Toolkit

This section provides descriptive information about the set of software utilities furnished by Kernel Version 8.0 and Kernel Toolkit Version 7.3 (a.k.a. “Toolkit”), describing how these tools can be used for the management and definition of development projects.

The major areas of the Kernel Toolkit described in this section are listed below:

- Multi-Term Look-Up (MTLU):

Multi-Term Look-Up (MTLU) utilities provide a method of enhancing the lookup capabilities of associated VA FileMan files. Multi-Term Look-Up (MTLU) is an adaptation of a tool developed by the Indian Health Service (IHS), which was originally made generic by the Albany Office of Information Field Office (OIFO). MTLU does the following:

- Tests ICD diagnosis and procedure codes, CPT codes, and other commonly used references that have been entered in the LOCAL LOOKUP (#8984.4) file. Optionally, terms or phrases can be entered into the LOCAL KEYWORD (#8984.1), LOCAL SHORTCUT (#8984.2), or LOCAL SYNONYM (#8984.3) files.
- Prints a list of shortcuts, keywords, or synonyms from a specified reference file in the LOCAL LOOKUP (#8984.4) file.
- Adds or deletes a reference file from a site’s LOCAL LOOKUP (#8984.4) file.
- Enters new or edit existing shortcuts, keywords, or synonyms to the LOCAL LOOKUP (#8984.4) file.

- Routine Tools:

Routine Tools provide a set of generic tools to aid the VistA development community and system administrators in analysis, writing, and testing of code. These tools are used by VistA developers to support distinct tasks. Routine Tools do the following:

- Promote standard program interfaces.
- Check adherence to programming standards and correct syntax with the XINDEX utility.
- Provide standard error trapping, storing, and reporting.
- Customize and tunes site parameters for local requirements.
- Provide M function libraries.
- Provide a portable routine and global editor.
- Provide a Kermit file transfer utility.
- Provide a Multi-Term Look-Up (MTLU) utility for enhanced VA FileMan lookups.
- Provide software project management utilities.

- Verification Tools:

Verification Tools are a set of generic tools to aid the VistA development community and system administrators in reviewing M code. These tools are used by VistA developers to support distinct tasks. Verification Tools provide the following:

- Tools used for comparison of routines and data dictionaries.
- A tool used to record routine text indicated in the file used to maintain changes in routines.

Where applicable, each major area of Kernel Toolkit is described first in terms of its user interface then in terms of system management implications, showing the menu that can be used to accomplish the task at hand.



**REF:** Kernel and Kernel Toolkit Application Program Interfaces (APIs) are documented in the “Toolkit: Developer Tools” chapter in the *Kernel 8.0 & Kernel Toolkit 7.3 Developer’s Guide*. Kernel and Kernel Toolkit APIs are also available in HTML format at a VA Intranet Website.



**NOTE:** The *Parameter Tools Supplement to Patch Description (Patch XT\*7.3\*26)* explains the functions available with the use of the Parameter Tools, provides information on the Kernel PARAMETERS (#8989.5) file, and describes the associated Application Program Interfaces (APIs).



**REF:** This documentation can be downloaded from the VA Software Document Library (VDL) at: <http://www.va.gov/vdl/application.asp?appID=12>

The following Kernel Toolkit chapters were removed from the “Toolkit” section of this manual because they are superseded by subsequent software and documentation:

- Duplicate Record Merge:

The Kernel Toolkit “Duplicate Record Merge” documentation is superseded by the *Duplicate Record Merge: Patient Merge* software/documentation (i.e., Kernel Toolkit patch XT\*7.3\*23).

The Duplicate Record Merge functionality provides a developer Merge Shell with options that allow users to check data files for duplicate entries and merge those entries if any are found. These options provide functionality to combine duplicate records based on conditions established in customized applications. The Merge Shell was originally developed by Indian Health Service (IHS) to support their Multi-Facility Integration Project.



**REF:** For instructions on how to build a merge capability for a file, see the “Developing a File Merge Capability” section in the *Kernel 8.0 & Kernel Toolkit 7.3 Developer’s Guide* available on the VA Software Document Library (VDL) at: <http://www.va.gov/vdl/application.asp?appid=10>



**REF:** The *Duplicate Record Merge: Patient Merge* documentation is available on the VDL at: <http://www.va.gov/vdl/application.asp?appid=2>

- Capacity Management:

The Kernel Toolkit “Capacity Management” documentation is superseded by the following software/documentation:

- Capacity Management (CM) Tools 3.0
- Resource Usage Monitor (RUM) 2.0
- Statistical Analysis of Global Growth (SAGG) 2.0



**REF:** The Capacity Management-related documentation is available on the VDL at:

- Capacity Management (CM) Tools:  
<http://www.va.gov/vdl/application.asp?appid=129>
- Resource Usage Monitor (RUM):  
<http://www.va.gov/vdl/application.asp?appid=130>
- Statistical Analysis of Global Growth (SAGG):  
<http://www.va.gov/vdl/application.asp?appid=115>

Kernel Toolkit patch XT\*7.3\*102 removed all options, routines, and files associated with the following menus and options:

- VPM VAX/ALPHA Capacity Management ...
- Move Host File to Mailman
- Response Time Log Options ...

The following namespace options and routines are also removed:

- **XUCM\***
- **XUCS\***
- **XURTL\***
- **XTCM DISK2MAIL** (option)
- **XTCMXTCMFILN** (routine)

Data dictionaries and data have been deleted for the following VA FileMan compatible files:

- Global **^XUCM:**
  - CM DAILY STATISTICS (#8986.6)
  - CM DISK DRIVE RAW DATA (#8986.5)
  - CM METRICS (#8986.4)
  - CM NODENAME RAW DATA (#8986.51)
  - CM SITE DISKDRIVES (#8986.35)
  - CM SITE NODENAMES (#8986.3)
  - CM SITE PARAMETERS (#8986.095)
  - VPM RESPONSE TIME DATA (#8986.098)
- Global **^%ZRTL:**
  - RESPONSE TIME (#3.091)
  - RT DATE\_UCI,VOL (#3.092)
  - RT RAWDATA (#3.094)

Data has been deleted for the following *non*-VA FileMan compatible global:

- **^%ZRTL(3)**
- **^%ZRTL("RTH")**



**NOTE to System Managers:** The `^XUCM` and `%ZRTL` globals can be removed from your database after installation of this patch; however, please make sure no local routines access these globals before doing so.

## 25 Multi-Term Look-Up (MTLU)

### 25.1 Overview

This chapter contains an introduction and functional description, site implementation instructions for Multi-Term Look-Up (MTLU), and the option documentation.

### 25.2 Introduction to Multi-Term Look-Up (MTLU)

Many medical information systems depend on the standardized encoding of diagnoses and procedures for reports, searches, and statistics. The ICD DIAGNOSIS (#80), ICD OPERATION/PROCEDURE (#80.1), and CPT (#81) files are among some of the more critical files. The Multi-Term Look-Up utility increases the accessibility of the information in these files by associating user-supplied words or phrases with terms found in a more descriptive, free-text field.

Multi-Term Look-Up allows:

- Local setup of virtually any reference file.
- Modification of the behavior of the “special” lookup by defining shortcuts, synonyms, or keywords.

MTLU integrates with any software that uses a reference file that has been entered into a site’s LOCAL LOOKUP (#8984.4) file.

### 25.3 Functional Description

The Multi-Term Look-Up (MTLU) utility provides a method of enhancing the lookup capabilities of associated software applications. This utility is comprised of the following options:

- The Multi-Term Lookup (MTLU) option [XTLKCLKUP] is used to test ICD diagnosis and procedure codes, CPT codes, and other commonly used references that have been entered in the LOCAL LOOKUP (#8984.4) file. Optionally, terms or phrases may be entered into the LOCAL KEYWORD (#8984.1), LOCAL SHORTCUT (#8984.2) (#8984.1), or LOCAL SYNONYM (#8984.3), files.
- The Print Utility option [XTLKPRTUTL] is used to print a list of shortcuts, keywords, or synonyms from a specified reference file in the LOCAL LOOKUP (#8984.4) file. This list can be sorted alphabetically by name or numerically by code.
- The Delete Entries from Look-Up option [XTLKMODPARK] is used to delete a reference file from a site’s LOCAL LOOKUP (#8984.4) file. This option should be used as a system administrator/developer utility and can only be accessed by holders of the XTLKZMGR security key.
- The Add Entries To Look-Up File option [XTLKMODPARS] is used to add reference files to a site’s LOCAL LOOKUP (#8984.4) file. This option should be used as a system administrator/developer utility and can only be accessed by holders of the XTLKZMGR security key. In order to add entries with this option, **DUZ(0)** must be set to an at-sign (@; Programmer access).

- The Add/Modify Utility option [XTLKMODUTL] is used to enter new or edit existing shortcuts, keywords, or synonyms to the LOCAL LOOKUP (#8984.4) file as described below:
  - The Shortcuts option [XTLKMODSH] is used to enter new or edit existing shortcuts to the LOCAL LOOKUP (#8984.4) file.
  - The Keywords option [XTLKMODKY] is used to enter new or edit existing keywords to the LOCAL LOOKUP (#8984.4) file.
  - The Synonyms option [XTLKMODSY] is used to enter new or edit existing synonyms to the LOCAL LOOKUP (#8984.4) file.

## 25.4 Usage Considerations

MTLU provides users and developers with the ability to perform specialized lookups on database files using standard VA FileMan calls. These files typically comprise a number or “term” in the .01 field and a longer description or definition in some other field.

In the simplest application of MTLU, a special lookup **XTLKDICL** routine is defined in the file’s data dictionary (DD), then a MUMPS cross-reference is applied to the description/definition field. Options are available to fully configure a file for use with MTLU. FileMan is used to create/build the cross-reference. To set the cross-reference, text from the selected field is passed to a tokenizing **XTLKTOKN** routine. Trivial words are filtered by an expanded Key Word In Context (KWIC), and then each remaining token is added to the cross-reference.

To request a lookup, users and developers can pass in words or phrases. Their input is similarly tokenized. However, only terms associated with *all* tokens entered are found. Input can be generalized using partial words or fewer words as well as lexical variants. For example, using the FileMan Inquire to File Entries option on the ICD DIAGNOSIS (#80) file one could first enter “**MALIG**”. MTLU informs the user which terms apply to the search, “MALIG/MALIGNANT”, and that **447** matches are found. To be more specific, the user might enter “**MALIG LIP**” to request all malignancies associated with the lip. In this case, only **12** matches are found. The user can further screen searches by using the grave accent “Not-Sign” ( ` ) before a word or phrase. To request all malignancies of the lip *except* those of the lower lip, one could enter “**MALIG LIP ‘LOWER**” and obtain **10** matches. Though the term “malignancies” may *not* exist in the lookup file, MTLU might still produce a match. When a term contains a suffix that does *not* produce a match, MTLU removes the suffix and continues the search.



**REF:** For more information on the Inquire to File Entries option, see the “Print” chapter in the *VA FileMan User Manual*.

Three additional files are supplied that can dramatically alter the predictable behavior described above. They are checked in the following order against the user's entry:

1. LOCAL SHORTCUT (#8984.2) file: Shortcuts are used to point to a single term. They can be a word or phrase. MTLU checks the user's entry against this file first for an exact match. If found, the lookup displays only the associated entry. A single shortcut *cannot* point to multiple terms.
2. LOCAL SYNONY (#8984.3)M file: Synonyms can be associated with many terms in a file because they can be associated with multiple "tokens" rather than a specific term. For example, CANCER can be defined as a synonym of "MALIG", "TUMOR", and "LEUKEMIA". When the user enters CANCER, the lookup finds *all* terms associated with the three tokens as if each had been entered separately. Compared with the example above, CANCER returns 534 matches. CANCER LIP returns the same 12 matches as MALIG LIP.
3. LOCAL KEYWORD (#8984.1) file: A keyword or phrase can be associated with a single term, much like a shortcut; however, it can also be associated with multiple terms, and multiple keywords can be associated with the same term.

The term SMOKER can be used as a synonym or keyword. As a keyword, one can associate it with a few *specific* diseases. As a synonym, properly selected tokens might result in a display of all smoking-related diseases.

Recall that MALIG results in 447 matches. If this were used as a shortcut to a single entry, MTLU would display only that entry and the remaining 446 would never be displayed.

These files add some control over the behavior of certain lookups. However, developers should use extreme caution when placing entries in these files to ensure that results are predictable and appropriate for both users and other VistA software developers.

The decision to populate them for a given lookup file depends on whether or *not* a commonly used word or phrase results in any matches during a lookup. If *not*, it is a candidate. The LOCAL KEYWORD (#8984.1), LOCAL SHORTCUT (#8984.2), and LOCAL SYNONYM (#8984.3) files should only be populated with common words or phrases.

In the event that a search produces no matches, MTLU continues with a standard FileMan search.

## 25.5 User Interface

### 25.5.1 Multi-Term Look-Up Menu Options

The following is a description of the Multi-Term Lookup Main Menu [XTLKUSER2] which can be selected from the Application Utilities menu [XTMENU]. The options are described in the same order as they appear on the screen:

**Figure 305: Multi-Term Lookup Main Menu Options**

Application Utilities ...	[XTMENU]
Multi-Term Lookup Main Menu ...	[XTLKUSER2]
Multi-Term Lookup (MTLU)	[XTLKLKUP]
Print Utility	[XTLKPRTUTL]
Utilities for MTLU ... <Locked with XTLKZMGR>	[XTLKUTILITIES]
Delete Entries From Look-up <Locked with XTLKZMGR>	[XTLKMODPARK]
ST Add Entries To Look-Up File <Locked with XTLKZMGR>	[XTLKMODPARS]
Add/Modify Utility...	[XTLKMODUTL]

Most MTLU options are described using the following methods:

- Introduction—A detailed description of the option is given. The introduction usually contains any necessary special instructions.
- Process Chart—The step-by-step flow of the option is illustrated, showing the various choices allowed at each prompt.
- Examples—In most cases, there is an example of what might appear on the screen when using the particular option. If the option produces a hardcopy output, an example of the output is usually given.

The phrase “You will be prompted for a device at this step” appears in the process chart when a device is asked for. A Standard Device Chart is shown on the next page. It provides assistance in answering prompts related to device selection.

The MTLU Process Charts do *not* contain documentation of the system’s response to erroneous input. In certain instances, in order to preserve the integrity of previously entered data, the system does *not* allow the entry of a caret (^, sometimes referred to as an up-arrow). This might *not* be documented.



The following chart provides assistance in answering prompts related to device selection:

### 25.5.1.1 Standard Device Chart

**Figure 306: Standard Device Chart**

STEP	AT THIS PROMPT...	IF USER ANSWERS WITH...	THEN STEP
1	DEVICE:	Device name/number from your DEVICE file (#3.5) for report to print on.....3 'Q'UEUE to have report queued to print at a Later date/time.....2 <Enter> for report to Print on your screen.....3 Up-arrow <^>.....6	
2	DEVICE:	Device name/number from your DEVICE file (#3.5) for report to print on.....3 Up-arrow <^>.....6	
3	RIGHT MARGIN: 132//	*<Enter> to accept default, different RIGHT MARGIN Value, or up-arrow <^>.....6  *The next step depends on what you entered in Step 1: Device name/number.....4 "Q".....5 <Enter> (The report appears on your screen).....6	
4	WANT TO FREE UP THIS TERMINAL? NO//	<Enter> to accept default.....6 'Y'ES to free up terminal during report processing and to exit from the system.....5 Up-arrow <^>.....6	
5	REQUESTED TIME TO PRINT: NOW//	*<Enter> to accept default.....6 *Later date/time for report process to begin.....6 Up-arrow <^>.....6  *If <Enter> or later date/time is entered, the following message appears: "REQUEST QUEUED!"	
6	Return to the menu.		

## 25.5.2 Using the Multi-Term Lookup (MTLU) Option

The Multi-Term Lookup (MTLU) option [XTLKLKUP] is used to test the ICD diagnosis and procedure codes, CPT codes, and other commonly used references that have been entered in the LOCAL LOOKUP (#8984.4) file and have been associated with a shortcut, synonym, or keyword.

The system searches for entries in the following order:

1. Shortcut
2. Synonym
3. Keyword

If you are entering a multi-term narrative (phrase), you can enter double spaces between each term to avoid a search of the LOCAL SHORTCUT (#8984.2) file. When searching for a keyword phrase, the system searches for each word in the phrase and then displays all common entries. For example, if the keyword is FRACTURE FEMUR, the system searches for FRACTURE and then FEMUR and displays only those codes with a diagnosis containing both keywords or synonyms of those words.

The following process chart shows the prompts and steps involved in using the Multi-Term Lookup (MTLU) option:

**Figure 307: Multi-Term Lookup (MTLU) Option Process Chart**

STEP	AT THIS PROMPT...	IF USER ANSWERS WITH...	THEN STEP
1	Lookup on which file?:	Name of entry in LOCAL LOOKUP file (#8984.4).....2 <?> for list of entries.....1 <Enter> or up-arrow <^>.....4	
2	NARRATIVE:  If a word, phrase, or symbol is entered that the system cannot identify, the following appears:  "Narrative contained no usable words.  The following word(s) was not used in this search: {word(s)}  Search was unsuccessful."	Existing shortcut, synonym, or keyword.....3	
3	OK? Y//	<Enter> to accept default.....4 'N'O.....4	
4	Return to the menu.		

The following is an example of what might appear on your screen when using the Multi-Term Lookup (MTLU) option:

**Figure 308: Multi-Term Lookup (MTLU) Option—Sample User Entries**

```
Lookup on which file?: ICD DIAGNOSIS
```

```
NARRATIVE: DIABETES MELLITUS  
( DIABETES|DIABETIC MELLITUS )  
.....
```

```
The following 3 matches were found:
```

- 1: 250.00 (250.00)  
DIABETES UNCOMPL ADULT/NIDDM
- 2: 250.40 (250.40)  
DIAB RENAL MANIF ADULT/NIDDM
- 3: 775.0 (775.0)  
INFANT DIABET MOTHER SYN

```
Select 1-3: 2
```

### 25.5.3 Using the Print Utility Option

The Print Utility option [XTLKPRUTL] is used to print a list of shortcuts, keywords, or synonyms from a specified reference file in the LOCAL LOOKUP (#8984.4) file. Both the shortcut and keyword lists can be sorted alphabetically by name or numerically by code. The synonym list, however, only prints alphabetically.

Since these lists can be long and the generation time consuming, it is suggested you queue the report to a device during off hours.

The following process chart shows the prompts and steps involved in using the Print Utility option:

**Figure 309: Print Utility Option Process Chart**

STEP	AT THIS PROMPT...	IF USER ANSWERS WITH...	THEN STEP
1	Select one of the following:  SH       Shortcuts KE       Keyword SY       Synonyms  Print which file?:	SH for Shortcuts..... KE for Keywords..... SY for Synonym.....	2 2 3
2	Select one of the following:  A        Alphabetic C        Code  Sort By?:	'A'lphabetic..... 'C'ode.....	3 3
3	Print {Shortcuts, Keywords, or Synonyms} for which file?:	Name of entry in LOCAL LOOKUP file (#8984.4)..... <?> for list of entries..... <Enter> or up-arrow <^>.....	4 3 5
4	You will be prompted for a device at this step.....		1
5	Return to the menu.		

The following is an example of what might appear on your screen when using the Print Utility option (an example of the output generated by this option is provided following the computer dialogue):

**Figure 310: Print Utility Option—Sample User Entries and Sample Output**

```

Select one of the following:

    SH      Shortcuts
    KE      Keywords
    SY      Synonyms

Print which file?: SH <Enter> Shortcuts

Select one of the following:

    A      Alphabetic
    C      Code

Sort By?: A <Enter> lphabetic

Print Shortcuts for which file?: CPT
DEVICE:HOME// <Enter>    RIGHT MARGIN: 80// <Enter>

```

**Sample output.**

```

Shortcuts of the CPT file sorted by Name          NOV 23, 1994  13:36  PAGE 1
FREQUENTLY USED NARRATIVE                        ENTRY
-----
DREAM                                           01200
NIGHT                                           02400
SLEEP                                           01100

```

## 25.5.4 Using the Utilities for MTLU Option

The following is a list of the options and their descriptions that comprise the Utilities for MTLU menu [XTLKUTILITIES]. This option can only be accessed by holders of the XTLKZMGR security key:

- The Delete Entries From Look-Up option [XTLKMODPARK] deletes entries from the LOCAL LOOKUP (#8984.4) file. In order to do this, there *cannot* be any shortcuts, synonyms, or keywords associated with the file to be deleted. This option should be used as a system administrator/developer utility and can only be accessed by holders of the XTLKZMGR security key.
- The Add Entries To Look-Up File option [XTLKMODPARS] sets entries in the LOCAL LOOKUP (#8984.4) file. This option should be used as a system administrator/developer utility and can only be accessed by holders of the XTLKZMGR security key. In order to add entries with this option, **DUZ(0)** *must* be set to an at-sign (@; Programmer access).
- The Add/Modify Utility option [XTLKMODUTL] is used to make or edit entries in the LOCAL KEYWORD (#8984.1), LOCAL SHORTCUT (#8984.2), and LOCAL SYNONYM (#8984.3) files.

### 25.5.4.1 Delete Entries from Look-Up Option

The Delete Entries From Look-Up option [XTLKMODPARK] is used to delete a reference file from a site's LOCAL LOOKUP (#8984.4) file.

All shortcuts, synonyms, and keywords associated with the reference file you wish to delete *must* be canceled before you attempt to delete the file.

It should be noted that when a reference file is **KILLED** through this option, all variable pointers from the LOCAL KEYWORD (#8984.1) and LOCAL SHORTCUT (#8984.2) files are deleted. The special lookup routine for the file is also deleted.

Only holders of the XTLKZMGR security key, can access this option.



**NOTE:** Due to the brevity of this option, no process chart has been provided.

The following is an example of what might appear on your screen when using the Delete Entries From Look-Up option:

**Figure 311: Delete Entries From Look-Up Option—Sample User Entries**

```
Select LOCAL LOOKUP NAME: PROCEDURE MODIFIERS
Are you sure you want to delete PROCEDURE MODIFIERS? YES
Deleting from Local Lookup file.....
Deleting variable pointers from Local Keyword and Shortcut files.
Deleting special lookup routine from PROCEDURE MODIFIERS DD.
```

### 25.5.4.2 Add Entries To Look-Up File Option

The Add Entries To Look-Up File option [XTLKMODPARS] is used to add/edit reference files to a site's LOCAL LOOKUP (#8984.4) file. Examples of files that a site might wish to enter in their LOCAL LOOKUP (#8984.4) file include: ICD DIAGNOSIS (#80), ICD OPERATION/PROCEDURE (#80.1), and CPT (#81).

Only holders of the XTLKZMGR security key, can access this option. In order to add entries with this option, **DUZ(0)** *must* be set to an at-sign (@; Programmer access).

The process chart below shows the prompts and steps involved in using the Add Entries To Look-Up File option:

**Figure 312: Add Entries To Look-Up File Option Process Chart (1 of 2)**

STEP	AT THIS PROMPT...	IF USER ANSWERS WITH...	THEN STEP
1	Select LOCAL LOOKUP NAME:	Name of new reference file you wish to enter in LOCAL LOOKUP (#8984.4) file.....2 <?> for file list.....1 Name of existing file.....8 <Enter> or up-arrow <^>.....12	
2	ARE YOU ADDING {reference file name} AS A NEW LOCAL LOOKUP (THE nTH)?	'Y'ES.....3 'N'O.....1	
3	LOCAL LOOKUP NAME: {reference file name}//	<Enter> to accept default.....4 Other file name.....4	
4	LOCAL LOOKUP DISPLAY PROTOCOL:	Entry point for routine to determine the display format.....5 <Enter> to accept the internal default display format.....5	
<p>If the entry made at this step is not the same as the cross reference in the description field of the file, the software still functions, but it only uses the keywords entered in the LOCAL LOOKUP (#8984.4) file.</p>			

\*Required field

**Figure 313: Add Entries To Look-Up File Option Process Chart (2 of 2)**

<u>STEP</u>	<u>AT THIS PROMPT...</u>	<u>IF USER ANSWERS WITH...</u>	<u>THEN STEP</u>
* 5	INDEX:	Cross reference to be used to create new key-words.....	6
	NOTE: The following message is displayed :		
	"...Ok, will now setup KEYWORD and SHORTCUT file DD's to allow terms for {reference file name} entries..."		
* 6	PREFIX: M//:	Letter(s) to be used to identify a variable pointer.....	7
7	The following reminder message is displayed:		
	<REMINDER> Using 'Edit File', set the lookup routine, XTLKDICL, in {reference file name} DD .....		1
	The selected file is displayed.		
8	...OK? YES//	<Enter> to accept default 'N'O.....	9
			1
9	LOCAL LOOKUP NAME: {reference file name}//	<Enter> to accept default Correct file name.....	10
			10
10	LOCAL LOOKUP DISPLAY PROTOCOL: {protocol}//	<Enter> to accept default Correct entry point for routine to set display format.....	11
		<Enter> (no default) to accept the internal Default display format.....	11
			11
11	INDEX: {index}//	<Enter> to accept default correct cross reference to be used to create new Keywords.....	12
			12
12	Return to the menu.		

\*Required field



[Figure 314](#) is an example of what might appear on your screen when using the Add Entries To Look-Up File option:

**Figure 314: Add Entries To Look-Up File Option—Sample User Entries**

```
Select LOCAL LOOKUP NAME: PROCEDURE MODIFIERS
  ARE YOU ADDING 'PROCEDURE MODIFIERS' AS A NEW LOCAL LOOKUP (THE 4th)? Y <Enter>
(YES)
  LOCAL LOOKUP NAME: PROCEDURE MODIFIERS// <Enter>
  LOCAL LOOKUP DISPLAY PROTOCOL: <Enter>
INDEX: AIHS
...Ok, will now setup KEYWORD and SHORTCUT file DD's
  to allow terms for 'PROCEDURE MODIFIERS' entries...
PREFIX: M// <Enter>
  <REMINDER> Using 'Edit File', set the lookup routine, XTLKDICL, in PROCEDURE
MODIFIERS DD
Select LOCAL LOOKUP NAME: <Enter>
```

### 25.5.4.3 Add/Modify Utility Option

The Add/Modify Utility option [XTLKMOUTL] is used to enter new or edit existing shortcuts, keywords, or synonyms to the LOCAL LOOKUP (#8984.4) file.

A shortcut is a word or phrase which recognizes one specific code or procedure. If you are adding a shortcut whose text duplicates the first part of an existing entry, you *must* enclose the new shortcut word or phrase in double quotes to prevent the system from matching it to existing terms.

A keyword is a word or phrase which corresponds to several related codes or procedures. Keywords are typically terms commonly used to describe a clinical entity. Entering a series of keywords separated by single spaces results in all of the keywords being added to the specified code.

A synonym is a word entered to expand the lookup capability of an existing term or terms in the LOCAL LOOKUP (#8984.4) file. Synonyms would be used in cases where several words within the text of codes or procedures have the same diagnostic meaning (e.g., CANCER and MALIGNANCY). A synonym can be entered for an existing keyword or for a word in the diagnostic description or procedure (e.g., the term CANCER might be matched to the synonyms MALIGNANCY, LEUKEMIA, and CARCINOMA). When CANCER is referenced in the Multi-Term Lookup (MTLU) option, it recognizes all the codes and descriptions associated with MALIGNANCY, LEUKEMIA, and CARCINOMA.



**NOTE:** A synonym replaces the original word in the lookup process; therefore, to retain the original word in the search, it *must* be matched to itself as well as to other synonyms.

Words used as a shortcut should never be repeated as synonyms or keywords. Since the system searches for shortcuts first and stops when one is found, it cannot find duplicated words in the LOCAL SYNONYM (#8984.3) or LOCAL KEYWORD (#8984.1) files. Since searching all files for each word is time consuming, the search is done in this order so as to speed up the search process.

Since the add/modify functions for Shortcuts, Keywords, and Synonyms are considered separate options, a process chart for each is provided. The charts on the following pages show the prompts and steps involved in using the following options:

**Figure 315: Add/Modify Utility Menu Options**

```
Select Add/Modify Utility Option: ??

      SH Shortcuts                               [ XTLKMODSH ]
      KE Keywords                                [ XTLKMODKY ]
      SY Synonyms                                [ XTLKMODSY ]
```

The Shortcuts option [XTLKMODSH], one of the three selections within the Add/Modify Utility option, is described below.

The following process chart shows the prompts and steps involved in using the Add/Modify Utility option when adding or editing a shortcut:

**Figure 316: Add/Modify Utility Option—Shortcuts Process Chart (1 of 2)**

<u>STEP</u>	<u>AT THIS PROMPT...</u>	<u>IF USER ANSWERS WITH...</u>	<u>THEN STEP</u>
1	SH Shortcuts KE Keywords SY Synonyms  Select Add/Modify Utility Option:	SH for Shortcuts..... <Enter> or up-arrow <^>.....	2 11
2	Additions/Modifications to Shortcuts in which file?	Name of entry in local reference file..... <?> for list of entries..... <Enter>.....	3 2 1
3	Select LOCAL SHORTCUT FREQUENTLY USED NARRATIVE:	New text you wish to use as a shortcut..... Existing shortcut term..... <Enter>.....	4 8 1
4	ARE YOU ADDING {'text'} AS A NEW LOCAL SHORTCUT?  An at-sign (@) entered at this step deletes the entire entry.	'Y'ES..... 'N'O or <Enter>.....	5 3
5	LOCAL SHORTCUT FREQUENTLY USED NARRATIVE: {shortcut}//	<Enter> to accept default..... Other text.....	6 6
6	LOCAL SHORTCUT ENTRY:	Name or number of entry in LOCAL LOOKUP file (#8984.4) you wish your shortcut to reference.....	7

**Figure 317: Add/Modify Utility Option—Shortcuts Process Chart (2 of 2)**

<u>STEP</u>	<u>AT THIS PROMPT...</u>	<u>IF USER ANSWERS WITH...</u>	<u>THEN STEP</u>
7	If the selected number/name corresponds to more than one entry, they are shown and you are prompted to choose one. If there is only one corresponding entry, it is displayed and the following appears:  "...OK? YES//	<Enter> to accept default.....2 'N'O.....6	
8	LOCAL SHORTCUT FREQUENTLY USED NARRATIVE:{shortcut}//	<Enter> to accept default.....9 Correct shortcut term.....9	
9	LOCAL SHORTCUT ENTRY: {code}//	<Enter> to accept default.....2 Correct code.....10	
	The selected code is displayed.		
10	...OK? YES//	<Enter> to accept default.....2 'N'O.....9	
11	Return to the menu.		

The Keywords option [XTLKMODKY], one of the three selections within the Add/Modify Utility option, is described below.

The following process chart shows the prompts and steps involved in using the Add/Modify Utility option when adding or editing a keyword:

**Figure 318: Add/Modify Utility Option—Keywords Process Chart**

<u>STEP</u>	<u>AT THIS PROMPT...</u>	<u>IF USER ANSWERS WITH...</u>	<u>THEN STEP</u>
1	SH Shortcuts KE Keywords SY Synonyms  Select Add/Modify Utility Option:	KE for Keywords..... <Enter> or up-arrow <^>.....	2 7
2	Additions/Modifications to Keywords in which file?	Name of entry in local reference file..... <?> for list of entries..... <Enter>.....	3 2 1
3	Which code in the {file name} file?	Code for which you wish to enter a keyword.....	4
4	Select LOCAL KEYWORD NAME:	New text you wish to use as a keyword..... Existing keyword term..... <Enter>.....	5 6 1
5	ARE YOU ADDING {'text'} AS A NEW LOCAL KEYWORD?	'Y'ES..... 'N'O or <Enter>.....	6 1
	An at-sign (@) entered at this step deletes the entire entry.		
6	LOCAL KEYWORD NAME: {keyword}//	<Enter> to accept default..... Correct keyword term.....	2 2
7	Return to the menu.		

The Synonyms option [XTLKMODSY], one of the three selections within the Add/Modify Utility option, is described below.

The following process chart shows the prompts and steps involved in using the Add/Modify Utility option when adding or editing a synonym:

**Figure 319: Add/Modify Utility Option—Adding or Editing a Synonym Process Chart (1 of 2)**

<u>STEP</u>	<u>AT THIS PROMPT...</u>	<u>IF USER ANSWERS WITH...</u>	<u>THEN STEP</u>
1	SH Shortcuts KE Keywords SY Synonyms  Select Add/Modify Utility Option:	SY for Synonyms.....2 <Enter> or up-arrow <^>.....9	
2	Additions/Modifications to Synonyms in which file?	Name of entry in local reference file.....3 <?> for list of entries.....2 <Enter>.....1	
The entry made at this step must be in all upper case letters.			
3	Select LOCAL SYNONYM TERM:	New text you wish to use as a synonym.....4 Existing synonym term.....7 <Enter>.....1	
4	ARE YOU ADDING {'text'} AS A NEW LOCAL SYNONYM?	'Y'ES.....5 'N'O.....3	
An at-sign (@) entered at this step deletes the entire entry.			
5	LOCAL SYNONYM TERM: {synonym}//	<Enter> to accept default.....6 Other text.....6	
6	LOCAL SYNONYM Select SYNONYM:	Existing term in LOCAL LOOKUP file (#8984.4) for which you are entering a synonym.....2	

**Figure 320: Add/Modify Utility Option—Adding or Editing a Synonym Process Chart (2 of 2)**

<u>STEP</u>	<u>AT THIS PROMPT...</u>	<u>IF USER ANSWERS WITH...</u>	<u>THEN STEP</u>
7	TERM: {term entered at Step 3}//	<Enter> to accept default.....8 Correct synonym term.....8	
	The entry made at this step must be in all upper case letters.		
8	Select SYNONYM: {term synonym was entered for}//	<Enter> to accept default.....2 Correct term.....2	
9	Return to the menu.		

## 25.5.5 Examples

The following are examples of what might appear on your screen when using the Add/Modify Utility option. The first example is for a new shortcut entry, the second example shows a new keyword entry, and the third shows the editing of an existing synonym entry.

### 25.5.5.1 Example 1

Illustration of a new Shortcut entry.

**Figure 321: Shortcut Option—Sample User Entries**

```

SH      Shortcuts
KE      Keywords
SY      Synonyms

Select Add/Modify Utility Option: SH <Enter> Shortcuts

Additions/Modifications to Shortcuts in which file? CPT

Select LOCAL SHORTCUT FREQUENTLY USED NARRATIVE: COUGH
ARE YOU ADDING 'COUGH' AS A NEW LOCAL SHORTCUT? Y <Enter> (YES)
LOCAL SHORTCUT FREQUENTLY USED NARRATIVE: COUGH// <Enter>
LOCAL SHORTCUT ENTRY: 31659

Searching for a CPT 31659          BRONCHOSCOPIC PROCEDURES
...OK? YES// <Enter> (YES)

```

### 25.5.5.2 Example 2

Illustration of a new Keyword entry.

Figure 322: Keyword Option—Sample User Entries

```
SH      Shortcuts
KE      Keywords
SY      Synonyms

Select Add/Modify Utility Option: KE <Enter> Keywords

Additions/Modifications to Keywords in which file?: CPT

Which code in the CPT file?: 11044 <Enter> CLEANSING TISSUE/MUSCLE/BONE
Select LOCAL KEYWORD NAME: TISSUE SKIN
ARE YOU ADDING 'TISSUE SKIN' AS A NEW LOCAL KEYWORD? Y <Enter> (YES)
LOCAL KEYWORD NAME: TISSUE SKIN// <Enter>
```

### 25.5.5.3 Example 3

Illustration of editing an existing Synonym entry.

Figure 323: Synonym Option—Sample User Entries

```
SH      Shortcuts
KE      Keywords
SY      Synonyms

Select Add/Modify Utility Option: SY <Enter> Synonyms

Additions/Modifications to Synonyms in which file?: CPT

Select LOCAL SYNONYM TERM: SLEEP
TERM: SLEEP// <Enter>
Select SYNONYM: DREAM// NIGHT
```

## 25.6 Systems Management

### 25.6.1 Implementation of Multi-Term Look-Up (MTLU)

This is how a user would configure a new file to be used with MTLU. The file you select would typically contain a free text field that more completely describes the record entry. Users would then use a cross-reference on this text field to perform lookups. MTLU is distinguished from FileMan in that users can enter a narrative or phrase, rather than a single term. The cross-reference can be either a VA FileMan Key Word In Context (KWIC) cross-reference, or you can create a custom MUMPS cross-reference that calls the routine, ^XTLKWIC (shown in [Figure 324](#)). The ICD DIAGNOSIS (#80) file is used as an example.



**REF:** Multi-Term Look-Up (MTLU) Application Programming Interfaces (APIs) are documented in the “Toolkit: Developer Tools” chapter in the *Kernel 8.0 & Kernel Toolkit 7.3 Developer’s Guide*. Kernel and Kernel Toolkit APIs are also available in HTML format at a VA Intranet Website.

Once you are in VA FileMan, do the following:

**Figure 324: VA FileMan Utility Functions Option—Sample User Entries**

```
Select OPTION: UTILITY FUNCTIONS
Select UTILITY OPTION: CROSS-REFERENCE A FIELD

MODIFY WHAT FILE: ICD DIAGNOSIS// <Enter> ICD DIAGNOSIS
(12535 entries)
Select FIELD: DESCRIPTION

CURRENT CROSS-REFERENCE IS MUMPS 'D' INDEX OF FILE
CHOOSE E (EDIT)/D (DELETE)/C (CREATE): C
WANT TO CREATE A NEW CROSS-REFERENCE FOR THIS FIELD? NO// Y <Enter> (YES)
CROSS-REFERENCE NUMBER: 2// <Enter>
Select TYPE OF INDEXING: REGULAR// MUMPS
WANT CROSS-REFERENCE TO BE USED FOR LOOKUP AS WELL AS FOR SORTING? YES// N <Enter>
(NO)
SET STATEMENT: S %="^ICD9("AIHS",I,DA)" D S^XTLKWIC
KILL STATEMENT: S %="^ICD9("AIHS",I,DA)" D K^XTLKWIC
INDEX: AC// AIHS
...

NO-DELETION MESSAGE: <Enter>
DESCRIPTION: <Enter>
Edit? NO// <Enter>

DO YOU WANT TO CROSS-REFERENCE EXISTING DATA NOW? YES// Y <Enter> (YES)
...EXCUSE ME, THIS MAY TAKE A FEW MOMENTS...
```



Figure 325: Add Entries To Look-Up File—Sample User Entries

```
>D ^XUP

Setting up programmer environment
Terminal Type set to: C-VT100

Select OPTION NAME: APP <Enter> LOCATION UTILITIES XTMENU Application
Utilities

Multi-Term Lookup Main Menu ...

Select Application Utilities Option: MULTI <Enter> -Term Lookup Main Menu

Multi-Term Lookup (MTLU)
Print Utility
Utilities for MTLU ...

Select Multi-Term Lookup Main Menu Option: UTIL <Enter> ities for MTLU

KL Delete Entries From Look-up
ST Add Entries To Look-Up File
Add/Modify Utility ...

Select Utilities for MTLU Option: ST <Enter> Add Entries To Look-Up File
Select LOCAL LOOKUP NAME: ICD DIAGNOSIS
ARE YOU ADDING 'ICD DIAGNOSIS' AS A NEW LOCAL LOOKUP (THE 3RD)? Y <Enter> (YES)
LOCAL LOOKUP NAME: ICD DIAGNOSIS// <Enter>
LOCAL LOOKUP DISPLAY PROTOCOL: DSPLYD^XTLKKWLD
INDEX: AIHS
...Ok, will now setup KEYWORD and SHORTCUT file DD's
to allow terms for 'ICD DIAGNOSIS' entries...
PREFIX: M// ?
Answer must be a unique prefix, 1-10 characters in length

Enter the "Variable Pointer" prefix.

PREFIX: M// D
<REMINDER> Using 'Edit File', set the lookup routine, XTLKDICL, in ICD
DIAGNOSIS DD
Select LOCAL LOOKUP NAME: <Enter>
```

If *all* references to a file (by all packages) are to behave as MTLU lookups, add the special lookup routine, **^XTLKDICL**, to the file's DD using the FileMan Edit File option.



**REF:** For more information on the Edit File option, see the “File Utilities” chapter in the *VA FileMan Advanced User Manual*.

**Figure 326: VA FileMan Edit File Option—Sample User Entries**

```
VAH,MTL>D Q^DI

VA FileMan 20.0

Select OPTION: UT <Enter> ILITY FUNCTIONS
Select UTILITY OPTION: ED <Enter> IT FILE

MODIFY WHAT FILE: ICD DIAGNOSIS// <Enter>
NAME: ICD DIAGNOSIS// <Enter>
DESCRIPTION: <Enter>
    1>Contains all valid ICD diagnosis codes.
EDIT Option: <Enter>
Select APPLICATION GROUP: <Enter>
PROGRAMMER: <Enter>
VERSION: 9// <Enter>
DATA DICTIONARY ACCESS: <Enter>
READ ACCESS: <Enter>
WRITE ACCESS: <Enter>
DELETE ACCESS: <Enter>
LAYGO ACCESS: <Enter>
AUDIT ACCESS: <Enter>
DD AUDIT? NO// <Enter>

ASK 'OK' WHEN LOOKING UP AN ENTRY? YES// <Enter> (YES)
POST-SELECTION ACTION: <Enter>
LOOK-UP PROGRAM: XTLKDICL
CROSS-REFERENCE ROUTINE: <Enter>

Select UTILITY OPTION: <Enter>
```



**NOTE:** The developer might elect to use MTLU only in selected instances. This is accomplished by *not* adding the special lookup routine to the file's DD. After the file has been added to the LOCAL LOOKUP (#8984.4) file, you can make a developer call to LKUP^XTLKMGR.



**REF:** Multi-Term Look-Up (MTLU) Application Programming Interfaces (APIs) are documented in the “Toolkit: Developer Tools” chapter in the *Kernel 8.0 & Kernel Toolkit 7.3 Developer's Guide*. Kernel and Kernel Toolkit APIs are also available in HTML format at a VA Intranet Website.

## 26 Parameter Tools

### 26.1 Introduction

This section describes the Parameter Tools released with Kernel Toolkit Patch XT\*7.3\*26. It explains the functions available with the use of the Parameter Tools, as well as providing additional explanatory material and a generic example to illustrate the use of the Parameter Tools.

Parameter Tools was designed as a method of managing the definition, assignment, and retrieval of parameters for VistA software applications. A parameter can be defined for various levels at which you want to allow the parameter described (e.g., software level, system level, division level, location level, user level).



**REF:** For a list and description of the Parameter Tools (XPAR) application programming interfaces (APIs), see the “Toolkit—Parameter Tools” section in the *Kernel and Kernel toolkit Developer’s Guide*.

### 26.2 Background

VistA software applications are designed to be used in a variety of ways. Many aspects of site activity vary from one site to another, and thus, there are many possible ways software applications can be used that also vary from one institution to another. Each site has its own requirements—its own settings for each software application. System managers *must* modify the software parameters to fit their requirements.

Previously, each software application had its own files and options but no two software applications had the site parameters set up the same way or found in the same place. Thus, when a new software application was released, each site would have to look for the location where the settings were stored for that software. Next, they would have to look to see what settings were available and how to set them. Very little about the parameters was uniform from software to software.

With the Computerized Patient Record System (CPRS) software, the idea was born that a parameter file could be created to export with the software. The CPRS parameter file and parameter utility were subsequently modified to create a generic method of exporting and installing other VistA software applications. Most developers were willing to abandon previous methods and use this tool for software they were developing.

Whenever you have an entity with many attributes that apply to it, you can do either of the following:

- Make one big relation to represent that entity.
- Create a "binary" relation to represent the entity. The relation consists of two columns (thus the term binary), one representing the attribute and the other representing the value for that attribute. So, each tuple (i.e., a data type/data object containing two or more components) of the relation represents a single attribute and its associated value.



**NOTE:** This works only when the individual attributes are independent observations (have no dependencies on anything other than the key that identifies the entity). Such a relation tends to look a lot like a Windows INI file.

Most of the VistA parameter files were very long lists of independent values that pertained to a single entity. In most cases, this entity was the site or system on which the software was running [similar to an INI file]. In other cases, however, the parameter files had multiples that made things more complex. These multiples generally allow parameters to be defined at levels more specific than the site (e.g., by divisions or hospital location). It seems best to accommodate this by using both an entity identifier and parameter together to name any given value. This yields a relation with a compound key:

Entity | Parameter = Value

Finally, it seems that multiple-valued parameters (e.g., collection times) occur often enough that it is worthwhile to add a field to identify the parameter instance. So the relation becomes:

Entity | Parameter | Instance = Value

This is the relation that the PARAMETERS (#8989.5) file is intended to represent.

Software parameter files frequently maintain parameters that apply to the site, a division, or a location. In addition, many parameters that apply to individual users are kept in the NEW PERSON (#200) file. Also, many parameter values are hard-coded in individual software routines for the case when the site has *not* set up a value for a given parameter. Entity, then, is implemented as a variable pointer.

A given parameter may occur for a variety of entities. In fact, we frequently need to obtain the value of a parameter by following an entity "chain." For example, the Add Orders menu a CPRS user sees may be defined at various levels. Initially, a site generally creates a custom Add Orders menu. Later, hospital locations may each build a custom menu that more specifically meets their needs. Individual users may also have their own Add Orders menus. If no site configuration has been done, the Add Orders menu exported with OE/RR is used. So, when OE/RR needs to display an Add Orders menu, a chain is followed that looks first to see if the user has their own menu. Next, the current location is checked, followed by the site. Finally, if no values exist, the software default menu is used.

In the PARAMETER DEFINITION (#8989.51) file, a multiple lists which entities are valid with a given parameter. These entities are also assigned a precedence, so that it is possible to write functions that will "chain" through entities until a value is found, using the proper sequence.

## 26.3 Description

Patch XT\*7.3\*26 contains a developer toolset that allows creation of software parameters in a central location. Integration Agreements (IAs) 2263 and 2336 define the supported entry points for this application. Kernel Patch XU\*8.0\*201 allows KIDS to transport the parameters.

Parameter Tools is a generic method of handling parameter definition, assignment, and retrieval. A parameter can be defined for various entities where an entity is the level at which you want to allow the parameter defined (e.g., software level, system level, division level, location level, user level, etc.). A developer can then determine in which order the values assigned to given entities are interpreted.

## 26.4 Definitions

The following are some basic definitions used by Parameter Tools:

- [Entity](#)
- [Parameter](#)
- [Instance](#)
- [Value](#)
- [Parameter Template](#)

## 26.4.1 Entity

An entity is a level at which you can define a parameter. The entities allowed are stored in the PARAMETER ENTITY (#8989.518) file. Kernel Toolkit patches maintain entries in this file. [Table 52](#) lists the allowable parameter entries:

**Table 52: Parameter Entities**

Entity Prefix	Message	Points To File
PKG	Package	PACKAGE (#9.4)
SYS	System	DOMAIN (#4.2)
DIV	Division	INSTITUTION (#4)
SRV	Service	SERVICE/SECTION (#49)
LOC	Location	HOSPITAL LOCATION (#44)
TEA	Team	TEAM (#404.51)
CLS	Class	USR CLASS (#8930)
USR	User	NEW PERSON (#200)
BED	Room-Bed	ROOM-BED (#405.4)
OTL	Team (OE/RR)	OE/RR LIST (#100.21)
DEV	Device	DEVICE (#3.5)

Package (PKG), as an entity, allows the software defaults to be handled the same way as other parameters rather than hard-coded.

System (SYS), Division (DIV), Location (LOC), and User (USR) are frequent entries in existing software parameter files (or additions to the NEW PERSON [#200] file).

Service (SRV), Team (TEA), and Class (CLS) are referenced frequently by parameters that pertain to Notifications.

The process of exporting software using this kind of parameters file involves sending:

- Parameter definitions that belong to the software (entries in the PARAMETER DEFINITION [#8989.51] file).
- Actual parameter instances that point to the software (entries in the PARAMETERS [#8989.5] file that have an entity that matches the software).

All the other entries in the PARAMETERS (#8989.5) file (those that correspond to entities other than package [PKG]) would never be exported, as they are only valid for the system on which they reside.

## 26.4.2 Parameter

A parameter is the actual name under which values are stored. The name of the parameter *must* be:

- Namespaced
- Unique and start with two uppercase characters

Parameters can be defined to store the typical software parameter data (e.g., the default add order screen in OE/RR), but they can also be used to store graphical user interface (GUI) application screen settings a user has selected (e.g., font or window width). With each parameter, a more readable display name can

also be defined. When a parameter is defined, the entities that may set that parameter are also defined. The definition of parameters is stored in the PARAMETER DEFINITION (#8989.51) file.

### 26.4.3 Instance

An instance is a unique value assigned to an entity/parameter combination. For most parameters, there will only be one instance, that is, instance does *not* apply and is simply set to **1**.

However, a parameter can be multi-valued—it can have more than one instance. More than one value can be assigned to the parameter as it relates to a specific entity. For example, lab collection times at a division. For a single entity (division in this case), multiple collection times may exist. Each collection time would be assigned a unique instance.

A parameter is *not* considered multi-valued if it can apply to several entities, but for each entity only one value of the parameter exists. For example, "maximum days for a lab order" can be set for every location in the hospital. However, since there is only one value for each location, "maximum days for a lab order" is *not* multi-valued.

When a parameter that is multi-valued is defined, the instance can be defined as any of the following:

- Numeric
- Date/Time
- Pointer
- Set Of Codes
- Free Text
- Yes/No

The validating logic for an instance is defined the same way as for a value.

### 26.4.4 Value

A value can be assigned to every parameter for the entities allowed in the parameter definition. Values are stored in the PARAMETERS (#8989.5) file. Fields in the PARAMETERS (#8989.5) file map to DIR fields. DIR is used to validate the data. Values can be any of the following:

- Numeric
- Date/Time
- Pointer
- Set Of Codes
- Free Text
- Yes/No
- Word-processing Type

### 26.4.5 Parameter Template

A Parameter template is similar to an Input template. It contains a list of parameters that can be entered through an input session (e.g., an option). Templates are stored in the PARAMETER TEMPLATE (#8989.52) file. Entries in this file *must* also be namespaced.

[Table 53](#) lists the two Input templates for adding parameter definitions:

**Table 53: Templates—Parameter Tools**

Template	Description
XPAR SINGLE VALUED CREATE	For adding/editing parameters that will be single valued
XPAR MULTI VALUED CREATE	For adding/editing parameters that will be multiple valued

## 26.5 Why Use Parameter Tools?

The reason a developer would use Parameter Tools is to allow a hierarchical designation of a parameter value. Thus, rather than many parameters that exist now, which are just for the system level or just for a particular clinic, Parameter Tools allows you to define:

- Different levels at which the parameter can be set.
- In what priority the values are used.

Take, for example, setting up a default order menu for a person. Each facility may have a default order menu for their primary care clinicians. Each division may have one that is slightly different if their practices vary enough. For each location, they may set up a different order menu so that users working in a cardiology clinic get a different set of possible orders than those in a dermatology clinic. And there may be reasons to give one specific person a different order menu because they are authorized to prescribe additional medications, because they tend to practice in a different flow, or for other reasons. It's one parameter, but it allows the parameter to be set for multiple entities (at multiple levels). Those entities are defined in the IA, but can include package (PKG, which only developers should set—these are default export values), system (SYS, whole medical facility), division (DIV), location (LOC), room-bed (BED), team (TEA), provider, etc.

The PARAMETER DEFINITION (#8989.51) file defines what entities are allowed to be used for a parameter and in which order they are resolved (individual takes precedence over location takes precedence over division takes precedence over system which takes precedence over package). Sometimes you would want to create defaults for your medical center, but allow users in a certain area to customize what they see and do for their particular role.

XPAR finds the appropriate value based on the parameter definitions and settings that may exist. This way, the developer does *not* need to look at multiple different location or person files to determine how the software should operate.

With integrations, this is even more important because it allows facilities to integrate; however, at the same time, continue some business practices based on parameters set at the division level rather than at the system level.

## 26.6 General Parameter Tools Menu

The General Parameters Tools menu [XPAR MENU TOOLS], which is located on the Programmer Options menu [XUPROG; locked with the XUPROG security key], provides general purpose options for managing and editing parameters.

**Figure 327: General Parameters Tools Menu [XPAR MENU TOOLS]**

```
Select Programmer Options <TEST ACCOUNT> Option: General Parameter Tools

LV      List Values for a Selected Parameter           [XPAR LIST BY PARAM]
LE      List Values for a Selected Entity             [XPAR LIST BY ENTITY]
LP      List Values for a Selected Package            [XPAR LIST BY PACKAGE]
LT      List Values for a Selected Template          [XPAR LIST BY TEMPLATE]
EP      Edit Parameter Values                        [XPAR EDIT PARAMETER]
ET      Edit Parameter Values with Template          [XPAR EDIT BY TEMPLATE]
EK      Edit Parameter Definition Keyword            [XPAR EDIT KEYWORD]
```

### 26.6.1 List Values for a Selected Parameter Option

The List Values for a Selected Parameter option [XPAR LIST BY PARAM] prompts the user for a parameter defined in the PARAMETER DEFINITION (#8989.51) file, and lists all value instances for that parameter.

The synonym for this option is “LV.”

**Figure 328: List Values for a Selected Parameter Option—Sample User Entries and Report**

```
Select General Parameter Tools <TEST ACCOUNT> Option: LV <EDnter> List Values for a
Selected Parameter
Select PARAMETER DEFINITION NAME: XUSC1 <Enter> DEBUG Set Debug mode for XUSC1

Values for XUSC1 DEBUG

Parameter                Instance                Value
-----
SYS: XXX.FO-TEST.MED.VA.GOV 1      Enabled
SYS: XXY.FO-TEST.MED.VA.GOV 1      Enabled

Type <Enter> to continue or '^' to exit:
```

### 26.6.2 List Values for a Selected Entity Option

The List Values for a Selected Entity option [XPAR LIST BY ENTITY] prompts the user for the entry of an entity (e.g., location, user, etc.), and lists all value instances for that entity.

The synonym for this option is “LE.”



**Figure 329: List Values for a Selected Entity Option—Sample User Entries**

```
Select General Parameter Tools <TEST ACCOUNT> Option: LE <Enter> List Values for a
Selected Entity

Entities may be set for the following:

    10 User          USR    [choose from NEW PERSON]
    20 Team          TEA    [choose from ]
    30 Class          CLS    [choose from ]
    40 Location       LOC    [choose from HOSPITAL LOCATION]
    50 Service        SRV    [choose from SERVICE/SECTION]
    60 Division       DIV    [choose from INSTITUTION]
    70 System         SYS    [XXX.FO-TEST.MED.VA.GOV]
    80 Package        PKG    [choose from PACKAGE]
    90 Room-Bed       BED    [choose from ROOM-BED]
    100 Team (OE/RR) OTL    [choose from OR TEST]
    110 Device        DEV    [choose from DEVICE]

Enter selection: 10 <Enter> User NEW PERSON
Select NEW PERSON NAME: XUSER,ONE <Enter> XUSER,ONE      OEX      TECHNICAL
WRITER
```

**Figure 330: List Values for a Selected Entity Option—Sample Report**

```
Values for USR: XUSER,ONE

Parameter                                Instance      Value
-----
KMPD GUI OPTION GLOBAL LIST              1             2
KMPD GUI OPTION ERROR LIST               1             2
KMPD GUI OPTION ROUTINE SEARCH           1             2
KMPD GUI OPTION LOOKUPS                   1             1
KMPD GUI OPTION CODE STATS                1             2
KMPD GUI OPTION CODE EVALUATOR           1             2
KMPD GUI OPTION TIMING MONITOR            1             2
KMPD GUI OPTION ENVIRON CHECK             1             2
KMPD GUI OPTION TOOLS PARAMS              1             2
KMPD GUI OPTION ENVIRON SELECT            1             SAGG
KMPD GUI OPTION RPT                       1             2~1

Type <Enter> to continue or '^' to exit:
```

### 26.6.3 List Values for a Selected Package Option

The List Values for a Selected Package option [XPAR LIST BY PACKAGE] prompts the user for a package and lists all parameter values for the selected package.

The synonym for this option is “**LP.**”

**Figure 331: List Values for a Selected Package Option—Sample User Entries and Report**

```
Select General Parameter Tools <TEST ACCOUNT> Option: LP <Enter> List Values for a
Selected Package
Select PACKAGE NAME: KERNEL <Enter> XU

Values for PKG: KERNEL

Parameter                               Instance                               Value
-----
XPAR TEST SET OF CODES                   1                                       Red
XUSNPI QUALIFIED IDENTIFIER              Individual_ID                           VA(200,
XUSNPI QUALIFIED IDENTIFIER              Organization_ID                          DIC(4,
XUSNPI QUALIFIED IDENTIFIER              Pharmacy_ID                             PS(59,
XUSNPI QUALIFIED IDENTIFIER              Test_ID                                 TEST

Type <Enter> to continue or '^' to exit:
```

## 26.6.4 List Values for a Selected Template Option

The List Values for a Selected Template option [XPAR LIST BY TEMPLATE] prompts the user for a parameter template. Depending on the definition of the template, additional information may be prompted for, and then the parameter values defined by the template are displayed.

The synonym for this option is “LT.”

**Figure 332: List Values for a Selected Template Option—Sample User Entries and Report**

```
Select General Parameter Tools <TEST ACCOUNT> Option: LT <Enter> List Values for a
Selected Template
Select PARAMETER TEMPLATE NAME: OEX
  1 OEX TEST                               TEMPLATE FOR OEX TEST
  2 OEX TEST2                             TEMPLATE FOR OEX TEST2
  3 OEX TEST3                             TEMPLATE FOR OEX TEST3
CHOOSE 1-3: 1 <Enter> OEX TEST TEMPLATE FOR OEX TEST
Select INSTITUTION NAME: 13TH & MISSION <Enter> CA D 662BU
Are you adding -1 as a new Instance? Yes// <Enter> YES

TEMPLATE FOR OEX TEST for Division: 13TH & MISSION, -1
-----
THIS IS OEX TEST
-----
Type <Enter> to continue or '^' to exit:
```

## 26.6.5 Edit Parameter Values Option

The Edit Parameter Values option [XPAR EDIT PARAMETER] calls the low level parameter editor, which allows you to edit the values for every parameter. Normally, packages supply other means of editing parameters.

The synonym for this option is “EP.”

**Figure 333: Edit Parameter Values Option—Sample User Entries**

```
Select General Parameter Tools <TEST ACCOUNT> Option: EP <Enter> Edit Parameter
Values
          --- Edit Parameter Values ---

Select PARAMETER DEFINITION NAME: XUSC1 <Enter> DEBUG Set Debug mode for XUSC1

----- Setting XUSC1 DEBUG for System: XXX.FO-TEST.MED.VA.GOV -----
Value: Enabled// ?

Enter a code from the list.

      Select one of the following:

          0      Disabled
          1      Enabled

Value: Enabled// <Enter>
-----

Select PARAMETER DEFINITION NAME:
```

## 26.6.6 Edit Parameter Values with Template Option

The Edit Parameter Values with Template option [XPAR EDIT BY TEMPLATE] prompts the user for a parameter template, and then uses the selected template to edit parameter values.

The synonym for this option is “ET.”

## 26.6.7 Edit Parameter Definition Keyword Option

The Edit Parameter Definition Keyword option [XPAR EDIT KEYWORD] allows a user to edit the keyword field in the PARAMETER DEFINITION (#8989.51) file.

The synonym for this option is “EK.”

**Figure 334: Edit Parameter Definition Keyword Option—Sample User Entries**

```
Select General Parameter Tools <TEST ACCOUNT> Option: EK <Enter> Edit Parameter
Definition Keyword

Select PARAMETER DEFINITION NAME: XUSC1 <Enter> DEBUG Set Debug mode for XUSC1
Select KEYWORD: DEVELOPER// ??
DEVELOPER

      You may enter a new KEYWORD, if you wish
      This field provides a list of KEYWORDS that can be used for lookup of
      Parameter definitions. It is suggested that each entry only have
      one word.

Select KEYWORD: DEVELOPER// DEBUG
Are you adding 'DEBUG' as a new KEYWORD? No// Y <Enter> (Yes)
Select KEYWORD: <Enter>

Select PARAMETER DEFINITION NAME:
```

## 26.7 Example

The following is a simple example of a way you might use the Parameter Tools. Suppose you needed a parameter that could be set as a default for the system (account) and also overridden for a given user. Previously, you had to add a field to a software site file (e.g., the KERNEL SYSTEM PARAMETERS [#8989.3] file) and then add a similar field to the NEW PERSON (#200) file. This situation is a perfect use of the Parameter Tools.

1. You need the equivalent to a data dictionary (DD) entry. [Figure 335](#) goes into the PARAMETER DEFINITION (#8989.51) file. In this case, you need a **Yes/No** Set of Codes. So, this is what you set up:

**Figure 335: Setting Up the PARAMETER DEFINITION (#8989.51) File**

```
Name: XUS-XUP VPE
DISPLAY TEXT: Drop into VPE
MULTIPLE VALUED: n <Enter> No
VALUE DATA TYPE: y <Enter> yes/no
VALUE HELP: Should XUP drop the user into the VPE environment?
Description...
PRECEDENCE: 1          ENTITY FILE: USER
PRECEDENCE: 2          ENTITY FILE: SYSTEM
```



**NOTE:** [Figure 335](#) only shows the fields with the data necessary to set up the PARAMETER DEFINITION (#8989.51) file.

[Figure 335](#) lists the order that values are looked for and returned. You want a USER value (File #200) if there is one; otherwise a SYSTEM value (File #4.2). It also gives the entities that are allowed to have values of this data. In the place of SYSTEM, you could have used PACKAGE.

2. You can use ^XPAREDIT to enter a value for your new parameter:

**Figure 336: Use ^XPAREDIT to Enter Value for New Parameter**

```
>D ^XPAREDIT

      --- Edit Parameter Values ---

Select PARAMETER DEFINITION NAME: XUS-XUP VPE <Enter> Drop into VPE

XUS-XUP VPE may be set for the following:

      1  User          USR      [choose from NEW PERSON]
      2  System        SYS      [NXT.KERNEL.ISC-SF.VA.GOV]

Enter selection: 2 <Enter> System  NXT.KERNEL.ISC-SF.VA.GOV

----- Setting XUS-XUP VPE for System: NXT.KERNEL.ISC-SF.VA.GOV -----
Value: NO
...
```

### 3. How do you get this value out in your VistA application?

**Figure 337: Get Value of New Parameter for VistA Application**

```
>S X=$$GET^XPAR("USR^SYS","XUS-XUP VPE",1,"Q") ;X will be null, 0 or 1.
```

- First Parameter—Value from **USR** (user / New Person) or **SYS** (system)
- Second Parameter—Name of the parameter: "**XUS-XUP VPE**"
- Third Parameter—Number of Instances. In this example, you only allow one instance (optional, defaults to 1 if *not* passed).
- Fourth Parameter—Format to return: Use "**Q**" to get the internal value.

Adding the parameter template with VA FileMan, [Figure 338](#):

**Figure 338: Adding a Sample Parameter Template**

```
Select PARAMETER DEFINITION NAME: XUS-XUP VPE <Enter> Drop into VPE
NAME: XUS-XUP VPE// <Enter>
DISPLAY TEXT: Drop into VPE// <Enter>
MULTIPLE VALUED: No// <Enter>
INSTANCE TERM: <Enter>
VALUE TERM: <Enter>
PROHIBIT EDITING: <Enter>
VALUE DATA TYPE: yes/no// <Enter>
VALUE DOMAIN: <Enter>
VALUE HELP: Should XUP drop the user into the VPE environment.
VALUE VALIDATION CODE: <Enter>
VALUE SCREEN CODE: <Enter>
INSTANCE DATA TYPE: <Enter>
INSTANCE DOMAIN: <Enter>
INSTANCE HELP: <Enter>
INSTANCE VALIDATION CODE: <Enter>
INSTANCE SCREEN CODE: <Enter>
DESCRIPTION:
  1> This parameter controls if a user when exiting XUP is dropped into
  2> VPE or right to the ">" prompt.
EDIT Option: <Enter>
Select PRECEDENCE: 2// <Enter>
PRECEDENCE: 2// <Enter>
ENTITY FILE: SYSTEM// <Enter>
Select PRECEDENCE: <Enter>
```

## Glossary

Term	Definition
Alpha Testing	In VA terminology, Alpha testing is when a VistA test software application is running in a site's account.
Auto Menu	An indication to Menu Manager that the current user's menu items should be displayed automatically. When AUTO MENU is <i>not</i> in effect, the user <i>must</i> enter a question mark at the menu's select prompt to see the list of menu items.
Beta Testing	In VA terminology, Beta testing is when a VistA test software application is running in a Production account.
Capacity Management	The process of assessing a system's capacity and evaluating its efficiency relative to workload in an attempt to optimize system performance. Kernel provides several utilities.
Checksum	A numeric value that is the result of a mathematical computation involving the characters of a routine or file.
Cipher	A system that arbitrarily represents each character as one or more other characters. (See also: ENCRYPTION.)
Common Menu	Options that are available to all users. Entering two question marks (??) at the menu's select prompt displays any SECONDARY MENU OPTIONS available to the signed-on user along with the common options available to all users.
Compiled Menu System (^XUTL Global)	Job-specific information that is kept on each CPU so that it is readily available during the user's session. It is stored in the ^XUTL global, which is maintained by the menu system to hold commonly referenced information. The user's place within the menu trees is stored, for example, to enable navigation via menu jumping.
Computed Field	This field takes data from other fields and performs a predetermined mathematical function (e.g., adding two columns together). You do <i>not</i> , however, see the results of the mathematical function on the screen. Only when you are printing or displaying information on the screen do you see the results for this type of field.
DEA	Drug Enforcement Administration.
Device Handler	The Kernel module that provides a mechanism for accessing peripherals and using them in controlled ways (e.g., user access to printers or other output devices).
DIFROM	VA FileMan utility that gathers all software components and changes them into routines ( <b>namespacel*</b> routines) so that they can be exported and installed in another VA FileMan environment.
Double Quote (")	A symbol used in front of a Common option's menu text or synonym to select it from the Common menu. For example, the five character string <b>"TBOX</b> selects the User's Toolbox Common option.

Term	Definition
DR String	The set of characters used to define the <b>DR</b> variable when calling VA FileMan. Since a series of parameters may be included within quotes as a literal string, the variable's definition is often called the <b>DR</b> string. To define the fields within an edit sequence, for example, the developer may specify the fields using a <b>DR</b> string rather than an INPUT template.
DUZ(0)	A local variable that holds the FILE MANAGER ACCESS CODE (#3) field of the signed-on user.
Encryption	Scrambling data or messages with a cipher or code so that they are unreadable without a secret key. In some cases encryption algorithms are one directional, that is, they only encode and the resulting data <i>cannot</i> be unscrambled (e.g., Access and Verify codes).
EPCS	Drug Enforcement Administration (DEA) Electronic-Prescribing of Controlled Substances (ePCS).
File Access Security System	Formerly known as Part 3 of the Kernel Inits. If the File Access Security conversion has been run, file-level security for VA FileMan files is controlled by Kernel's File Access Security system, <i>not</i> by VA FileMan Access codes (i.e., FILE MANAGER ACCESS CODE [#3] field in the NEW PERSON [#200] file).
Forced Queuing	A device attribute indicating that the device can only accept queued tasks. If a job is sent for foreground processing, the device rejects it and prompt the user to queue the task instead.
Go-Home Jump	A menu jump that returns the user to the primary menu presented at signon. It is specified by entering two carets (^ ^) at the menu's select prompt. It resembles the "Rubber-band Jump" but <i>without</i> an option specification/name following the carets.
Help Processor	A Kernel module that provides a system for creating and displaying online documentation. It is integrated within the menu system so that help frames associated with options can be displayed with a standard query at the menu's select prompt.
Host File Server (HFS)	A procedure available on layered systems whereby a file on the host system can be identified to receive output. It is implemented by the Device Handler's HFS device type.
INIT	Initialization of an software application. <b>INIT*</b> routines are built by VA FileMan's DIFROM and, when run, recreate a set of files and other software components.
Jump	In VistA applications, the Jump command allows you to go from a particular field within an option to another field within that same option. You can also Jump from one menu option to another menu option without having to respond to all the prompts in between. To jump, type a caret (^) and then type the name of the field or option to which you wish to jump. (See also GO-HOME JUMP, PHANTOM JUMP, RUBBER-BAND JUMP, or UP-ARROW JUMP.)

Term	Definition
Jump Start	A logon procedure whereby the user enters the "Access code;Verify code;option" to go immediately to the target option, indicated by its menu text or synonym. The jump syntax can be used to reach an option within the menu trees by entering "accesscode;verifycode;option".
Kermit	A standard file transfer protocol. It is supported by Kernel and can be set up as an alternate editor.
Manager Account	A UCI that holds vendor shared routines.
Menu Cycle	The process of first visiting a menu option by picking it from a menu's list of choices and then returning to the menu's select prompt. Menu Manager keeps track of information (e.g., the user's place in the menu trees) according to the completion of a cycle through the menu system.
Menu Manager	The Kernel module that controls the presentation of user activities (e.g., menu choices or options). Information about each user's menu choices is stored in the Compiled Menu System, the <b>^XUTL</b> global, for easy and efficient access.
Menu System	The overall Menu Manager logic as it functions within the Kernel framework.
Menu Template	An association of options as pathway specifications to reach one or more final destination options. The final options <i>must</i> be executable activities and <i>not</i> merely menus for the template to function. Any user can define user-specific MENU templates via the corresponding Common option.
Menu Trees	The menu system's hierarchical tree-like structures that can be traversed or navigated, like pathways, to give users easy access to various options.
PAC	<b>Programmer Access Code</b> . An optional user attribute that can function as a second level password into programmer mode.
Part 3 of the Kernel Init	See FILE ACCESS SECURITY SYSTEM.
Pattern Match	A preset formula used to test strings of data. Refer to your system's M Language Manuals for information on Pattern Match operations.
Phantom Jump	Menu jumping in the background. Used by the menu system to check menu pathway restrictions.
Primary Menus	The list of options presented at signon. Each user <i>must</i> have a PRIMARY MENU OPTION in order to sign on and reach Menu Manager. Users are given primary menus by system administrators. This menu should include most of the computing activities the user needs.
Programmer Access	Privilege to become a developer on the system and work outside many of the security controls of Kernel. Accessing programmer mode from Kernel's menus requires having the at-sign security code (@), which sets the variable <b>DUZ(0)=@</b> .
Protocol	An entry in the PROTOCOL (#101) file. Used by the Order Entry/Results Reporting (OE/RR) software to support the ordering of medical tests and other activities. Kernel includes several protocol-type options for enhanced menu displays within the OE/RR software.



Term	Definition
Queuing	Requesting that a job be processed in the background rather than in the foreground within the current session. Kernel's TaskMan module handles the queuing of tasks.
Queuing Required	An option attribute that specifies that the option <i>must</i> be processed by TaskMan (the option can only be queued). The option can be invoked and the job prepared for processing, but the output can only be generated during the specified time periods.
Resource	A method that enables sequential processing of tasks. The processing is accomplished with a RES device type designed by the application developer and implemented by system administrators. The process is controlled via the RESOURCE (#3.54) file.
Rubber-Band Jump	A menu jump used to go out to an option and then return, in a bouncing motion. The syntax of the jump is two carets (^ ^, uppercase-6 on most keyboards) followed by an option's menu text or synonym (e.g., ^ ^Print Option File). If the two carets are <i>not</i> followed by an option specification, the user is returned to the primary menu. (See also: GO-HOME JUMP.)
Scheduling Options	A way of ordering TaskMan to run an option at a designated time with a specified rescheduling frequency (e.g., once per week).
Scroll/No Scroll	The <b>Scroll/No Scroll</b> button (also called Hold Screen) allows the user to "stop" (No Scroll) the terminal screen when large amounts of data are displayed too fast to read and "restart" (Scroll) when the user wishes to continue.
Secondary Menu Options	Options assigned to individual users to tailor their menu choices. If a user needs a few options in addition to those available on the primary menu, the options can be assigned as secondary options. To facilitate menu jumping, secondary menus should be specific activities, <i>not</i> elaborate and deep menu trees.
Secure Menu Delegation (SMD)	A controlled system whereby menus and security keys can be allocated by people other than system administrators (e.g., application coordinators) who have been so authorized. SMD is a part of Menu Manager.
Server Option	An entry in the OPTION (#19) File. An automated mail protocol that is activated by sending a message to the server with the "S.server" syntax. A server option's activity is specified in the OPTION (#19) File and can be the running of a routine or the placement of data into a file.
Signon/Security	The Kernel module that regulates access to the menu system. It performs a number of checks to determine whether access can be permitted at a particular time. A log of signons is maintained.
Special Queueing	An option attribute indicating that TaskMan should automatically run the option whenever the system reboots.

Term	Definition
Spooler	An entry in the DEVICE (#3.5) file. It uses the associated operating system's spool facility, whether it's a global, device, or host file. Kernel manages spooling so that the underlying OS mechanism is transparent. In any environment, the same method can be used to send output to the spooler. Kernel subsequently transfers the text to a global for subsequent despooling (printing).
Synonym	A field in the OPTION (#19) File. Options can be selected by their menu text or synonym. (See also: MENU TEXT.)
TaskMan	The Kernel module that schedules and processes background tasks (also called Task Manager).
Timed Read	The amount of time Kernel waits for a user response to an interactive <b>READ</b> command before starting to halt the process.
Up-Arrow Jump	In the menu system, entering a caret (^; sometimes referred to as an up-arrow) followed by an option specification/name accomplishes a jump to the target option without needing to take the usual steps through the menu pathway.
XINDEX	A Kernel utility used to verify routines and other M code associated with a software application. Checking is done according to current ANSI MUMPS standards and VistA programming standards. This tool can be invoked through an option or from direct mode (> <b>D ^XINDEX</b> ).
Z Editor (^%Z)	A Kernel tool used to edit routines or globals. It can be invoked with an option, or from direct mode after loading a routine with > <b>X ^%Z</b> .
Zosf Global (^%ZOSF)	The Operating System File—a manager account global distributed with Kernel to provide an interface between VistA software and the underlying operating system. This global is built during Kernel installation when running the manager setup routine ( <b>ZTMGRSET</b> ). The nodes of the global are filled-in with operating system-specific code to enable interaction with the operating system. Nodes in the ^%ZOSF global can be referenced by VistA application developers so that separate versions of the software need <i>not</i> be written for each operating system.



**REF:** For a list of commonly used terms and definitions, see the OIT Master Glossary VA Intranet Website.

For a list of commonly used acronyms, see the VA Acronym Lookup Intranet Website.

## Index

### \$

- \$\$Cache2() Algorithm**, 264
- \$\$TEST^DDBRT API**, 231
- \$HOROLOG Variable**, 280, 299
- \$I (#1) Field**
  - DEVICE (#3.5) File, 199, 212, 227
- \$I Field**
  - DEVICE (#3.5) File, 198, 201, 212, 215, 216, 219, 227, 234, 235, 236, 238, 302, 304
- \$STACK Variable**, 187
- \$ZC Calls**, 189

### ^

- ^%ZIS("14.5","LOGON","volume set") Node**, 24
- ^XTER Direct Mode Utility**, 188
- ^XTERPUR Direct Mode Utility**, 188
- ^XTLKDICL Routine**, 346, 366
- ^XTLKWIC Routine**, 363
- ^ZTMON Direct Mode Utility**, 282

### 2

- 2-Factor Authentication (2FA)**, 1, 4, 6, 16, 23, 44, 47, 51, 62, 63, 118, 119

### A

- Abnormal Signoff and Error Handling**, 9
- Abort**
  - KIDS Installations, 327
  - Recovering From KIDS Installations, 327
  - Restarting Aborted KIDS Installations, 327
- ACADEMIC AFFILIATION WAIVER (#13) Field**, 45
- Academic Afiliation Waiver**, 45
- ACCESS CODE (#2) Field**, 35
- ACCESS CODE Field**, 35
- Access Codes**, 4, 5, 6, 7, 8, 9, 16, 17, 21, 26, 34, 35, 43, 44, 46, 52, 53, 61, 68, 179, 209
  - Assigning, 25
  - Log, 53
  - Old, 53
  - Purging, 53

- ACCESSIBLE FILE (#32) Multiple Field**, 54, 55, 60, 65, 66, 68, 69
- Acronyms**
  - Intranet Website, 382
- Acting as a Delegate**
  - User Interface, 153
- Action Prompt**
  - Monitor Taskman, 282
- Actions**
  - USE AS LINK FOR MENU ITEMS, 315, 323
- Active Directory**, 1
- Actual Usage of Alpha/Beta Test Options Option**, 330
- Add a New User Option**, 26
- Add a New User to the System Option**, 25, 26
- Add DEA ePCS Utility Users**, 82
- Add Entries To Look-Up File Option**, 353, 354
  - Example, 357
  - Multi-Term Look-Up (MTLU), 345
- Add Error Screens Option**, 186
- Add/Modify Utility Option**, 353, 357
  - Multi-Term Lookup (MTLU), 346
  - Multi-Term Look-Up (MTLU) Examples, 362
- Adding Explicit File Access for System Administrators**, 66
- Adding New Users**, 25
  - Add a New User to the System Option, 25
  - Grant Access by Profile, 26
  - Grant Access by Profile Option, 26
  - NEW PERSON IDENTIFIERS, 25
  - Primary Menu, 25
  - Security Forms, 26
  - SSN (#9) Field
    - NEW PERSON (#200) File, 25, 26
    - XUMGR Security Key, 25, 26
    - XUSPF200 Security Key, 25
- Additional Attributes Editable by Users**, 42
- After the File Access Security Conversion**, 70
- AGENCY (#4.11) File**, 21
- AGENCY CODE (#9) Field**, 21, 62
- AGENCY Field**, 21
- AK Cross-reference**, 150
- ALERT (#8992) File**, 166, 167, 168, 169, 170
- ALERT CRITICAL TEXT (#8992.3) File**, 162
- ALERT DATE/TIME (#.01) Multiple Field**, 170
- Alert Management Menu**, 165, 167

ALERT TRACKING (#8992.1) File, 164, 166, 167, 169, 170

Alerts, 10, 162

- Critical, 162
- Deleting, 164
- Forwarding, 165
- Make an Alert on the Fly Option, 168
- Processing, 162
- Purging, 167, 168
- Reports, 168, 169, 170, 171
- Surrogates, 165, 167
- System Management, 166
- User Interface, 162

Alerts - Set/Remove Surrogate for User Option, 167

Algorithms

- \$\$Cache2()**, 264
- Parsing, 34

All Keys a User Needs Option, 149

All your tasks Option, 276

Allocate/De-Allocate of PSDRPH Key Option, 93, 113

Allocating

- Security Keys, 148

Allocation of Security Keys Option, 82, 148, 149, 159

Allow other users access to spool documents Option, 222

ALLOWED TO USE SPOOLER (#41) Field, 38, 225

Alpha/Beta Test Option Usage Menu, 131, 330

Alpha/Beta Tracking

- Sending a Summary Message, 330

Alpha/Beta Tracking (KIDS), 330

Altering Exported Menus, 135

ALTERNATE EDITOR (#1.2) File, 37

Alternate Syntax for Device Specification, 196

ALWAYS SHOW SECONDARIES (#200.11) Field, 39

ALWAYS SHOW SECONDARIES Field, 134

Answerback Message, 20

Answering Installation Questions for Transport Globals in a Distribution (KIDS), 314

AOLD Cross-reference, 53

APIs

- \$\$TEST^DDBRT**, 231
- ^%ZTLOAD**, 245, 246, 303
- ^%ZTLOAD API**, 235
- ^DIE**, 57
- ^XUP**, 231
- DIC**, 57
- DIE**, 57
- DQ^%ZTLOAD**, 303
- ENABLE^XUFILE3 Routine**, 69
- ERR^ZU**, 185
- GETENV^%ZOSV API**, 254
- LKUP^XTLKMGR**, 366
- PATIENT^XQALERT**, 166
- REQ^%ZTLOAD**, 303
- TaskMan, 245
- USER^XQALERT**, 166

APPLICATION PROXY, 47

Application Utilities Menu, 347

ASK DEVICE TYPE AT SIGN-ON (#200.05) Field, 12

ASK DEVICE TYPE AT SIGN-ON Field, 9, 10, 20, 21

ASK DEVICE TYPE AT SIGN-ON Field (3200.05), 38

ASK HFS I/O OPERATION (#5.2) Field

DEVICE (#3.5) File, 218

ASK HOST FILE (#5.1) Field

DEVICE (#3.5) File, 218

ASK PARAMETERS (#5) Field

DEVICE (#3.5) File, 200, 211

ASK PARAMETERS Field

DEVICE (#3.5) File, 218

Assign Editors Option, 183

Assign the XU EPCS EDIT DATA Option, 84

Assign the XUEPCSEdit Security Key, 82

Assign the XUSSPKI UPN SET Option, 87

Assigning

- Access Codes, 21, 25
- Display Order, 130
- File Number Ranges, 38
- Help Frame Editors, 183
- Options, 154
- Secondary Menus, 134

Assumptions, xliii

Attributes

- Editable by Users, 42
- Users, 16, 25, 26, 34

AUDIT (#1.1) File, 60

**AUDIT Access**, 54, 56, 57, 59, 60

Audit Features Menu, 131

AUDIT LOG FOR OPTIONS (#19.081) File, 131, 172, 175

Audited Options Purge Option, 131

Audits

- Failed Access Attempts, 52
- Option Use, 131
- Signon, 51

Authentication  
 2-Factor Authentication (2FA), 1, 4, 6, 16, 23,  
 44, 47, 51, 62, 63, 118, 119  
 AUTO DESPOOL (#31) Field  
 DEVICE (#3.5) File, 227  
 AUTO MENU (#.06) Field, 62  
 AUTO MENU (#200.06) Field, 13, 38, 130  
 AUTO MENU Field, 22, 121  
 Auto Print Mode, 237  
 Auto-despooling, 223, 227  
 AUTO-GENERATE ACCESS CODES Field,  
 21  
 Automatic Deactivation of Users Option, 44, 45  
 Automatically  
 Deactivating Users, 44

## B

B Cross-references, 301  
 BACK SPACE (#4)  
 FieldTERMINAL TYPE (#3.2) File, 233  
 BACK SPACE (#4) Field  
 TERMINAL TYPE (#3.2) File, 210  
 Background, 367  
 Background Jobs  
 TaskMan  
 User Interface, 240  
 Backing Up Transport Globals (KIDS), 322  
 Backup a Transport Global Option, 322  
 Backup Reviewer for Unprocessed Alerts, 170  
 BALANCE State, 264  
 TaskMan, 305  
 Benefits  
 DEA ePCS Utility, 76  
 Block Count Utility, 183  
 BOX-VOLUME PAIR (#.01) Field, 254, 255  
 BOX-VOLUME PAIR Field, 263  
 Broker Security Enhancement (BSE), 51  
 Browse a Spool Document Option, 222  
 Browser Device, 229  
 Storing Host Files in a Specific Directory, 231  
 System Management, 231  
 User Interface, 229  
 BROWSER Device, 207, 229  
 BROWSER Type, 231  
 BSE, 51  
 BUILD (#9.6) File, 308, 311, 319, 324, 329,  
 337, 339, 341  
 Purging, 337  
 Build a New Menu Option, 155, 161  
 Build Entries and the BUILD (#9.6) File, 311

Build Entry  
 Components, 340  
 Definition, 308  
 Build File Print Option, 332  
 Build Primary Menu Trees Option, 140  
 Building Options, 156  
 BULLETIN (#3.6) File, 174, 178  
 Bulletins  
 Server Request, 172, 173, 174, 175, 178, 179  
 XQSERVER, 174, 178  
 XUSSPKI SAN, 115  
 BYPASS DEVICE LOCK-OUT Field, 17

## C

Caché  
 Systems  
 DCL Context, 267  
 VAX ENVIRONMENT FOR DCL (#9)  
 Field, 256  
 Cache/VMS DCL Context Setup, 267  
 Callout Boxes, xlii  
 Calls  
 \$ZC, 189  
 CAN DELETE WITHOUT PROCESSING (#.1)  
 Field, 168  
 CAN MAKE INTO A MAIL MESSAGE  
 (#41.2) Field, 38, 225  
 Can Server Requests Be Denied?, 172  
 Change my Division Option, 11  
 Change user's allocated keys to delegated keys  
 Option, 149  
 Changes in the Role of the PACKAGE (#9.4)  
 File (KIDS), 312  
 Characteristics of Intended Users, 156  
 Check Taskman's Environment Option, 283  
 CHECK^XTSUMBLD Routine, 319, 341  
 CHECK1^XTSUMBLD Routine, 319, 341  
 Checkpoints  
 KIDS, 327  
 CHECKSUM REPORT (#6) Field, 340  
 Checksums, 314, 339  
 KIDS, 319, 341  
 Choosing Options, 120  
 Clean Error Log Over Range Of Dates Option,  
 296  
 Clean Error Trap Option, 188  
 Clean old Job Nodes in the XUTL Option, 138,  
 139  
 Clean Old Job Nodes in XUTL, 138  
 Clean Task File Option, 288

- Cleanup Task List Option, 278
- Clear all users at startup Option, 20, 24, 50
- Clear Electronic signature code Option, 73
- CLOSE EXECUTE (#7) Field
  - TERMINAL TYPE (#3.2) File, 210, 232, 239
- CLOSE EXECUTE Field
  - TERMINAL TYPE (#3.2) File, 197, 238
- CLOSE PRINTER PORT (#111) Field, 238, 239
- Codes
  - Access, 4, 5, 6, 7, 8, 9, 16, 17, 21, 26, 34, 35, 43, 44, 46, 52, 53, 61, 68, 179, 209
  - Assigning, 25
  - Log, 53
  - Old, 53
  - Purging, 53
  - Electronic Signature, 13
  - Verify, 4, 5, 6, 7, 8, 9, 13, 16, 17, 21, 25, 35, 43, 52, 53, 61, 174, 179
  - Defining, 6
  - Log, 53
  - Old, 53
  - Purging, 53
- Commands
  - %SPAWN, 246, 256
  - JOB, 246, 255, 256, 299
  - USE, 247
- COMMERCIAL PHONE (#.135) Field, 39
- Common Menu, 6, 35, 121, 122, 124, 125, 134, 147, 151, 162, 222, 225, 241
- Redefining, 134
- Compare local/national checksums report
  - Option, 319, 341
- Compare Transport Global to Current System
  - Option, 320
- Comparing Loaded Transport Globals to the Current System (KIDS), 320
- Components
  - Build Entry, 340
  - Definition, 308
  - Exported, 320
  - Installations, 326
  - KIDS, 319
  - Missing, 340
  - Routine, 340
  - Software, 249, 311, 339, 341
  - Transport Global, 315
- Compute Server
  - Job List, 250, 282, 304
  - Node**, 297
  - Mode, 255
- COMPUTE SERVER Type, 258
- Computer Access Policy, 26
- Computer Account Notification, 26
- Configuration
  - DEA ePCS Utility, 80
  - Multiple Managers
    - TaskMan, 263
    - TaskMan, 253
  - Caché and GT.M, 262
- CONNECTOR PROXY, 47, 49, 50
- Contents, xiii
- Continue Option, 125
- Control
  - How Can the Number of Instances of a Server Option Be Controlled?, 173
- Conversion
  - After File Access Security, 70
  - File Access Security, 65
- Convert Loaded Package for Redistribution
  - Option, 313, 334
- COORDINATOR (IRM) Field, 34
- Copy Everything About an Option to a New Option Option, 155, 161
- Copy One Users Menus and Keys to others
  - Option, 155
- Copy Print Mode, 237
- CPRS Configuration (IRM) Menu, 80
- CPRS Manager Menu, 80
- CPT (#81) File, 345
- CPU
  - Cross-references, 199, 253
  - Definition, 252
- CPU/Service/User/Device Stats Option, 38, 52
- Create a Set of Options to Mark Out-Of-Order
  - Option, 136
- Creating
  - Another Level of Delegation, 153
  - Delegates, 157
  - Device Types, 203
  - Distributions, 310
  - Help Frames, 183
  - Menus and Options, 128
  - New User Account, 25
  - Options and Menus, 128
  - Resource Devices, 236
  - Security Keys, 150
  - Several Dummy Users, 26
  - Spooled Document, 224
  - Tasks, 235
    - TaskMan User Interface, 240
  - Terminal Types, 210
  - Transport Globals, 340

- Critical Alerts, 162
- Critical Alerts Count Report Option, 169
- Cross Reference Help Frames Option, 183
- Cross-references
  - ^XUSEC, 151
  - AK, 150
  - AOLD, 53
  - B, 301
  - CPU, 199, 253
  - CUR, 46
  - Devices, 215, 216
  - Errors, 295
  - Lookup-type, 34, 35
  - Options, 183
  - Parents, 183
  - Routines, 183
  - VOLD, 53
- CUR Cross-reference, 46

## D

- DA Return Code Edit Option, 21, 213
- DA RETURN CODES (#3.22) File, 20, 21, 213
  - Global Location**, 198
- DA RETURN CODES File(#3.22), 198
- Dangling Pointers
  - OPTION (#19) File, 135
- Data Dictionaries Being Audited Option, 57
- Data Dictionary
  - Data Dictionary Utilities Menu, xliii
  - Listings, xliii
- DATA DICTIONARY Access**, 54, 56, 58, 59, 60, 68
- Data Dictionary Utilities Menu, 58
- DATE GIVEN (#2) Subfield
  - KEYS (#51) Multiple Field, 102, 103
- DATE/TIME EDITED (#.06) Field
  - XUEPCS DATA (#8991.6) File, 104
- DAY(S) FOR TIME PERIOD (#.02) Field, 138
- DAYS FOR BACKUP REVIEWER (#.15)
  - Field, 170
- DAYS TO KEEP OLD TASKS (#8) Field, 260
- DAYS TO KEEP OLD TASKS Field, 288
- DCL Command Files, 256, 267
- DCL Commands
  - SET LOGINS/INTERACTIVE, 18
- DCL Context
  - Batch Queues, 273
  - OpenVMS User TASKMAN on ALPHA
    - AXP Systems, 273
  - Restarting, 270

- Running TaskMan with a DCL Context, 267
- Set up for TaskMan and DCL Context in
  - Cache/VMS, 267
  - TaskMan Cache/VMS, 267
  - TASKMAN Queue, 273
  - ZTMSWDCL.COM, 272
  - ZTMWDCL.COM, 271
- DEA ePCS Utility
  - Add DEA ePCS Utility Users, 82
  - Assign the XU EPCS EDIT DATA Option, 84
  - Assign the XUEPCSEEDIT Security Key, 82
  - Assign the XUSSPKI UPN SET Option, 87
  - Benefits, 76
  - Configuration, 80
  - History, 74
  - Intended Audience, 76
  - Options, 90
  - Overview, 74
  - Parameter, 80
  - Processes
    - e-Prescribing Process, 78
    - Manual Paper-based Process, 77
  - Requirements, 75
- DEA ePCS Utility Functions Main Menu, 90
- DEA EXPIRATION DATE (#747.44) Field, 93, 94, 95, 96, 97
- DEA# (#53.2) Field, 93, 94, 95, 96, 97, 98, 100
- Deactivate a User Option, 43
- Deactivating
  - Users, 43
    - Automatically, 44
- De-allocating
  - Security Keys, 148
- De-allocation of Security Keys Option, 148, 159
- De-assigning
  - Help Frame Editors, 183
- DEFAULT # OF ATTEMPTS Field, 17
- Default Institution, 37
- DEFAULT INSTITUTION Field, 21
- DEFAULT LANGUAGE (#207) Field, 62
- DEFAULT LANGUAGE Field, 39
- DEFAULT LOCK-OUT TIME Field, 17
- DEFAULT MULTIPLE SIGN-ON Field, 20
- Defining
  - Environments
    - TaskMan, 253
  - Primary Menu, 128
  - Spool Device Types, 227
    - Caché, 227
    - GT.M, 227

- Verify Codes (Passwords), 6
- Definitions, 368
- KIDS, 308
- Delegate keys Option, 149, 159
- Delegate's Menu Management Menu, 153, 155, 156, 158, 159
- DELEGATED KEYS Multiple Field, 149, 159
- Delegating, 153
  - Options, 149, 158, 159
  - Security Keys, 149, 159
- DELEGATION LEVEL Field, 152
- Delete A Spool Document Option, 222
- DELETE Access, 36, 54, 56, 58, 59
- DELETE ALL MAIL ACCESS (#9.21) Field, 44, 45
- DELETE ALL MAIL ACCESS Field, 43
- Delete Entries From Look-Up Option, 353, 354
  - Example, 354
  - Multi-Term Look-Up (MTLU), 345
- Delete Error Log Option, 296
- DELETE KEYS AT TERMINATION (#9.22) Field, 44
- DELETE KEYS AT TERMINATION Field, 43
- Delete Old (>14 d) Alerts Option, 167
- Delete Tasks Option, 252, 278
- Delete Unreferenced Options Option, 135
- Deleting
  - Alerts, 164
  - Security Keys, 151
- Dequeue Tasks Option, 252, 277, 278, 303
- Description, 368
- DESCRIPTION (#3.5) Field
  - OPTION (#19) File, 174
- DESCRIPTION Field, 292
- Descriptions
  - Options, 133
- DESPOOL DEVICES (#32) Multiple Field
  - DEVICE (#3.5) File, 227
- DEVICE (#3.5) File, 2, 16, 17, 19, 20, 22, 36, 173, 176, 198, 199, 202, 203, 204, 206, 207, 208, 210, 211, 212, 227, 228, 231, 232, 233, 234, 235, 236, 238, 239, 251, 265, 291, 369
  - \$I (#1) Field, 199, 212, 227
  - \$I Field, 198, 201, 212, 215, 216, 219, 227, 234, 235, 236, 238, 302, 304
  - ASK HFS I/O OPERATION (#5.2) Field, 218
  - ASK HOST FILE (#5.1) Field, 218
  - ASK PARAMETER (#5)S Field, 218
  - AUTO DESPOOL (#31) Field, 227
  - Cross-references, 215

- DESPOOL DEVICES (#32) Multiple Field, 227
- Fields, 199
- GENERATE SPL DOC NAME (#33) Field, 228
- Global Location**, 198
- Identification, 215
- NAME (#.01) Field, 199
- OPEN PARAMETERS (#19) Field, 200, 218
- OpenVMS-Specific DEVICE Fields, 202
- POST-CLOSE EXECUTE (#8) Field, 200
- PRE-OPEN EXECUTE (#7) Field, 200
- PRIORITY AT RUN TIME (#25) Field, 265
- QUEUING (#5.5) Field, 200
- SIGN-ON/SYSTEM DEVICE (#1.95) Field, 199, 212, 215, 216
- SUBTYPE (#3) Field, 199, 210, 233
- TaskMan
  - Configuration, 265
- TASKMAN PRINT A HEADER PAGE? (#26) Field, 265
- TYPE (#2) Field, 199, 265
- TYPE Field, 201
- USE PARAMETERS (#19.5) Field, 200
- VOLUME SET(CPU) (#1.9) Field, 199, 212, 215, 216, 265, 291
- Device Allocation List, 281
- Node**, 297
- Device Chart
  - Multi-Term Look-Up (MTLU), 349
- DEVICE FOR QUEUED JOB OUTPUT (#3) Field, 290, 291
- Device Handler, 1, 20, 36, 130, 143, 191, 194, 195, 197, 198, 199, 200, 208, 211, 212, 213, 214, 215, 218, 220, 232, 234, 235, 238, 239, 247
  - Alternate Syntax, 196
  - DA Return Codes, 213
  - Home Device, 212
  - Influence on TaskMan, 265
  - Out of Service Devices, 214
  - Page Length, 193
  - Queuing, 193
  - Right Margin, 193
  - Security (Devices), 209
  - Selecting Devices, 213
  - Spool Document Formats, 196
  - Subtypes, 194
  - Summary, 197
  - System Management, 198



- Terminal Type Information Retained by User, 212
- Test Pattern, 214
- Troubleshooting, 213
- User Interface, 191
- Virtual Terminals, 212
- Device Lock-out Times, 17
- Device Management Menu, 203, 214
- Device Waiting List**
  - Node**, 298
- Devices
  - BROWSER, 207, 229, 231
  - Cross-references, 215, 216
  - Editing, 215
  - File Entries, 238
  - HFS, 200, 204, 211, 217, 218, 236, 265, 308, 313, 314, 316
  - Home, 191, 193, 212, 238, 239
  - Identification, 215
  - IO List, 281
  - Magtape, 233
  - Network Channel, 234
  - NULL, 206
  - P-MESSAGE, 207
  - Printing, 191
  - RESOURCES Type, 173
  - SDP, 236
  - Security, 209
  - Selection at Signon, 212
  - Sequential Disk Processor (SDP), 211, 236
  - Signon, 212
  - Slaved, 237
  - Special Devices, 229
  - SPOOLER, 220
  - Synonyms, 215
  - TELNET, 207
  - VMS
    - Systems Virtual Devices, 212
- DI DDMAP Option, 58
- DI DDU Menu, xliii, 58
- Diagram Menus Option, 148, 151
- Diagramming Options, 132
- DIALOG (#.84) File, 62
- DIAUDIT DD Option, 57
- DIAUDIT PURGE DATA Option, 57
- DIAUDIT PURGE DD Option, 57
- DIAUDIT TURN ON/OFF Option, 57
- DIAUDITED FIELDS Option, 57
- DIC API, 57
- DIC Routine**, 56
- DIDEL Variable**, 56, 57
- DIE API, 57
- DIE Routine**, 56
- DIEDFILE Option, 66
- DIEDIT Option, 56, 58, 59
- DIFROM Utility, 308, 311, 313
- Digital Certificate
  - Smart Card, 4
- DIGITAL PAGER (#.138) Field, 12, 39, 72
- DIINQUIRE Option, 58, 60
- DILIST Option, xliii, 58
- DIMODIFY Option, 58, 60
- DIP Routine, 146
- DIPRINT Option, 58
- Direct Mode Utilities
  - Error Processing
    - ^XTER, 188
    - ^XTERPUR, 188
  - TaskMan
    - ^ZTMON, 282
    - RESTART^ZTMB, 270
- DISABLE USER Field, 43
- Disclaimers
  - Documentation, xl
  - Software, xl
- DISEARCH, 58
- Disk Space Concerns, 183
- Display
  - Attributes, 20
    - Return Codes, 21
  - Delegated Options, 161
  - Help Frames, 180
  - Nodes, 141, 142
  - Options, 133
    - Description, 123
    - Help, 121
    - Order, 130
    - Status of Tasks, 243
- Display Menus and Options Menu, 132, 133
- DISPLAY OPTION (#11) Field, 130
- DISPLAY OPTION Field, 130, 134
- Display Patches for a Package Option, 337
- Display status Option, 243
- DISPLAY TEXT (#.02) Field, 170
- Display User Characteristics Option, 14, 147
- Display/Edit Help Frames Option, 182, 183
- Displaying Option Descriptions, 123
- Displaying Option Help, 121
- DISTATISTICS Option, 58
- Distributions
  - Definition, 308
  - Global, 313, 314

- KIDS, 309, 310, 313
  - Standard, 313, 314
  - Transport Mechanism, 313
- DISUSER (#7) Field, 38, 43, 45
- DISUSER Field, 46
- DISV Global, 43, 65, 66, 69, 70
  - KILLing, 66, 69
- DITRANSFER Option, 58, 59
- DIUTILITY Menu, 58
- DIVISION (#16) Multiple Field, 37, 61
- DIVISION Multiple Field, 21
- Division of Labor
  - TaskMan, 245
- DLAYGO Variable**, 56, 57
- Documentation
  - Symbols, xli
  - VA Handbook 6500, 45
    - Appendix D, 45
- Documentation Conventions, xli
- Documentation Disclaimer, xl
- Documentation Navigation, xlii
- DOMAIN (#4.2)File, 369
- DOMAIN (#4.2) File, 66, 69
- Double Quote Jump, 125
- Double Quote Shortcuts, 125
- DQ^%ZTLOAD API, 303
- DSM for OpenVMS
  - Systems
    - VAX
      - ENVIRONMENT FOR DCL (#9) Field, 256
- DTIME Variable, 22, 38
- Duplicate Resolution Utilities
  - Merge Capability
    - Developing, 343
- DUZ
  - Description, 61
  - Variable, 61
- DUZ("AG") Variable, 22
- DUZ("AUTO") Variable, 22
- DUZ(0) Variable, 36, 55, 56, 59, 60, 65, 156, 209
- DUZ(2) Variable, 21

## E

- Edit a Build Option, 339
- Edit a User's Options Option, 154
  - Example, 154
- Edit an Existing User
  - ACCESS CODE (#2) Field, 35

- ALLOWED TO USE SPOOLER (#41) Field, 38
- ALWAYS SHOW SECONDARIES
  - (#200.11) Field, 39
- ASK DEVICE TYPE AT SIGN-ON Field
  - (#200.05), 38
- AUTO MENU (#200.06) Field, 38
- CAN MAKE INTO A MAIL MESSAGE
  - (#41.2) Field, 38
- DISUSER (#7) Field, 38
- DIVISION (#16) Multiple Field, 37
- FILE MANAGER ACCESS CODE (#3)
  - Field, 36
- FILE RANGE (#31.1) Field, 38
- INITIAL (#1) Field, 34
- MAIL CODE (#28) Field, 35
- MULTIPLE SIGN-ON (#200.04) Field, 38
- NAME (#.01) Field, 34
- NETWORK USERNAME (#501.1) Field, 38
- NICK NAME (#13) Field, 35
- PAC (#14, Programmer Access Code), 38
- PREFERRED EDITOR (#31.3) Field, 37
- PRIMARY MENU OPTION (#201) Field, 35
- PROHIBITED TIMES FOR SIGN-ON (#15)
  - Field, 39
- SECONDARY MENU OPTIONS (#203)
  - Multiple Field, 35
- SERVICE/SECTION (#29) Field, 38
- SSN (#9) Field
  - NEW PERSON (#200) File, 35
- TERMINATION DATE (#9.2) Field, 39
- TIMED READ (#200.1) Field, 38
- TITLE (#8), 35
- TYPE-AHEAD (#200.09) Field, 38
- VERIFY CODE (#7.2) Field, 35
- Edit an Existing User Option, 34, 35, 84, 87
- Edit Devices by Specific Types Option, 233
- Edit Error Screens Option, 186
- Edit Facility DEA# and Expiration Date Option, 90, 93, 114
- Edit File Option, 66
- Edit Install Status Option, 334
- Edit Logical/Physical Mapping Option, 208
- Edit Menu
  - Line Editor, 55
- Edit option Menu, 37
- Edit options Option, 128, 130, 134, 138, 139, 173, 184
- Edit Parameter Definition Keyword Option, 375
- Edit Parameter Values Option, 80, 374

- Edit Parameter Values with Template Option, 375
- Edit task Option, 243
- Edit TaskMan Parameters Menu, 253, 265
- Edit User Characteristics
  - ASK DEVICE TYPE AT SIGN-ON (#200.05) Field, 12
  - AUTO MENU (#200.06) Field, 13
  - ELECTRONIC SIGNATURE CODE (#20.4) Field, 13
  - Form and Template, 42
  - INITIAL (#1) Field, 12
  - NETWORK USERNAME (#501.1) Field, 13
  - NICK NAME (#13) Field, 12
  - PREFERRED EDITOR (#31.3) Field, 13
  - TEXT TERMINATOR (#31.2) Field, 13
  - TITLE (#8) Field, 12
  - TYPE-AHEAD (#200.09) Field, 13
  - VERIFY CODE (#7.2) Field, 13
- Edit User Characteristics Option, 6, 9, 10, 12, 14, 20, 22, 34, 35, 42, 212
  - Kernel, 37
  - MailMan, 37
- Edit User's Spooler Access Option, 225
- EDITED BY (#.02) Field
  - XUEPCS DATA (#8991.6) File, 104
- EDITED DATA (#.05)
  - XUEPCS DATA (#8991.6) File, 104
- Editing
  - Device Types, 203
  - Devices, 215
  - Help Frames, 183
  - Network Channel Devices, 234
  - Resource Devices, 236
  - Security Keys, 150
  - Tasks, 243
  - Terminal Types, 210
- Editors
  - Line, 13, 37, 55, 57
  - Screen, 10, 20, 37
- Edits and Distribution Menu, 310
- Electronic Signature Block Edit Option, 72
- ELECTRONIC SIGNATURE CODE (#20.4) Field, 13
- Electronic Signature code Edit Option, 72, 73
- Electronic Signature code Option
  - User's Toolbox, 72
- Electronic Signatures, 72
  - System Management, 72
  - User Interface, 72
- Enable Building Options from Templates, 156
- ENABLE^XUFILE3 API, 69
- Enabling/Disabling Logons, 24
- Enhanced Error Processing, 187
- Enter or Edit File Entries Option, 56, 58, 59
- Enter Site Parameter
  - DEA ePCS Utility, 80
- Enter/Edit Kernel Site Parameters Option, 16, 17, 22, 209
- Enter/Edit of Security Keys Option, 150
- Entity
  - Definition, 369
- ENTRY ACTION (#20) Field, 137, 172, 174
- Environment Check, 246, 314, 316
- ePCS DEA Utility Functions Menu, 91
- ePCS Edit Prescriber Data Option, 84, 90, 114
- ePCS Set SAN from PIV Card Option, 87, 90, 115
- ERR^ZU API, 185
- Error Log, 190
  - Purge, 188
- ERROR LOG (#3.075) File, 185, 188, 295
- Error Log Node**, 297
- ERROR MESSAGES (#3.076) File, 188
- Error Messages During Menu Jumping, 140
- Error Processing, 9, 185
  - ^XTER, 188
  - ^XTERPUR Direct Mode Utility, 188
  - Add Error Screens Option, 186
  - Clean Error Trap Option, 188
  - Edit Error Screens Option, 186
  - Enhanced, 187
  - Error Screens, 185
  - Error Trap Display Option, 188
  - Interactive Print of Error Messages option, 190
  - List Error Screens Option, 186
  - P1 Print 1 occurrence of each error for T-1 (QUEUE) Option, 187
  - P2 Print 2 occurrences of errors for T-1 (QUEUE), 187
  - Remove Error Screens Option, 187
  - System Management, 185
  - User Interface, 185
- Error Processing Menu, 187
- Error Screens
  - Node**, 297
  - TaskMan, 250
- ERROR State
  - TaskMan, 305
- Error Trap
  - Purging, 188

- Error Trap Auto Clean Option, 188
- Error Trap Display Option, 188
- Errors
  - Cross-references, 295
  - Error Messages During Menu Jumping, 140
  - Error Screens
    - Error Processing, 185
- Errors Logged in Alpha/Beta Test (QUEUED) Option, 330
- Escaping from a Jumbled Screen, 10
- Establish System Audit Parameters Option, 131
- EVE Menu, 82, 84, 87, 142, 143, 160, 185, 309
- Example, 376
- EXIT ACTION (#15) Field, 130, 137, 172, 174
- Exploding Key, 150
- Exported
  - Components, 320
  - Files, 35
  - Frames, 183
  - Keys, 151
  - Menus, 128, 135
  - Software, 308, 311, 320
- Extended Help, 181

## F

- Failed Access Attempts Audit, 52
- FAILED ACCESS ATTEMPTS LOG (#3.05) File, 52
- FAX NUMBER (#.136) Field, 39
- FIELD EDITED (#.03) Field
  - XUEPCS DATA (#8991.6) File, 104
- Fields
  - \$I
    - DEVICE (#3.5) File, 198, 201, 212, 215, 216, 219, 227, 234, 235, 236, 302, 304
  - \$I (#1)
    - DEVICE (#3.5) File, 199, 212, 227
  - \$IDEVICE (#3.5) File, 238
  - ACADEMIC AFFILIATION WAIVER (#13), 45
  - ACCESS CODE, 35
  - ACCESS CODE (#2), 35
  - ACCESSIBLE FILE (#32) Multiple, 54, 55, 60, 65, 66, 68, 69
  - AGENCY, 21
  - AGENCY CODE (#9), 21, 62
  - ALERT DATE/TIME (#.01) Multiple, 170
  - ALLOWED TO USE SPOOLER (#41), 38, 225
  - ALWAYS SHOW SECONDARIES, 134

- ALWAYS SHOW SECONDARIES (#200.11), 39
- ASK DEVICE TYPE AT SIGN-ON, 9, 10, 20, 21
- ASK DEVICE TYPE AT SIGN-ON (#200.05), 12, 38
- ASK HFS I/O OPERATION (#5.2) DEVICE (#3.5) File, 218
- ASK HOST FILE DEVICE (#3.5) File, 218
- ASK PARAMETERS (#5) DEVICE (#3.5) File, 200, 211, 218
- AUTO DESPOOL (#31) DEVICE (#3.5) File, 227
- AUTO MENU, 22, 121
- AUTO MENU (#.06), 62
- AUTO MENU (#200.06), 13, 38, 130
- AUTO-GENERATE ACCESS CODES, 21
- BACK SPACE (#4) TERMINAL TYPE (#3.2) File, 210, 233
- BOX-VOLUME PAIR, 263
- BOX-VOLUME PAIR (#.01), 254, 255
- BYPASS DEVICE LOCK-OUT, 17
- CAN DELETE WITHOUT PROCESSING (#.1), 168
- CAN MAKE INTO A MAIL MESSAGE (#41.2), 38, 225
- CHECKSUM REPORT (#6), 340
- CLOSE EXECUTE TERMINAL TYPE (#3.2) File, 197
- CLOSE EXECUTE (#7) TERMINAL TYPE (#3.2) File, 210, 232, 239
- TERMINAL TYPE (#7) (#3.2) File, 238
- CLOSE PRINTER PORT (#111), 238, 239
- COMMERCIAL PHONE (#.135), 39
- COORDINATOR (IRM), 34
- DATE GIVEN (#2) KEYS (#51) Multiple, 102, 103
- DATE/TIME EDITED (#.06) XUEPCS DATA (#8991.6) File, 104
- DAY(S) FOR TIME PERIOD (#.02), 138
- DAYS FOR BACKUP REVIEWER (#.15), 170
- DAYS TO KEEP OLD TASKS, 288
- DAYS TO KEEP OLD TASKS (#8), 260
- DEA EXPIRATION DATE (#747.44), 93, 94, 95, 96, 97
- DEA# (#53.2), 93, 94, 95, 96, 97, 98, 100
- DEFAULT # OF ATTEMPTS, 17
- DEFAULT INSTITUTION, 21

DEFAULT LANGUAGE, 39  
 DEFAULT LANGUAGE (#207), 62  
 DEFAULT LOCK-OUT TIME, 17  
 DEFAULT MULTIPLE SIGN-ON, 20  
 DELEGATED KEYS Multiple, 149, 159  
 DELEGATION LEVEL, 152  
 DELETE ALL MAIL ACCESS, 43  
 DELETE ALL MAIL ACCESS (#9.21), 44, 45  
 DELETE KEYS AT TERMINATION, 43  
 DELETE KEYS AT TERMINATION (#9.22), 44  
 DESCRIPTION, 292  
 DESCRIPTION (#3.5)  
     OPTION (#19) File, 174  
 DESPOOL DEVICES (#32) Multiple  
     DEVICE (#3.5) File, 227  
 DEVICE FOR QUEUED JOB OUTPUT (#3), 290, 291  
 DIGITAL PAGER (#.138), 12, 39, 72  
 DISABLE USER, 43  
 DISPLAY OPTION, 130  
 DISPLAY OPTION (#11), 130  
 DISPLAY TEXT (#.02), 170  
 DISUSER, 46  
 DISUSER (#7), 38, 43, 45  
 DIVISION (#16) Multiple, 37, 61  
 DIVISION Multiple, 21  
 DIVISION Multiple, 21  
 EDITED BY (#.02)  
     XUEPCS DATA (#8991.6) File, 104  
 EDITED DATA (#.05)  
     XUEPCS DATA (#8991.6) File, 104  
 ELECTRONIC SIGNATURE CODE (#20.4), 13  
 ENTRY ACTION (#20), 137, 172, 174  
 EXIT ACTION (#15), 130, 137, 172, 174  
 FAX NUMBER (#.136), 39  
 FIELD EDITED (#.03)  
     XUEPCS DATA (#8991.6) File, 104  
 FILE MANAGER ACCESS CODE (#3), 36, 43, 46, 54, 55, 56, 59, 60, 61, 65, 68, 69, 128, 148, 149, 156, 209  
 FILE RANGE (#31.1), 38  
 FORM FEED (#2)  
     TERMINAL TYPE (#3.2) File, 210, 233  
 FROM UCI, 260  
 FROM UCI (#.01), 261  
 FROM VOLUME SET, 260  
 FROM VOLUME SET (#1), 261  
 GENERATE SPL DOC NAME (#33)  
     DEVICE (#3.5) File, 228  
 GIVEN BY (#1)  
     KEYS (#51) Multiple, 102, 103  
 GLOBAL LOCK (#36), 235  
 HEADER (#26), 137, 172, 174  
 HELP FRAME, 130, 183, 184  
 INDEPENDENTLY INVOCABLE, 135  
 INHIBIT LOGONS?, 24  
 INHIBIT LOGONS? (#1), 259  
 INITIAL (#1), 25  
     NEW PERSON (#200) File, 12, 34, 35, 72  
 INSTALL ANSWERS Multiple, 324  
 INSTALL COMPLETE TIME (#17), 334  
 INTERACTIVE USER'S PRIORITY, 20  
 INTRO TEXT, 16, 22  
 INVOKED BY ROUTINE, 183  
 KEEP AT TERMINATE, 150  
 KEYS Multiple, 148, 149, 155  
 LANGUAGE (#.01)  
     DIALOG (#.84) File, 62  
     LANGUAGE (#.85) File, 62  
 LANGUAGE (#200.07), 39, 62  
 LAST SIGN-ON DATE/TIME (#202), 45  
 LAT PORT SPEED #64), 202  
 LAT SERVER NODE (#61), 202  
 LAT SERVER PORT (#62), 202  
 LIFETIME OF VERIFY CODE, 21  
 LINK ACCESS (#2), 259  
 LOAD BALANCE ROUTINE, 263, 264  
 LOAD BALANCE ROUTINE (#21), 257  
 LOCAL SYNONYM, 215  
 LOCK (#3), 148, 151, 172, 174  
 LOG RESOURCE USAGE?, 298  
 LOG TASKS? (#2), 254  
 LOGICAL DISK NAME (#504), 208  
 MAIL CODE (#28), 35  
 MARGIN WIDTH (#9)  
     DEVICE File(#3.5), 233  
 MAX SIGNON ALLOWED, 16, 18  
 MAX SIGNON ALLOWED (#41,2), 255  
 MAX SPOOL DOCUMENT LIFE-SPAN (#31.3), 226  
 MAX SPOOL DOCUMENT LIFE-SPAN (#31.3) field, 222  
 MAX SPOOL DOCUMENTS PER USER (#31.2), 226  
 MAX SPOOL LINES PER USER (#31.1), 224, 226  
 MENU (item) Multiple, 128  
 MENU TEMPLATE Multiple, 126  
 MENU TEXT (#1), 173

MESSAGES, 324, 327  
 MIXED OS (#.05), 208  
 Mixed OS Environment  
     KERNEL SYSTEM PARAMETERS  
         (#8989.3) file, 208  
 MNEMONIC, 215  
 MODE OF TASKMAN, 258, 263  
 MODE OF TASKMAN (#8), 255, 258  
 MULTI-DEVICE DESPOOLING (#41.1),  
     225  
 MULTIPLE SIGN-ON (#200.04), 38  
 NAME (#.01), 93, 95, 96, 97, 98, 100, 102,  
     103  
     BUILD (#9.6) File, 311  
     DEVICE (#3.5) File, 199, 215  
     NEW PERSON (#200) File, 34, 72, 73  
     OPTION (#19) File, 129, 173  
     PARAMETER DEFINITION (#8989.51)  
         file, 170  
     RESOURCES (#3.54) File, 235  
     SECURITY KEY (#19.1) File, 151  
     TERMINAL TYPE (#3.2) File, 210  
     XUEPCS DATA (#8991.6) File, 104  
 NETWORK USERNAME (#501.1), 13, 38  
 NEW PERSON IDENTIFIERS, 25  
 NICK NAME (#13), 12, 35  
 OFFICE PHONE (#.132), 12, 39, 72  
 OPEN EXECUTE  
     TERMINAL TYPE (#3.2) File, 197  
 OPEN EXECUTE (#6)  
     TERMINAL TYPE (#3.2) File, 210, 238,  
         239  
 OPEN PARAMETERS  
     DEVICE (#3.5) File, 234  
 OPEN PARAMETERS (#19)  
     DEVICE (#3.5) File, 200, 211, 218, 227,  
         231, 235  
 OPEN PRINTER PORT (#110), 238, 239  
 Open VMS-Specific DEVICE Fields  
     DEVICE (#3.5) File, 202  
 ORGANIZATION (#200.2), 23  
 ORIGINAL DATA (#.04)  
     XUEPCS DATA (#8991.6) File, 104  
 OUT OF ORDER MESSAGE (#2), 137, 140,  
     172, 173, 178  
 OUT OF SERVICE? (#3), 259  
 OUT-OF-SERVICE DATE, 17  
 PAC (#14, Programmer Access Code), 38  
 PAGE LENGTH (#3)  
     TERMINAL TYPE (#3.2) File, 210, 233  
 PASSWORD, 209  
 PATCH APPLICATION HISTORY Multiple,  
     312  
 PERFORM DEVICE CHECKING, 17  
 PERMITTED DEVICES Multiple, 138  
 PERSON LOOKUP, 150  
 PHONE #3 (#.133), 39  
 PHONE #4 (#.134), 39  
 PHONE (HOME) (#.131), 12, 39  
 PKI SERVER (#53.1), 116  
 POST SIGN-IN MESSAGE, 22  
 POST-CLOSE EXECUTE (#19.8)  
     DEVICE (#3.5) File, 231  
 POST-CLOSE EXECUTE (#8)  
     DEVICE (#3.5) File, 200  
 PREFERRED EDITOR, 37  
 PREFERRED EDITOR (#31.3), 13, 37  
 PRE-OPEN EXECUTE (#7)  
     DEVICE (#3.5) File, 200  
 PRIMARY HFS DIRECTORY (#320), 208  
 PRIMARY MENU OPTION, 16, 25, 35, 46,  
     154, 155  
 PRIMARY MENU OPTION (#201), 35  
 PRINT SERVER NAME OR ADDRESS  
     (#65), 202  
 PRIORITY (#3.8)  
     Options, 130  
     Server Options, 174  
 PRIORITY AT RUN TIME (#25), 265  
 PROHIBITED TIMES FOR SIGN-ON, 17,  
     19  
 PROHIBITED TIMES FOR SIGN-ON (#15),  
     39  
 QUEUED TO RUN AT WHAT TIME (#2),  
     290, 291, 292, 294  
 QUEUED TO RUN ON VOLUME SET (#5),  
     290, 291, 292  
 QUEUING (#5.5)  
     DEVICE (#3.5) File, 200  
 QUEUING REQUIRED Multiple, 138  
 REMOTE PRINTER NAME (#67), 202  
 REPLACEMENT VOLUME SET (#7), 259  
 Required Fields  
     NEW PERSON (#200) File, 25  
 REQUIRED VOLUME SET? (#4), 259  
 RESCHEDULE FREQUENCY (#6), 290,  
     291, 292  
 RESCHEDULING FREQUENCY (#6), 292,  
     294  
 RESOURCE SLOTS (#35), 173, 176  
     DEVICE (#3.5) File, 235, 236  
 RESTRICT DEVICES, 138

REVERSE/NEGATIVE LOCK, 151  
 RIGHT MARGIN (#1)  
     TERMINAL TYPE (#3.2) File, 210  
 ROUTINE (#25), 172, 174, 179  
 SCHEDULE II NARCOTIC (#55.1), 98, 100  
 SCHEDULE II NON-NARCOTIC (#55.2),  
     98, 100  
 SCHEDULE III NARCOTIC (#55.3), 98, 100  
 SCHEDULE III NON-NARCOTIC (#55.4),  
     98, 100  
 SCHEDULE IV (#55.5), 98, 100  
 SCHEDULE V (#55.6), 98, 100, 102, 103,  
     105, 106, 110, 113, 114, 115  
 SCHEDULING RECOMMENDED (#209),  
     130, 290, 292  
 SECONDARY \$I (#52), 204, 206, 208  
 SECONDARY HFS DIRECTORY (#320.2),  
     208  
 SECONDARY MENU OPTIONS (#203)  
     Multiple Field, 35  
 SECONDARY MENU OPTIONS Multiple,  
     39, 134, 143, 155  
 SECURITY, 17, 36, 209  
 SECURITY TOKEN SERVICE (#200.1), 23  
 SELECTABLE AT SIGN-ON  
     TERMINAL TYPE (#3.2) File, 21  
 SELECTABLE AT SIGN-ON (#.02)  
     TERMINAL TYPE (#3.2) File, 210, 213  
 SERVER ACTION (#221), 173, 174, 175,  
     176  
 SERVER AUDIT (#223), 174, 175  
 SERVER BULLETIN (#220), 174, 175  
 SERVER DEVICE (#227), 173, 176  
 SERVER MAIL GROUP (#222), 175  
 SERVER REPLY (#225), 175  
 SERVICE/SECTION, 34  
 SERVICE/SECTION (#29), 38  
 SEX (#4)  
     NEW PERSON (#200) File, 25  
 SIGNATURE BLOCK PRINTED NAME, 72  
 SIGNATURE BLOCK PRINTED NAME  
     (#20.2), 72  
 SIGNATURE BLOCK TITLE (#20.3), 72  
 SIGN-ON/SYSTEM DEVICE (#1.95)  
     DEVICE (#3.5) File, 199, 212, 215, 216  
 SLAVE FROM DEVICE, 239  
 SPECIAL QUEUEING (#9), 290  
 SPECIAL QUEUEING (#9), 292  
 SSN  
     PATIENT (#2) File, 60  
     SSN (#9)  
     NEW PERSON (#200) File, 25, 26, 35  
 START NEXT, 287  
 STATUS, 326  
 STATUS (#.02), 334  
 SUBJECT ORGANIZATION (#205.2), 23  
 SUBJECT ORGANIZATION ID (#205.3), 23  
 SUBMANAGER RETENTION TIME (#5),  
     255  
 SUBORDINATE KEY Multiple, 150  
 SUBTYPE (#3)  
     DEVICE (#3.5) File, 199, 210, 233  
 SUPPRESS BULLETIN (#224), 175  
 SUPPRESS FORM FEED AT CLOSE  
     (#11.2), 232  
 SYNC FLAG, 287  
 TASK PARAMETERS, 53, 167, 188  
 TASK PARAMETERS (#15), 290, 292  
 TASK PARTITION SIZE (#4), 255  
 TASKMAN FILES UCI (#5), 259  
 TASKMAN FILES VOLUME SET (#6), 259  
 TASKMAN HANG BETWEEN NEW JOBS  
     (#7), 255  
 TASKMAN JOB LIMIT, 18, 253  
 TASKMAN JOB LIMIT (#6), 255  
 TASKMAN PRINT A HEADER PAGE?  
     (#26), 265  
 TELNET PORT (#66), 202  
 TERMINATION DATE, 26, 44, 46, 174  
 TERMINATION DATE (#9.2), 39, 43, 44,  
     95, 100  
 TEXT TERMINATOR, 42  
 TEXT TERMINATOR (#31.2), 13  
 TIED ROUTINE, 16  
 TIME PERIOD (#.01), 138  
 TIMED READ, 22  
 TIMED READ (#200.1), 38  
 TIMES/DAYS PROHIBITED (#3.91)  
     Multiple, 173, 174  
 TITLE (#8), 12, 35  
 TO UCI (#3), 261  
 TO VOLUME SET (#2), 261  
 TRANSLATION (#.847) Subfield, 62  
 TRANSPORT BUILD NUMBER (#63), 319,  
     341  
 TYPE  
     DEVICE (#3.5) File, 201  
     TYPE (#.1)  
         VOLUME SET (#14.5) File, 258, 259  
     TYPE (#2)  
         DEVICE (#3.5) File, 199, 265  
     TYPE (#4)

OPTION (#19) File, 174  
 TYPE-AHEAD, 22  
 TYPE-AHEAD (#.09), 62  
 TYPE-AHEAD (#200.09), 13, 38  
 UCI ASSOCIATION TABLE, 261  
 USE PARAMETERS (#19.5)  
   DEVICE (#3.5) File, 200  
 USE TIMEOUT ON OPENS (#2009.5)  
   DEVICE (#3.5) File, 234  
 USER CHARACTERISTICS TEMPLATE,  
   42  
 USER CLASS (#9.5), 47  
 VA# (#53.3), 98, 100  
 VAX ENVIRONMENT FOR DCL (#9), 256,  
   267  
 VERIFY CODE, 35  
 VERIFY CODE (#7.2), 13, 35  
 VERSION Multiple, 312  
 VMS DEVICE TYPE (#63), 202  
 VOICE PAGER (#.137), 12, 39, 72  
 VOLUME SET (#.01)  
   VOLUME SET (#14.5) File, 258  
 VOLUME SET (#41) Multiple  
   KERNEL SYSTEM PARAMETERS  
     (#8989.3) File, 255  
 VOLUME SET Multiple  
   KERNEL SYSTEM PARAMETERS  
     (#8989.3) File, 18  
 VOLUME SET(CPU) (#1.9)  
   DEVICE (#3.5) File, 199, 212, 215, 216,  
     265, 291  
 Fields Being Audited Option, 57  
 File Access Security, 34, 36, 54, 55  
   Access Level, 57  
   **AUDIT**, 54, 56, 57, 59, 60  
   Conversion  
     Advance Preparation, 65  
     Advantages, 65  
     After, 70  
     Instructions, 69  
     Summary, 68  
   **DATA DICTIONARY**, 54, 56, 58, 59, 60,  
     68  
   **DELETE**, 54, 56, 58, 59  
   DELETE Access, 36, 56  
   LAYGO, 35, 54, 56, 58, 59, 68, 70, 128  
   LAYGO Access, 56  
   Menu, 60, 61, 65, 69, 70, 71  
   Properties, 57  
   **READ**, 54, 56, 58, 59, 70, 128  
   READ Access, 36, 66  
   Running the Conversion, 65  
   System Management, 55  
   User Interface, 54  
   When is File Access Security Checked?, 56  
   Who Needs File Access?, 57  
   **WRITE**, 54, 56, 59, 128  
   WRITE Access, 36  
 FILE MANAGER ACCESS CODE (#3) Field,  
   36, 43, 46, 54, 55, 56, 59, 60, 61, 65, 68, 69,  
   128, 148, 149, 156, 209  
 File Merge Capability  
   Developing, 343  
 FILE RANGE (#31.1) Field, 38  
 FILE SERVER Type (Obsolete), 258  
 FileMan  
   Browser Device, 229  
   Limited File manger Options (Build) Option,  
     155  
   Line Editor, 13, 37, 55, 57  
   Menu, 54  
   Screen Editor, 10, 20, 37  
   What Happened to DIFROM, 313  
 FileMan edit template Option, 173  
 FileMan Inquire to File Entries Option, 346  
 Files  
   Adding Explicit File Access for System  
     Administrators, 66  
   AGENCY (#4.11), 21  
   ALERT (#8992), 166, 167, 168, 169, 170  
   ALERT CRITICAL TEXT (#8992.3), 162  
   ALERT TRACKING (#8992.1), 164, 166,  
     167, 169, 170  
   ALTERNATE EDITOR (#1.2), 37  
   AUDIT (#1.1), 60  
   Audit Access, 60  
   AUDIT LOG FOR OPTIONS (#19.081), 131,  
     172, 175  
   BUILD (#9.6), 308, 311, 319, 324, 329, 337,  
     339, 341  
   BULLETIN (#3.6), 174, 178  
   CPT (#81), 345  
   DA RETURN CODES (#3.22), 20, 21, 198,  
     213  
     **Global Location**, 198  
   DCL Command, 256, 267  
   DEVICE (#3.5), 369  
   DEVICE (#3.5), 2, 16, 17, 19, 20, 22, 36, 173,  
     176, 198, 199, 202, 203, 204, 206, 207,  
     208, 210, 211, 212, 227, 228, 231, 232,  
     233, 234, 235, 236, 238, 239, 251, 265, 291  
   \$I (#1) Field, 199, 212, 227



\$I Field, 198, 201, 212, 215, 216, 219, 227,  
 234, 235, 236, 238, 302, 304  
 ASK HFS I/O OPERATION (#5.2) Field,  
 218  
 ASK HOST FILE (#5.1) Field, 218  
 ASK PARAMETERS (#5) Field, 218  
 Cross-references, 215  
 Fields, 199  
**Global Location**, 198  
 MARGIN WIDTH (#9) Field, 233  
 NAME (#.01) Field, 199  
 OPEN PARAMETERS (#19) Field, 200  
 OpenVMS-Specific DEVICE Fields, 202  
 POST-CLOSE EXECUTE (#19.8) Field,  
 231  
 POST-CLOSE EXECUTE (#8) Field, 200  
 PRE-OPEN EXECUTE (#7) Field, 200  
 QUEUING (#5.5) Field, 200  
 SIGN-ON/SYSTEM DEVICE (#1.95)  
 Field, 199, 212, 215, 216  
 SUBTYPE (#3) Field, 199, 210, 233  
 TYPE (#2) Field, 199  
 TYPE Field, 201  
 USE PARAMETERS (#19.5) Field, 200  
 VOLUME SET(CPU) (#1.9) Field, 199,  
 212, 215, 216, 265, 291  
 DEVICE (#3.5) File  
 OPEN PARAMETERS (#19) Field, 231  
 Device File Entries, 238  
 DIALOG (#.84), 62  
 DOMAIN (#4.2), 66, 69, 369  
 ERROR LOG (#3.075), 185, 188, 295  
 ERROR MESSAGES (#3.076), 188  
 Exported, 35  
 FAILED ACCESS ATTEMPTS LOG  
 (#3.05), 52  
 File Access Security Conversion Instructions,  
 69  
 FORUM ROUTINE (#9.8), 319, 341  
 FUNCTION (#.5), 36  
 HELP FRAME (#9.2), 182, 183, 184  
 HOSPITAL LOCATION (#44), 369  
 Host, 217  
 How to  
 Grant Access, 60  
 ICD DIAGNOSIS (#80), 345, 346  
 ICD OPERATION/PROCEDURE (#80.1),  
 345  
 INSTALL (#9.7), 311, 312, 314, 316, 324,  
 326, 327, 329, 333, 334, 337, 339  
 INSTITUTION (#4), 21, 93, 114, 369  
 KERNEL PARAMETERS (#8989.2), 42  
 KERNEL SYSTEM PARAMETERS  
 (#8989.3), 16, 17, 18, 20, 21, 22, 23, 25,  
 39, 45, 62, 116, 208, 222, 224, 255, 298,  
 376  
 KERNEL SYSTEM PARAMETERS  
 (#8989.3) file  
 Mixed OS Environment Fields, 208  
 KIDS, 311  
 LANGUAGE (#.85), 62  
 Levels of File Access Security, 57  
 LOCAL KEYWORD (#8984.1), 342, 345,  
 347, 353, 354, 357  
 LOCAL LOOKUP (#8984.4), 342, 345, 346,  
 350, 352, 353, 354, 357, 366  
 LOCAL SHORTCUT (#8984.2), 342, 345,  
 347, 350, 353, 354  
 LOCAL SYNONYM (#8984.3), 342, 345,  
 347, 353, 357  
 MESSAGE (#3.9), 224  
 NEW PERSON (#200), 6, 11, 12, 15, 16, 19,  
 20, 21, 22, 23, 25, 26, 34, 35, 36, 43, 44,  
 45, 47, 50, 51, 53, 54, 55, 60, 61, 62, 65,  
 68, 71, 72, 93, 94, 95, 96, 97, 98, 100, 102,  
 103, 113, 115, 126, 134, 143, 148, 150,  
 151, 152, 159, 179, 212, 225, 275, 368,  
 369, 376  
 DEA EXPIRATION DATE (#747.44), 93,  
 94, 95, 96, 97  
 DEA# (#53.2) Field, 93, 94, 95, 96, 97, 98,  
 100  
 DUZ, 61, 98, 100, 102, 103  
 NAME (#.01) Field, 93, 95, 96, 97, 98,  
 100, 102, 103  
 Required Fields, 25  
 SCHEDULE II NARCOTIC (#55.1) Field,  
 98, 100  
 SCHEDULE II NON-NARCOTIC (#55.2)  
 Field, 98, 100  
 SCHEDULE III NARCOTIC (#55.3) Field,  
 98, 100  
 SCHEDULE III NON-NARCOTIC (#55.4)  
 Field, 98, 100  
 SCHEDULE IV (#55.5) Field, 98, 100  
 SCHEDULE V (#55.6) Field, 98, 100, 102,  
 103, 105, 106, 110, 113, 114, 115  
 TERMINATION DATE (#9.2), 95  
 TERMINATION DATE (#9.2) Field, 100  
 VA# (#53.3) Field, 98, 100  
 NEW PERSON (#200) file, 36  
 OE/RR LIST (#100.21), 369

OLD ACCESS AND VERIFY CODES (#200 XREF), 52  
 OPTION (#19), 24, 36, 45, 122, 123, 126, 128, 129, 130, 135, 137, 140, 141, 142, 143, 144, 148, 153, 160, 172, 173, 177, 178, 179, 184, 290, 292  
     Dangling Pointers, 135, 183  
 OPTION SCHEDULING (#19.2), 139, 167, 245, 246, 251, 288, 289, 290, 291, 292, 294  
 Other TaskMan Files, 251  
 PACKAGE (#9.4), 58, 308, 311, 312, 313, 337, 369  
 PARAMETER DEFINITION (#8989.51), 170, 368, 369, 370, 371, 372, 375, 376  
 PARAMETER ENTITY (#8989.518), 369  
 PARAMETER TEMPLATE (#8989.52), 370  
 PARAMETERS (#8989.5), 170, 343, 368, 369, 370  
 PATIENT (#2), 60  
     Purpose of Granting Access, 56  
 REMOTE APPLICATION (#8994.5), 63  
 RESOURCE (#3.54), 235  
 ROOM-BED (#405.4), 369  
 ROUTINE (#9.8), 319, 340, 341  
 SCHEDULE, 245, 249, 250, 251, 253, 254, 279, 282, 301, 302, 303, 305  
 SECURITY KEY (#19.1), 148, 150, 151, 184  
 SERVICE/SECTION (#49), 34, 38, 369  
 SIGN-ON (#3.081) LOG  
     Purging, 51  
 SIGN-ON LOG (#3.081), 46, 47, 50, 51, 52  
 SPOOL DATA (#3.519), 224  
 SPOOL DOCUMENT (#3.51), 196, 211, 224, 225, 228  
 TaskMan, 249  
 TASKMAN ERROR, 282  
 TASKMAN SITE PARAMETERS (#14.7), 18, 249, 251, 253, 254, 258, 262, 263, 269, 281  
     BOX-VOLUME PAIR (#.01) Field, 254, 255  
     Load Balance Routine, 263  
     LOAD BALANCE ROUTINE (#21) Field, 257  
     LOG TASKS? (#2) Field, 254  
     MODE OF TASKMAN (#8) Field, 255  
     Standardized VA Caché and GT.M Configuration, 262  
     SUBMANAGER RETENTION TIME (#5) Field, 255  
     TASK PARTITION SIZE (#4) Field, 255

TASKMAN HANG BETWEEN NEW JOBS (#7) Field, 255  
 TASKMAN JOB LIMIT (#6) Field, 255  
 VAX ENVIRONMENT FOR DCL (#9) Field, 256  
 TASKS (#14.4), 243, 245, 246, 247, 249, 251, 253, 254, 255, 275, 276, 277, 278, 288, 290, 291, 295, 297, 299, 301, 303, 305  
 TEAM (#404.51), 369  
 TERMINAL TYPE (#3.2), 20, 21, 194, 198, 199, 210, 211, 213, 215, 232, 233, 238  
     BACK SPACE (#4) Field, 210, 233  
     CLOSE EXECUTE (#7) Field, 210, 232, 238, 239  
     CLOSE EXECUTE Field, 197  
     FORM FEED (#2) Field, 210, 233  
     **Global Location**, 198  
     NAME (#.01) Field, 210  
     Naming Conventions, 211  
     OPEN EXECUTE (#6) Field, 210, 238, 239  
     OPEN EXECUTE Field, 197  
     PAGE LENGTH (#3) Field, 210, 233  
     RIGHT MARGIN (#1) Field, 210  
     SELECTABLE AT SIGN-ON (#.02) Field, 210, 213  
     SELECTABLE AT SIGN-ON Field, 21  
 Terminal Type File Entries, 238  
 TITLE (#3.1), 35  
 Transfer Entries, 58, 59  
 Transfer File Entries, 58  
 UCI ASSOCIATION (#14.6), 249, 251, 253, 260, 304  
     FROM UCI (#.01) Field, 261  
     FROM VOLUME SET (#1) Field, 261  
     Standardized VA Caché and GT.M Configuration, 262  
     TO UCI (#3) Field, 261  
     TO VOLUME SET (#2) Field, 261  
 USR CLASS (#8930), 369  
 VOLUME SET (#14.5), 24, 249, 251, 253, 257, 261, 288, 304, 305, 306  
     DAYS TO KEEP OLD TASKS (#8) Field, 260  
     INHIBIT LOGONS? (#1) Field, 259  
     LINK ACCESS (#2) Field, 259  
     OUT OF SERVICE? (#3) Field, 259  
     REPLACEMENT VOLUME SET (#7) Field, 259  
     REQUIRED VOLUME SET? (#4) Field, 259

- Standardized VA Caché and GT.M Configuration, 262
- TASKMAN FILES UCI (#5) Field, 259
- TASKMAN FILES VOLUME SET (#6) Field, 259
- TYPE (#.1) Field, 258, 259
- VOLUME SET (#.01) Field, 258
- Who Needs File Access?, 57
- XUEPCS DATA (#8991.6), 92, 104, 106
- XUEPCS PSDRPH AUDIT (#8991.7), 93, 110
- Find a User Option, 46
- Fix Help Frame File Pointers Option, 183
- Fix Option File Pointers Option, 135
- FORM FEED (#2) Field
  - TERMINAL TYPE (#3.2) File, 210, 233
- Form Feeds, 232
  - SUPPRESS FORM FEED AT CLOSE (#11.2) Field, 232
  - System Management, 232
  - User Interface, 232
- Forms
  - Security, 26
- FORUM ROUTINE (#9.8) File, 319, 341
- Forwarding
  - Alerts, 165
- FPHYSICAL DISK (#505), 208
- FROM UCI (#.01) Field, 261
- FROM UCI Field, 260
- FROM VOLUME SET (#1) Field, 261
- FROM VOLUME SET Field, 260
- FUNCTION (#.5) File, 36
- Functional Description
  - Multi-Term Look-Up (MTLU), 345
- Further Delegation, 160
- Future tasks Option, 276

## G

- General Parameter Tools Menu, 80
- General Parameter Tools Option, 145
- General Parameters Tools Menu, 371
- General Processor Mode, 255
- GENERAL PURPOSE VOLUME SET Type, 258
- GENERATE SPL DOC NAME (#33) Field
  - DEVICE (#3.5) File, 228
- GET\_METRIC.COM Script**, 264
- GETENV^%ZOSV API, 254
- GIVEN BY (#1) Subfield
  - KEYS (#51) Multiple Field, 102, 103

- Global Distributions, 313, 314
- GLOBAL LOCK (#36) Field, 235
- Globals
  - ^%ZIS, 251
  - ^%ZIS(1,, 198
  - ^%ZIS(2,, 198
  - ^%ZIS(3.22,, 198
  - ^%ZISL, 235
  - ^%ZTER, 185, 188
  - ^%ZTSCH, 245, 249, 251, 259, 263, 290, 297, 302
  - ^%ZTSK, 245, 249, 259, 263, 275, 288, 301, 302
  - ^%ZUA(3.05, 52
  - ^DISV, 43, 65, 66, 69, 70
    - KILLing, 66, 69
  - ^TMP, 138, 139
  - ^UTILITY(\$J, 68, 138, 139
  - ^XMB, 224
  - ^XMBS, 224
  - ^XTMP, 137, 138, 139, 314, 316, 327
  - ^XUSEC(0,, 52, 138
  - ^XUTL, 138, 139, 144, 212
    - Display Nodes, 142
    - Structure and Function, 141
    - User Stacks, 141
- Installing Global Distributions, 328
- KIDS Transport Global, 308
  - Backup, 322
  - Compare, 311, 314, 320
  - Create, 310, 313, 340
  - Definition, 308
  - Environment Check, 314
  - Export, 310
  - Install, 311
  - Load from Distribution, 311, 314, 316
  - Load from PackMan Messages, 311, 314
  - Print, 311, 314, 320
  - Processing, 323
  - Verify, 340
  - Verifying Checksums, 319
- Purging, 138
- Scratch, 231
- XUTL, 140, 146
- Glossary, 378
  - Intranet Website, 382
- Go-home Jump, 124
- Grant Access by Profile Option, 26, 38
- Granting File Access, Purpose, 56

## H

- Halt Option, 125
- HEADER (#26) Field, 137, 172, 174
- Header Page
  - TaskMan, 265
- Help
  - At Prompts, xliii
  - Display Option Help, 121
  - Displaying Option Descriptions, 123
  - Extended, 181
  - Listing Options, 121
  - Listing Secondary and Common Options, 121
  - Online, xliii
  - Question Marks, xliiii, 8, 22, 38, 39, 55, 64, 120, 121, 123, 124, 127, 134, 147, 181, 184, 186, 187, 189, 192, 201, 242, 244, 277, 282, 283, 323
- HELP FRAME (#9.2) File, 182, 183, 184
- HELP FRAME Field, 130, 183, 184
- Help Frames
  - Creating, 183
  - Deleting Help Frames, 183
  - Disk Space Concerns, 183
  - Display, 180
  - Editing, 183
  - Editors, 183
  - Exported, 183
  - Keywords, 184
  - Layout Considerations, 184
  - Linking Help to an Option or Menu, 184
  - Menu System, 181
  - Namespacing, 184
  - XUSER COMPUTER ACCOUNT, 27
- Help Processor, 180
  - Cross Reference Help Frames Option, 183
  - Deleting Help Frames, 183
  - Display/Edit Help Frames Option, 182
  - Editors, 183
  - Fix Help Frame File Pointers Option, 183
  - Help System Actions, 181
  - Layout Considerations, 184
  - Linking a Help Frame as Help for an Option or Menu, 184
  - List Help Frames Option, 182
  - Menu, 182
  - Menu System, 181
  - New/Revised Help Frames Option, 182
  - System Management, 182
  - User Interface, 180
- HFS Device, 204
- HFS Devices, 200, 211, 217, 218, 236, 265, 308, 313, 314, 316
- History
  - DEA ePCS Utility, 74
- History, Revisions to Documentation and Patches, ii
- Home Device, 191, 193, 212, 238, 239
- Home Pages
  - Acronyms Intranet Website, 382
  - Adobe Website, xliv
  - Enterprise Program Management Office Website, xl
  - Glossary Intranet Website, 382
  - KAAJEE Documentation Website, 5
  - Kernel Website, xliv
  - RPC Broker Documentation Website, 5
  - VA FileMan Documentation Website, 36, 54, 57
  - VA Software Document Library (VDL) Website, xliv, 343, 344
- HOME^%ZIS, 130
- HOSPITAL LOCATION (#44) File, 369
- Host File Server, 200, 211, 217, 218, 236, 265, 308, 313, 314, 316
- Host File Server Device Edit Option, 204, 218
- Host Files, 217
  - Caché Devices Setup, 219
  - GT.M Devices Setup, 219
  - Host File Server Device Edit Option, 218
  - System Management, 218
  - User Interface, 217
- How Can the Number of Instances of a Server Option Be Controlled?, 173
- How Shared Device and Terminal Type Attributes are Used, 211
- How the File Access Security Conversion Works
  - Summary, 68
- How to
  - Delete a Regularly Scheduled Task, 290
  - Grant File Access, 60
  - Obtain Technical Information Online, xliiii
  - Requeue a Regularly Scheduled Task, 290
  - Restart TaskMan when Running in a DCL Context, 270
  - Use this Manual, xxxix

## I

- ICD DIAGNOSIS (#80) File, 345, 346

- ICD OPERATION/PROCEDURE (#80.1) File, 345
- Identifying Locked Options, 148
- Idle Node**, 297
- If the Option Invokes Non-VistA Applications, 130
- If the Option Should Be Regularly Scheduled, 130
- Implementation
  - Multi-Term Look-Up (MTLU), 363
- INDEPENDENTLY INVOCABLE Field, 135
- Information Stored in the INSTALL (#9.7) File (KIDS), 324
- INHIBIT LOGONS? (#1) Field, 259
- INHIBIT LOGONS? Field, 24
- INIT Routines, 308, 313
- INITIAL (#1) Field
  - NEW PERSON (#200) File, 12, 25, 34, 35, 72
- Inquire Option, 133
- Inquire to File Entries Option, 58, 60
- Inspecting the Tasks in the Monitor's Lists, 283
- INSTALL (#9.7) File, 311, 312, 314, 316, 324, 326, 327, 329, 333, 334, 337, 339
  - Purging, 337
- INSTALL ANSWERS Multiple Field, 324
- INSTALL COMPLETE TIME (#17) Field, 334
- Install File Print Option, 324, 326, 333
- Install Package(s) Option, 314, 323, 324
- INSTALL/CHECK MESSAGE PackMan
  - Option, 314, 316
- Installation Menu, 311
- Installation Menu (KIDS), 315, 322
- Installations
  - Components, 326
  - Finish, 326
  - Global Distributions (KIDS), 328
  - KIDS, 309, 311
  - Menu (KIDS), 315
  - Progress (KIDS), 326
  - Restarting, 327
  - Running (KIDS), 323
  - Scheduling (KIDS), 323
  - Sequence (KIDS), 314
  - Standard Distributions (KIDS), 314
- Instance
  - Definition, 370
- Instances
  - How Can the Number of Instances of a Server Option Be Controlled?, 173
- INSTITUTION (#4) File, 21, 93, 114, 369
- Intended Audience, xl

- DEA ePCS Utility, 76
- Intensity, 196
- Interactive Print of Error Messages Option, 190
- INTERACTIVE USER'S PRIORITY Field, 20
- INTRO TEXT Field, 16, 22
- Introduction, 1
  - Multi-Term Look-Up (MTLU), 345
  - Parameter Tools, 367
  - System Manager, 2
  - User, 1
- Introductory Text
  - Signon/Security, 16
- Introductory text edit Option, 16
- INVOKED BY ROUTINE Field, 183
- Invoking Non-VistA Applications Options, 130
- IO
  - List, 281
  - Variables, 130
- IONOFF Variable, 232

## J

- JOB Command, 246, 255, 256, 299
- Job List, 250, 282
  - Node**, 298
- Jobs
  - KILL, 282
- Jumbled Screen
  - Escaping from, 10
- Jump Nodes, 141
  - ^XUTL Global, 144
- Jump Start
  - Signon, 8
- Jumps
  - Error Messages During Menu Jumping, 140
  - Options, 124
  - Phantom, 140, 141
  - Rubber-band Jump, 124
  - Up-arrow, 120, 124, 125, 126, 127, 139

## K

- KAJEE Documentation Website, 5
- KEEP AT TERMINATE Field, 150
- Kernel
  - Installation and Distribution System (KIDS), 308
  - KIDS, 308
  - Signon Auditing Files, 52
  - Website, xlv

- Kernel Installation & Distribution System Menu, 309
- Kernel Management Menu, 208
- KERNEL PARAMETERS (#8989.2) File, 42
- KERNEL SYSTEM PARAMETERS (#8989.3) file, 208, 222, 376
  - Mixed OS Environment Fields, 208
- KERNEL SYSTEM PARAMETERS (#8989.3) File, 16, 17, 18, 20, 21, 22, 23, 25, 39, 45, 62, 116, 208, 224, 255, 298
- Key Management Menu, 82, 149, 150, 159
- Key Word In Context (KWIC), 346, 363
- Keys
  - Delegating, 159
  - Delegation Levels, 149, 152, 154, 159
  - Exported, 151
  - Management
    - Security Keys, 148
    - Provider, 44, 149, 150
- Keys For a Given Menu Tree Option, 149
- KEYS Multiple Field, 148, 149, 155
- Keyword Option
  - Multi-Term Look-Up (MTLU)
    - Example, 363
- Keywords
  - Help Frames, 184
  - Multi-Term Look-Up (MTLU), 345, 357
    - Associated with a Single Term and Multiple Terms, 347
- Keywords Option
  - Multi-Term Look-Up (MTLU), 346, 360
- KIDS, 329, 340
  - Aborted Installations, 327
    - Recovering From, 327
  - Alpha/Beta Tracking, 330
  - Answering Installation Questions for
    - Transport Globals in a Distribution, 314
  - Backup a Transport Global Option, 322
  - BUILD (#9.6) File, 311
  - Build Entry
    - Definition, 308
  - Build File Print Option, 332
  - Changes in the Role of the PACKAGE (#9.4) File, 312
  - Checkpoints, 327
  - Checksums, 314, 319, 339, 341
  - Comparing Loaded Transport Globals to the Current System, 320
  - Components, 319
    - Definition, 308
  - Convert Loaded Package for Redistribution Option, 334
  - Definitions, 308
  - Deleting Security Keys, 151
  - Display Patches for a Package Option, 337
  - Distributions, 309, 310
    - Definition, 308
    - Global, 313, 328
    - Split Across Diskettes, 316
    - Standard, 313
    - Transport Mechanism, 313
  - Edit Install Status Option, 334
  - Environment Check, 314, 316
  - Exported
    - Components, 320
  - Files, 311
  - Global Distributions, 313, 314
  - Information Stored in the INSTALL (#9.7) File, 324
  - INSTALL (#9.7) File, 312
    - Information, 324
  - Install File Print Option, 333
  - Installations, 298, 309, 311
    - Answering Questions, 323
    - Global Distributions, 328
    - Menu, 315
    - Progress, 326
    - Progress Bar, 326
    - Queued, 323
    - Re-answering Questions, 324
    - Restarting, 327
    - Sequence, 314
    - Software, 315
    - Standard Distributions, 314
  - Loading
    - Standard Distributions, 316
    - Transport Globals from a Distribution or PackMan Message, 314
  - Once the Installation Finishes, 326
  - Options, 309
  - OVERWRITE**, 328
  - Package
    - Definition, 308
  - PACKAGE (#9.4) File, 312
  - Patches, 312, 313, 322, 339
  - Printing Loaded Transport Globals, 320
  - Processing Each Transport Global, 323
  - Progress Bar (Installations), 326
  - Purge Build or Install Files Option, 337
  - Purging
    - BUILD File, 329

- INSTALL File, 329
  - Selected Entries, 338
- Re-answering Installation Questions, 324
- Reasons to Retain BUILD and INSTALL File Entries, 339
- Recovering from an Aborted Distribution Load, 327
- REPLACE**, 328
- Restarting Aborted Installations, 327
- Rollup Patches into a Build Option, 339
- ROUTINE (#9.8) File, 340
- Running Installations, 323
- Scheduling Installations, 323
- Selecting Software Names for Purging, 338
- Software Installation, 315
- Standard Distributions, 313, 314
- System Management
  - Installations, 308
  - Utilities, 331
- Transport Global, 308
  - Backup, 322
  - Checksums, 319
  - Compare, 311, 314, 320
  - Create, 310, 313, 340
  - Definition, 308
  - Environment Check, 314
  - Export, 310
  - Install, 311
  - Load from Distribution, 311, 314, 316
  - Load from PackMan Messages, 311, 314
  - Print, 311, 314, 320
  - Processing, 323
  - Verify, 340
  - Verifying Checksums, 319
- Transport Mechanism
  - Distributions, 313
- Update Routine File Option, 340
- Verify a Build Option, 340
- Verify Package Integrity Option, 341
- Verifying Checksums in a Transport Global, 319
- Versions to Retain, 337
- When the Distribution is Split Across Diskettes, 316
- When the Installation is Queued, 323
- KILL**
  - ^DISV Global, 66, 69
  - ^TMP Global, 139
  - ^UTILITY(\$J Global, 139
  - ^XTMP Global

- INSTALL (#9.7) File Entries and Transport Globals, 314
- Device Allocation List Node, 297
- IO Variables, 130
- Jobs, 282
- Signon Nodes, 139
- Software-wide Variables, 135
- Subscript (\$J) or Namespace, \$J in the ^UTILITY(\$J or ^TMP Global, 139
- TaskMan Process, 287
- Tasks, 282
- Update Node, 299
- KILL off a users' job Option, 282, 299
- KWIC, 346, 363

## L

- LANGUAGE (#.01) Field
  - DIALOG (#.84) File, 62
  - LANGUAGE (#.85) File, 62
- LANGUAGE (#.85) File, 62
- LANGUAGE (#200.07) Field, 39, 62
- LAST SIGN-ON DATE/TIME (#202) Field, 45
- LAT PORT SPEED (#64) Field, 202
- LAT SERVER NODE (#61) Field, 202
- LAT SERVER PORT (#62) Field, 202
- LAYGO Access, 35, 54, 56, 58, 59, 68, 70, 128
- Levels of File Access Authority, 57
- LIFETIME OF VERIFY CODE Field, 21
- Limited File Manager Options (Build) Option, 155, 156, 161
  - Example, 157
- Limiting Simultaneous Running of a Particular Task, 235
- Line Editor
  - VA FileMan, 13, 37, 55, 57
- LINK ACCESS (#2) Field, 259
- Link List, 250
- Link List Node**, 298
- Linking a Help Frame as Help for an Option or Menu, 184
- List Alerts for a user from a specified date Option, 169
- List Delegated Options and their Users Option, 161
- List Error Screens Option, 186
- List File Attributes Option, xliii, 58
- List Help Frames Option, 182, 184
- List of tasks Option, 276
- List Options by Parents and Use Option, 132
- List own tasks Option, 244

- List Spool Documents Option, 222
- List Tasks Option, 275, 277, 283, 302
  - All your tasks, 276
  - Future tasks, 276
  - List of tasks, 276
  - Running tasks, 276
  - Tasks waiting for a device, 276
  - Unsuccessful tasks, 276
  - Your future tasks, 276
- List the Defined Options Sets Option, 137
- List Users Option, 47
- List Values for a Selected Entity Option, 372
- List Values for a Selected Package Option, 373
- List Values for a Selected Parameter Option, 372
- List Values for a Selected Template Option, 374
- Listing and Printing Tasks, 244
- Listing Options, 121
- Listing Primary, Secondary, and Common Menu Options, 122
- Listing Secondary and Common Options, 121
- LKUP^XTLKMGR API, 366
- Load a Distribution Option, 313, 314, 316, 317, 328
- Load Balance Routine
  - TASKMAN SITE PARAMETERS (#14.7) File, 263
- LOAD BALANCE ROUTINE (#21) Field, 257
- LOAD BALANCE ROUTINE Field, 263, 264
- Load Balancing and Multiple Managers, 263
- Load List Node**, 298
- Load Node**, 298
- Loading
  - Standard Distributions (KIDS), 316
  - Transport Globals from a Distribution or PackMan Message (KIDS), 314
- LOCAL KEYWORD (#8984.1) File, 342, 345, 347, 353, 354, 357
- LOCAL LOOKUP (#8984.4) File, 342, 345, 346, 350, 352, 353, 354, 357, 366
- LOCAL SHORTCUT (#8984.2) File, 342, 345, 347, 350, 353, 354
- LOCAL SYNONYM (#8984.3) File, 342, 345, 347, 353, 357
- LOCAL SYNONYM Field, 215
- LOCK (#3) Field, 148, 151, 172, 174
- Locked Options
  - Identifying, 148
- Lock-out Times, 17
- Locks
  - Negative, 137
  - Options, 134, 137
  - Reverse, 137, 148, 151
- LOG RESOURCE USAGE? Field, 298
- Log Resources Node**, 298
- LOG TASKS? (#2) Field, 254
- LOGICAL DISK NAME (#504) Field, 208
- LOGIN Menu Template, 8, 126
- Logon, 4
- Logs
  - Add Error Screens Option, 186
  - AUDIT LOG FOR OPTIONS (#19.081) File, 131, 172, 175
  - Clean Error Log Over Range Of Dates Option, 296
  - Clean Error Trap Option, 188
  - Delete Error Log Option, 296
  - Edit Error Screens Option, 186
  - Error Log, 190
  - ERROR LOG (#3.075) File, 185, 188, 295
  - Error Log Node**, 297
  - Error Log Purge, 188
  - FAILED ACCESS ATTEMPTS LOG (#3.05) File, 52
  - List Error Screens Option, 186
  - LOG RESOURCE USAGE? Field, 298
  - Log Resources Node**, 298
  - LOG TASKS? (#2) Field, 254
  - Old Access Codes Stored in the Whole-file AOLD Cross-reference in File #200, 53
  - Old Verify Codes Stored in the Whole-file VOLD Cross-reference in File #200, 53
  - Purge Error Log Of Type Of Error Option, 296
  - Queueable Task Log Clean Up Option, 288
  - Remove Error Screens Option, 187
  - Show Error Log Option, 295
  - SIGN-ON LOG (#3.081) File, 46, 47, 50, 51, 52
  - Purging, 51
  - Taskman Error Log Menu, 295
  - TaskMan Error Log, 185, 250, 282, 288, 295
  - XUSCZONK Option Purging File #3.081, 51
  - XUTM QCLEAN Option, 295
- Lookup-type Cross-reference, 34, 35
- Loopback Test of Device Port Option, 214
- Low Usage of Alpha/Beta Test Options Option, 330



## M

- Magtape Devices, 233
  - System Management, 233
- Mail
  - Purging, 46
- MAIL CODE (#28) Field, 35
- Make an Alert on the Fly Option, 168
- Make spool document into a mail message
  - Option, 223
- Manager
  - Startup TaskMan, 263
  - TaskMan, 245, 246
  - UCI Definition, 252
- Managing
  - Delegates, 157
    - System Management, 157
  - Display Attributes (DA) Return Codes, 213
  - Menus and Options, 134
  - Out-Of-Order Option Sets, 136
  - Primary Menus, 134
  - Spool Documents, 225
- Map Pointer Relations Option, 58
- MARGIN WIDTH (#9) Field
  - DEVICE (#3.5) File, 233
- Mark Option Set Out-Of-Order Option, 137
- MAX SIGNON ALLOWED (#41,2) Field, 255
- MAX SIGNON ALLOWED Field, 16, 18
- MAX SPOOL DOCUMENT LIFE-SPAN (#31.3) Field, 222, 226
- MAX SPOOL DOCUMENTS PER USER (#31.2) Field, 226
- MAX SPOOL LINES PER USER (#31.1) Field, 224, 226
- MENU (item) Multiple Field, 128
- Menu Management Menu, 82, 157
- Menu Manager
  - AUTO MENU, 121
  - Diagramming Options, 132
  - Display Options, 133
  - Double Quote Jump, 125
  - Fixing Option File Pointers, 135
  - Go-home Jump, 124
  - Local modifications, 135
  - LOGIN Menu Template, 8
  - Menu jumping, 124
  - Menu Tree Rebuilding, 139
  - Options that Should Be Scheduled, 138
  - Primary Menu, 121
  - Rebuilding Menu Trees, 139
  - Restricting Option Usage, 137
  - Rubber-band Jump, 124
  - Summary, 127
  - System Management, 128
    - Out-Of-Order Set Management Menu, 136
  - Templates
    - LOGIN Menu, 126
  - Up-arrow Jump, 124
  - User Interface, 120
  - Variables, Troubleshooting, 146
- MENU TEMPLATE Multiple Field, 126
- Menu Templates Option, 126
- MENU TEXT (#1) Field, 173
- Menus
  - Alert Management, 165, 167
  - Alpha/Beta Test Option Usage Menu, 131, 330
  - Altering Exported Menus, 135
  - Application Utilities, 347
  - Audit Features, 131
  - Common, 6, 35, 121, 122, 124, 125, 134, 147, 151, 162, 222, 225, 241
    - Redefining, 134
  - CPRS Configuration (IRM), 80
  - CPRS Manager Menu, 80
  - Creating, 128
  - Data Dictionary Utilities, xliii, 58
  - DEA ePCS Utility, 90
  - DEA ePCS Utility Functions, 90
  - Delegate's Menu Management, 153, 155, 156, 158, 159
  - Device Management, 203, 214
  - DI DDU, xliii, 58
  - Diagramming, 132
  - Display Menus and Options, 132, 133
  - Displaying, 132
  - DIUTILITY, 58
  - Edit
    - Line Editor, 55
  - Edit option, 37
  - Edit TaskMan Parameters, 253, 265
  - Edits and Distribution, 310
  - ePCS DEA Utility Functions, 91
  - Error Processing, 187
  - EVE, 82, 84, 87, 142, 143, 160, 185, 309
  - Exported, 128, 135
  - File Access Security, 60, 61, 65, 69, 70, 71
  - General Parameter Tools, 80
  - General Parameters Tools, 371
  - Help Processor, 182
  - Installation (KIDS), 311, 315, 322

- Kernel Installation & Distribution System, 309
- Kernel Management Menu, 208
- Key Management, 82, 149, 150, 159
- Managing, 134
- Menu Management, 82, 157
- Menu Templates Option, 126
- Multi-Term Lookup (MTLU) Main Menu, 347
- Navigating, 120
- Operations Management, 46, 330
- OR PARAM IRM MENU, 80
- ORMGR, 80
- Out-Of-Order Set Management, 136
- Parent of Queueable Options, 45, 51
- PARENT OF QUEUEABLE OPTIONS, 138, 226, 289
- Primary, 6, 8, 9, 16, 25, 35, 120, 124, 128, 132, 134, 135, 142, 144, 146
  - Assigning, 25
  - Managing, 134
  - Trees, 139, 140, 141, 144, 146
- Programmer Options, 148, 309, 371
- Rebuilding, 139
- Report Menu for Alerts, 168
- Secondary, 39, 121, 124, 132, 133, 134, 135, 141, 143, 149, 153, 154
  - Assigning, 134
  - Trees, 134, 142
- Secure Menu Delegation, 156, 157, 158, 160
- Secure Menu Management, 153, 156
- Spool Management, 224, 225, 226
- Spooler Menu, 222, 223, 225
- Systems Manager Menu, 82, 84, 87, 309
- Taskman Error Log, 185, 295
- Taskman Management, 185
- TaskMan Management Menu, 274
- Taskman Management Utilities, 185, 279
- Testing, 136
- Text, 129
- User Management, 43, 54, 84, 87
- User Management Menu, 46, 60, 65, 70
- User's Toolbox, 6, 9, 10, 11, 12, 14, 72, 73, 125, 126, 222, 241
- Utilities For MTLU, 353
- Utilities Menu
  - KIDS, 331
- Utility Functions, 58
- VA FileMan, 54
- XPAR MENU TOOLS, 80, 371
- XPD DISTRIBUTION MENU, 310
- XPD INSTALLATION, 315
- XPD INSTALLATION MENU, 311
- XPD MAIN, 309
- XPD UTILITY, 331
- XQAB MENU, 330
- XQAL REPORTS MENU, 168
- XQALERT MGR, 167
- XQDISPLAY OPTIONS, 132, 133
- XQHELP-MENU, 182
- XQOOMAIN, 136
- XQSMD MGR, 157, 160
- XQSMD USER MENU, 153, 155, 156, 158, 159
- XTLKUSER2, 347
- XTLKUTILITIES, 353
- XTMENU, 347
- XU EPCS UTILITY FUNCTIONS, 90, 91
- XUAUDIT MENU, 131
- XUCOMMAND, 134
- XUERRS, 187
- XUFILEACCESS, 60, 61, 65, 69, 70, 71
- XUKERNEL, 208
- XUKEYMGMT, 82
- XUMAIN, 82
- XUOPTUSER, 46
- XUPROG, 309, 371
- XUSER, 43, 54, 60, 65, 70, 87
- XUSERTOOLS, 10
- XUSITEMGR, 46, 330
- XU-SPL-MGR, 225, 226
- XUTIO, 203, 214
- XUTM ERROR, 185, 295
- XUTM MGR, 185, 274
- XUTM UTIL, 185, 279
- ZTMQUEUEABLE OPTIONS, 45, 51, 226, 288, 289
- MenusXQSMD MGR, 156
- Merge Capability
  - Duplicate Resolution Utilities
    - Developing, 343
- MESSAGE (#3.9) File, 224
- Messages
  - Answerback, 20
  - PackMan, 311, 313, 314, 316
  - TaskMan Rejection Messages, 304
  - TaskMan States:, 305
- MESSAGES Field, 324, 327
- METRIC\_SCHEDULE.COM Script, 264
- Microsoft® Windows Active Directory Profile, 1
- Missing Components, 340
- MIXED OS (#.05) Field, 208

- Mixed OS Environment Fields
  - KERNEL SYSTEM PARAMETERS (#8989.3) file, 208
- MNEMONIC Field, 215
- MODE OF TASKMAN (#8) Field, 255, 258
- MODE OF TASKMAN Field, 258, 263
- Modes
  - Auto Print, 237
  - Compute Server, 255
  - Copy Print, 237
  - General Processor, 255
  - Other Non-TaskMan, 255
  - Print Server, 255
  - Printer Controller, 237
  - Transparent Print, 237
- Modify File Attributes Option, 58, 60
- Monitor TaskMan
  - Inspecting the Tasks in the Monitor's Lists, 283
- Monitor Taskman Option, 264, 279, 305
  - Action Prompt, 282
  - IO List, 281
  - Job List, 282
  - RUN Node, 280
  - Schedule List, 281
  - Status List, 280
  - Task List, 282
- Mounted Volume Sets
  - Definition, 252
- MULTI-DEVICE DESPOOLING (#41.1) Field, 225
- Multiple Copies
  - Spooling, 220
- Multiple Managers and Load Balancing, 263
- MULTIPLE SIGN-ON (#200.04) Field, 38
- Multiple Sign-On Restriction, 20
- Multi-Term Look-Up (MTLU), 345
  - Add Entries To Look-Up File Option, 345, 353, 354
    - Example, 357
  - Add/Modify Utility
    - Keywords Option, 357
    - Shortcuts Option, 357
    - Synonyms Option, 357
  - Add/Modify Utility Option, 346, 353, 357
    - Examples, 362
    - Synonyms, 361
  - Delete Entries From Look-Up Option, 345, 353, 354
    - Example, 354
  - Functional Description, 345

- Implementation, 363
- Introduction, 345
- Keyword Option
  - Example, 363
- Keywords, 345, 357
  - Associated with a Single Term and Multiple Terms, 347
- Keywords Option, 346, 360
- Lexical Variants, 346
- LOCAL KEYWORD (#8984.1) File, 347, 353, 354, 357
- LOCAL KEYWORD File, 345
- LOCAL LOOKUP (#8984.4) file, 366
- LOCAL LOOKUP (#8984.4) File, 345, 346, 350, 352, 353, 354, 357
- LOCAL SHORTCUT (#8984.2) File, 345, 347, 350, 353, 354
- LOCAL SYNONYM (#8984.3) File, 345, 347, 353, 357
- Look-Up
  - How to Request, 346
- Lookups on Database Files, 346
- Multi-Term Lookup (MTLU) Main Menu, 347
- Multi-Term Lookup (MTLU) Option, 350
  - Example, 351
- Overview, 345
- Print Utility Option, 345, 352
  - Example, 353
- Shortcuts, 345, 357
  - Point to a Single Word or Phrase, 347
- Shortcuts Option, 346, 358
  - Example, 362
- Standard Device Chart, 349
- Synonym Option
  - Example, 363
- Synonyms, 345, 357
  - Associated with Multiple Terms, 347
  - Multiple Tokens, 347
- Synonyms Option, 346, 361
- Systems Management, 363
- Usage Considerations, 346
- User Interface, 347
- Utilities for MTLU Menu, 353
- Multi-Term Lookup (MTLU) Main Menu, 347
- Multi-Term Lookup (MTLU) Option, 345, 350
  - Example, 351

## N

- Name

- Options, 122
- NAME (#.01) Field, 93, 95, 96, 97, 98, 100, 102, 103
  - BUILD (#9.6) File, 311
  - DEVICE (#3.5) File, 199, 215
  - NEW PERSON (#200) File, 34, 72, 73
  - OPTION (#19) File, 129, 173
  - PARAMETER DEFINITION (#8989.51) file, 170
  - RESOURCES (#3.54) File, 235
  - SECURITY KEY (#19.1) File, 151
  - TERMINAL TYPE (#3.2) File, 210
  - XUEPCS DATA (#8991.6) File, 104
- Namespaces
  - Help Frames, 184
  - XQSRV, 175
  - XUFI, 68
  - XUTM (TaskMan), 249
  - Z, 161
  - ZTM (TaskMan), 249
- Naming Conventions
  - TERMINAL TYPE (#3.2) File, 211
- Navigating Kernel's Menus, 120
- Network Channel Device Edit Option, 234
- Network Channel Devices, 234
  - Editing, 234
  - System Management, 234
- NETWORK USERNAME (#501.1) Field, 13, 38
- NEW PERSON (#200) file, 11, 15, 36
- NEW PERSON (#200) File, 6, 12, 16, 19, 20, 21, 22, 23, 25, 26, 34, 35, 36, 43, 44, 45, 47, 50, 51, 53, 54, 55, 60, 61, 62, 65, 68, 71, 72, 93, 94, 95, 96, 97, 98, 100, 102, 103, 113, 115, 126, 134, 143, 148, 150, 151, 152, 159, 179, 212, 225, 275, 368, 369, 376
- DEA EXPIRATION DATE (#747.44), 93, 94, 95, 96, 97
- DEA# (#53.2) Field, 93, 94, 95, 96, 97, 98, 100
- DUZ, 61, 98, 100, 102, 103
- NAME (#.01) Field, 93, 95, 96, 97, 98, 100, 102, 103
  - Required Fields, 25
- SCHEDULE II NARCOTIC (#55.1) Field, 98, 100
- SCHEDULE II NON-NARCOTIC (#55.2) Field, 98, 100
- SCHEDULE III NARCOTIC (#55.3) Field, 98, 100
- SCHEDULE III NON-NARCOTIC (#55.4) Field, 98, 100
- SCHEDULE IV (#55.5) Field, 98, 100
- SCHEDULE V (#55.6) Field, 98, 100, 102, 103, 105, 106, 110, 113, 114, 115
- TERMINATION DATE (#9.2), 95
- TERMINATION DATE (#9.2) Field, 100
- VA# (#53.3) Field, 98, 100
- NEW PERSON IDENTIFIERS Field, 25
- New/Revised Help Frames Option, 182
- NICK NAME (#13) Field, 12, 35
- No Options Node**, 298
- Nodes
  - ^%ZIS("14.5","LOGON","*volume set*"), 24
  - ^%ZOSF, 306
  - ^%ZOSF("VOL"), 258
  - ^%ZTSK(task #, 0), 251
  - ^%ZTSK(task#,3), 251
  - ^XUSEC(0,"CUR",DUZ,DATE), 139
  - ^XUTL("XQ", \$J, "T") Node, 142
  - ^XUTL("XQ", \$J, "XQM") Node, 142
  - Compute Server Job List**, 297
  - Device Allocation List**, 297
  - Device Waiting List**, 298
  - Display, 141, 142
  - Error Log**, 297
  - Error Screens**, 297
  - Idle**, 297
  - Job List**, 298
  - Jump, 141, 144
  - Link List**, 298
  - Load**, 298
  - Load List**, 298
  - Log Resources**, 298
  - No Options**, 298
  - RUN, 250, 280, 286, 298
  - Schedule List**, 297
  - Startup List**, 299
  - Status List**, 299
  - Stop**, 299
  - Sub**, 299
  - Task List**, 299
  - TaskMan Error Log, 297
  - Update**, 299
  - User Stacks, 141
  - Wait**, 299
  - XQ, 142
  - XQT (MENU Templates), 142
- Normal Signoff, 9
- NULL Device, 206
- NVSTNSET Routine, 202

## O

### Obtaining

- Data Dictionary Listings, xliii

- OE/RR LIST (#100.21) File, 369

- OFFICE PHONE (#.132) Field, 12, 39, 72

- OLD ACCESS AND VERIFY CODES File (#200 XREF), 52

- Once the Installation Finishes (KIDS), 326

- One-time Option Queue Option, 294

### Online

- Documentation, xliii

- Technical Information, How to Obtain, xliii

- OPEN EXECUTE (#6) Field

  - TERMINAL TYPE (#3.2) File, 210, 238, 239

- OPEN EXECUTE Field

  - TERMINAL TYPE (#3.2) File, 197

- OPEN PARAMETERS (#19) Field

  - DEVICE (#3.5) File, 200, 211, 218, 227, 231, 235

- OPEN PARAMETERS Field

  - DEVICE (#3.5) File, 234

- OPEN PRINTER PORT (#110) Field, 238, 239

- OpenVMS Interactive Logins Parameter, 18

- OpenVMS-Specific DEVICE Fields

  - DEVICE (#3.5) File, 202

- Operations Management Menu, 46, 330

- OPTION (#19) File, 24, 36, 45, 122, 123, 126, 128, 129, 130, 135, 137, 140, 141, 142, 143, 144, 148, 153, 160, 172, 173, 177, 178, 179, 184, 290, 292

  - Dangling Pointers, 135, 183

- Option Access by User Option, 133

- Option Audit Display Option, 131

- Option Restrictions, 122

- Option Scheduling

  - Deleting and requeuing, 290

  - List Background Options, 289

  - One-time Option Queue Option, 294

  - PARENT OF QUEUABLE OPTIONS Menu, 289

  - Problems, 294

  - Queuing an option, 290

  - Schedule/Unschedule Options Option, 290

  - Scheduling Frequency Code Formats, 293

  - Special Queueing settings, 292

  - TaskMan, 289

  - Through the OPTION SCHEDULING (#19.2) File

    - TaskMan, 246

  - Which Options to Queue, 289

- OPTION SCHEDULING (#19.2) File, 139, 167, 245, 246, 251, 288, 289, 290, 291, 292, 294

### Options

- Actual Usage of Alpha/Beta Test Options, 330

- Add a New User, 26

- Add a New User to the System, 25, 26

- Add Entries To Look-Up File, 353, 354
  - Example, 357

  - Multi-Term Look-Up (MTLU), 345

- Add Error Screens, 186

- Add/Modify Utility, 353, 357

  - Multi-Term Lookup (MTLU), 346

  - Multi-Term Look-Up (MTLU)

    - Examples, 362

- Alert Management, 165, 167

- Alerts - Set/Remove Surrogate for User, 167

- All Keys a User Needs, 149

- All your tasks, 276

- Allocate/De-Allocate of PSDRPH Key, 93, 113

- Allocation of Security Keys, 82, 148, 149, 159

- Allow other users access to spool documents, 222

- Alpha/Beta Test Option Usage Menu, 131, 330

- Application Utilities, 347

- Assign Editors, 183

- Assign the XU EPCS EDIT DATA Option, 84

- Assign the XUSSPKI UPN SET Option, 87

- Audit Features, 131

- Audited Options Purge, 131

- Audits, 131

- Automatic Deactivation of Users, 44, 45

- Automatic Deactivation of Users, 44

- Backup a Transport Global, 322

- Browse a Spool Document, 222

- Build a New Menu, 155, 161

- Build File Print, 332

- Build Primary Menu Trees, 140

- Building, 156

- Change my Division, 11

- Change user's allocated keys to delegated keys, 149

- Check Taskman's Environment Option, 283

- Choosing, 120

- Clean Error Log Over Range Of Dates, 296

- Clean Error Trap, 188

- Clean old Job Nodes in the XUTL, 138, 139

- Clean Task File, 288
- Cleanup Task List, 278
- Clear all users at startup, 20, 24, 50
- Clear Electronic signature code, 73
- Common, 6, 35, 121, 122, 124, 125, 134, 147, 151, 162, 222, 225, 241
  - Redefining, 134
- Compare local/national checksums report, 319, 341
- Compare Transport Global to Current System, 320
- Continue, 125
- Convert Loaded Package for Redistribution, 313, 334
- Copy Everything About an Option to a New Option, 155, 161
- Copy One Users Menus and Keys to others, 155
- CPRS Configuration (IRM), 80
- CPRS Manager Menu, 80
- CPU/Service/User/Device Stats, 38, 52
- Create a Set of Options to Mark Out-Of-Order, 136
- Creating, 128
- Critical Alerts Count Report, 169
- Cross Reference Help Frames, 183
- Cross-references, 183
- DA Return Code Edit, 21, 213
- Data Dictionaries Being Audited, 57
- Data Dictionary Utilities, xliii, 58
- DEA ePCS Utility, 90
- DEA ePCS Utility Functions, 90
- Deactivate a User, 43
- De-allocation of Security Keys, 148, 159
- Delegate keys, 149, 159
- Delegate's Menu Management, 153, 155, 156, 158, 159
- Delegating, 149, 158, 159
- Delete A Spool Document, 222
- Delete Entries From Look-Up, 353, 354
  - Example, 354
  - Multi-Term Look-Up (MTLU), 345
- Delete Error Log, 296
- Delete Old (>14 d) Alerts, 167
- Delete Tasks, 252, 278
- Delete Unreferenced Options, 135
- Dequeue Tasks, 252, 277, 278, 303
- Descriptions, 133
- Device Management, 203, 214
- DI DDMAP, 58
- DI DDU, xliii, 58
- Diagram Menus, 148, 151
- Diagramming, 132
- DIAUDIT DD, 57
- DIAUDIT PURGE DATA, 57
- DIAUDIT PURGE DD, 57
- DIAUDIT TURN ON/OFF, 57
- DIAUDITED FIELDS, 57
- DIEDFILE, 66
- DIEDIT, 56, 58, 59
- DIINQUIRE, 58, 60
- DILIST, xliii, 58
- DIMODIFY, 58, 60
- DIPRINT, 58
- DISEARCH, 58
- Display, 132, 133
  - Description, 123
  - Help, 121
  - Order, 130
- Display Menus and Options, 132, 133
- Display Patches for a Package, 337
- Display status, 243
- Display User Characteristics, 14, 147
- Display/Edit Help Frames, 182, 183
- DISTATISTICS, 58
- DITRANSFER, 58, 59
- DIUTILITY, 58
- Edit a Build, 339
- Edit a User's Options, 154
  - Example, 154
- Edit an Existing User, 34, 35, 84, 87
- Edit Devices by Specific Types, 233
- Edit Error Screens, 186
- Edit Facility DEA# and Expiration Date, 90, 93, 114
- Edit File, 66
- Edit Install Status, 334
- Edit Line Editor, 55
- Edit Logical/Physical Mapping, 208
- Edit options, 37, 128, 130, 134, 138, 139, 173, 184
- Edit Parameter Definition Keyword, 375
- Edit Parameter Values, 80, 374
- Edit Parameter Values with Template, 375
- Edit task, 243
- Edit TaskMan Parameters, 253, 265
- Edit User Characteristics, 6, 9, 10, 12, 14, 20, 22, 34, 35, 42, 212
  - Kernel, 37
  - MailMan, 37
- Edit User's Spooler Access, 225
- Edits and Distribution, 310

Electronic Signature Block Edit, 72  
 Electronic Signature code Edit, 72, 73  
 Enter or Edit File Entries, 56, 58, 59  
 Enter/Edit Kernel Site Parameters, 16, 17, 22, 209  
 Enter/Edit of Security Keys, 150  
 ePCS DEA Utility Functions, 91  
 ePCS Edit Prescriber Data, 84, 90, 114  
 ePCS Set SAN from PIV Card, 87, 90, 115  
 Error Processing, 187  
 Error Trap Auto Clean, 188  
 Error Trap Display Option, 188  
 Errors Logged in Alpha/Beta Test (QUEUED), 330  
 Establish System Audit Parameters, 131  
 EVE, 82, 84, 87, 142, 143, 160, 185, 309  
 Fields Being Audited, 57  
 File Access Security, 60, 61, 65, 69, 70, 71  
 FileMan edit template, 173  
 FileMan Inquire to File Entries option, 346  
 Find a User, 46  
 Fix Help Frame File Pointers, 183  
 Fix Option File Pointers, 135  
 Future tasks, 276  
 General Parameter Tools, 80, 145  
 General Parameters Tools, 371  
 Grant Access by Profile, 26, 38  
 Halt, 125  
 Help Processor, 182  
 Host File Server Device Edit, 204, 218  
 Inquire, 133  
 Inquire to File Entries, 58, 60  
 Install File Print, 324, 326, 333  
 Install Package(s), 314, 323, 324  
 INSTALL/CHECK MESSAGE PackMan, 314, 316  
 Installation (KIDS), 311, 315, 322  
 Interactive Print of Error Messages, 190  
 Introductory text edit, 16  
 Invoking Non-Vista Applications, 130  
 Kernel Installation & Distribution System, 309  
 Kernel Management Menu, 208  
 Key Management, 82, 149, 150, 159  
 Keys For a Given Menu Tree, 149  
 Keyword  
     Multi-Term Look-Up (MTLU)  
         Example, 363  
 Keywords  
     Multi-Term Look-Up (MTLU), 346, 360  
 KIDS, 309  
 KILL off a users' job, 282, 299  
 Limited File Manager Options (Build), 155, 156, 161  
     Example, 157  
 List Alerts for a user from a specified date, 169  
 List Delegated Options and their Users, 161  
 List Error Screens, 186  
 List File Attributes, xliii, 58  
 List Help Frames, 182, 184  
 List of tasks, 276  
 List Options by Parents and Use, 132  
 List own tasks, 244  
 List Spool Documents, 222  
 List Tasks, 275, 277, 283, 302  
     All your tasks, 276  
     Future tasks, 276  
     List of tasks, 276  
     Running tasks, 276  
     Tasks waiting for a device, 276  
     Unsuccessful tasks, 276  
     Your future tasks, 276  
 List the Defined Options Sets, 137  
 List Users, 47  
 List Values for a Selected Entity, 372  
 List Values for a Selected Package, 373  
 List Values for a Selected Parameter, 372  
 List Values for a Selected Template, 374  
 Load a Distribution, 313, 314, 316, 317, 328  
 Locked, Identifying, 148  
 Locks, 134, 137  
 Loopback Test of Device Port, 214  
 Low Usage of Alpha/Beta Test Options, 330  
 Make an Alert on the Fly, 168  
 Make spool document into a mail message, 223  
 Managing, 134  
 Map Pointer Relations, 58  
 Mark Option Set Out-Of-Order, 137  
 Menu Management, 157  
 Menu Management menu, 82  
 Menu Templates Option, 126  
 Modify File Attributes, 58, 60  
 Monitor Taskman, 264, 279, 305  
 Multi-Term Lookup (MTLU), 345, 350  
     Example, 351  
 Multi-Term Lookup (MTLU) Main Menu, 347  
 Name, 122  
 Name and Menu Text, 129  
 Network Channel Device Edit Option, 234

- New/Revised Help Frames, 182
- One-time Option Queue, 294
- Operations Management, 46, 330
- Option Access by User, 133
- Option Audit Display, 131
- Options in the Option File that are Out-of-Order, 137
- Options that Should Be Scheduled, 138
- Options to be Delegated, 159
- OR PARAM IRM MENU, 80
- ORMGR, 80
- OUT OF ORDER MESSAGE (#2) Field, 137
- Out of Service Set/Clear, 214
- Out-Of-Order Set Management, 136
- P1 Print 1 occurrence of each error for T-1 (QUEUE), 187
- Parent of Queuable Options, 45, 51
- PARENT OF QUEUABLE OPTIONS, 138, 226, 289
- Patient Alert List for specified date, 169
- Permitted Devices, 138
- Place Taskman in a WAIT State, 286
- Post sign-in Text Edit, 22
- Print 2 occurrences of errors on T-1 (QUEUED), 187
- Print A Spool Document, 223
- Print All Delegates and their Options, 161
- Print Alpha/Beta Errors (Date/Site/Num/Rou/Err), 330
- Print Audits for Prescriber Editing, 92, 104
- Print DEA Expiration Date Expires 30 days, 91, 96
- Print DEA Expiration Date Null, 91, 93
- Print DISUSER DEA Expiration Date Expires 30 days, 91, 97
- Print DISUSER DEA Expiration Date Null, 91, 94
- Print DISUSER Prescribers with Privileges, 92, 100
- Print File Entries, 58
- Print Option File, 133
- Print Options Recommended for Queuing TaskMan, 289
- Print Options that are Scheduled to run, 289
- Print Prescribers with Privileges, 92, 98
- Print PSDRPH Key Holders, 92, 102
- Print Setting Parameters Privileges, 92, 103
- Print Sign-on Log, 47
- Print task, 244
- Print Transport Global, 320
- Print Utility
  - Multi-Term Look-Up (MTLU), 345, 352
    - Example, 353
  - Programmer mode, 38, 148
  - Programmer Options, 148, 309
  - Programmer Options Menu, 371
  - Prohibited Times, 138
  - Protocols Marked Out-of-Order in Protocol File Option, 137
  - Proxy (Connector) Detail Report, 49
  - Proxy (Connector) Inquire, 50
  - Proxy User List, 47
  - Purge Alerts for a User, 168
  - Purge Build or Install Files, 337
  - Purge Data Audits, 57
  - Purge DD Audits, 57
  - Purge Error Log Of Type Of Error, 296
  - Purge Inactive Users' Attributes Utility, 46
  - Purge Log of Old Access and Verify Codes Option, 53
  - Purge old spool documents, 226
  - Purge Sign-On log, 51
  - Queuable Task Log Clean Up, 288
  - Reactivate a User, 43, 46
  - Recover Deleted Option Set, 137
  - Reindex the users key's, 151
  - Reindexing All Users' Security Keys, 151
  - Release user, 50
  - Release User, 20
  - Remote Access User Sign-on Log, 51
  - Remove Error Screens, 187
  - Remove Options Previously Delegated, 160
  - Remove Out-Of-Order Messages from a Set of Options, 137
  - Remove Taskman from WAIT State, 287
  - Replace a Delegate, 160
  - Replicate or Replace a Delegate, 158, 160
  - Report Menu for Alerts, 168
  - Reprint Access Agreement Letter, 34
  - Requeue Tasks, 173, 252, 277, 303
  - Resource Device Edit, 236
  - Restart Install Of Package(s), 327
  - Restart Session, 125
  - Restart Task Manager Option, 286
  - Restart TaskMan, 270
  - Restrict Availability of Options, 137
  - Restricting Usage, 137
  - Rollup Patches into a Build, 339
  - Running tasks, 276
  - Schedule/Unschedule Options, 130, 288, 290, 294
  - Scheduling, 130



Search File Entries, 58  
 Secure Menu Delegation, 157, 158, 160  
 Secure Menu Management, 153, 156  
 Select another task, 244  
 Select Options to be Delegated, 158, 160  
 Send Alpha/Beta Usage to Programmers, 330  
 Send Test Pattern to Terminal, 214  
 Server-type, 172  
 Set Backup Reviewer for Alerts, 170  
 Shortcuts  
     Multi-Term Look-Up (MTLU), 346, 358  
         Example, 362  
 Show a Delegate's Options, 161  
 Show Error Log, 295  
 Show the Security Keys of a Particular User, 159  
 Show Users with Selected Primary Menu, 133  
 Site Parameters Edit, 265  
 Specify Allowable New Menu Prefix, 156, 161  
 Spool Device Edit, 227  
 Spool Management, 224, 225, 226  
 Spooler Menu, 222, 223, 225  
 Spooler Site Parameters Edit, 226  
 Statistics, 58  
 Stop task, 243  
 Stop Task Manager, 287  
 Stop TaskMan, 307  
 Surrogate for which Users?, 171  
 Switch Identities, 136  
 Switch UCI, 15  
 SYNC flag file control Option, 287  
 Synonym  
     Multi-Term Look-Up (MTLU)  
         Example, 363  
 Synonyms, 120, 122, 124, 130, 144, 181  
     Multi-Term Look-Up (MTLU), 346, 361  
 Systems Manager Menu, 82, 84, 87, 309  
 Task Allocation Audit of PSDRPH Key Report, 93, 110, 113  
 Task Changes to DEA Prescribing Privileges Report, 92, 106  
 Taskman Error Log, 185  
 Taskman Error Log Menu, 295  
 Taskman Management, 185  
 TaskMan Management Menu, 274  
 Taskman Management Utilities, 185, 279  
 TaskMan User, 241, 242, 243, 303  
 Tasks waiting for a device, 276  
 Time, 125  
 Toggle Options/Protocols On and Off, 137  
 Transfer Entries, 58  
 Transfer Lines from Another Document, 55, 57  
 Transport a Distribution, 313, 335  
 TRM or VTRM Device Edit, 206  
 Turn Data Audit On/Off, 57  
 UCI Association Table Edit, 260  
 Unassign Editor, 183  
 Unload a Distribution, 327  
 Unreferenced, 135  
 Unsuccessful tasks, 276  
 Update Routine File, 340  
 User Alerts Count Report, 170  
 User Inquiry, 51  
 User Management, 43, 54, 84, 87  
 User Management Menu, 46, 60, 65, 70  
 User sign-on event, 22, 23, 24  
 User start-up event, 24  
 User Status Report, 51  
 User's Toolbox, 6, 9, 10, 11, 12, 14, 72, 73, 125, 126, 222, 241  
 Users with Foreign Visits, 51  
 Utilities For MTLU, 353  
 Utilities Menu  
     KIDS, 331  
 Utility Functions, 58  
 VA FileMan, 54  
 Verify a Build, 340  
 Verify Checksums in Transport Global, 319  
 Verify Package Integrity, 341  
 View Alerts, 125  
 View Alerts "VA", 163  
 View Alerts "VA", 10, 125, 162  
 View data for Alert Tracking file entry, 170  
 Volume Set Edit Option, 257  
 Where am I?, 125  
 XPAR EDIT BY TEMPLATE, 375  
 XPAR EDIT KEYWORD, 375  
 XPAR EDIT PARAMETER, 80, 374  
 XPAR LIST BY ENTITY, 372  
 XPAR LIST BY PACKAGE, 373  
 XPAR LIST BY PARAM, 372  
 XPAR LIST BY TEMPLATE, 374  
 XPAR MENU TOOLS, 80, 145, 371  
 XPD BACKUP, 322  
 XPD COMPARE TO SYSTEM, 320  
 XPD CONVERT PACKAGE, 334  
 XPD DISTRIBUTION MENU, 310  
 XPD EDIT INSTALL, 334  
 XPD INSTALL BUILD, 323  
 XPD INSTALLATION, 315

XPD INSTALLATION MENU, 311  
 XPD LOAD DISTRIBUTION, 316, 317  
 XPD MAIN, 309  
 XPD PRINT BUILD, 332  
 XPD PRINT CHECKSUM, 319  
 XPD PRINT INSTALL, 320  
 XPD PRINT INSTALL FILE, 333  
 XPD PRINT PACKAGE PATCHES, 337  
 XPD PURGE FILE, 337  
 XPD RESTART INSTALL, 327  
 XPD ROLLUP PATCHES, 339  
 XPD ROUTINE UPDATE, 340  
 XPD UNLOAD DISTRIBUTION, 327  
 XPD UTILITY, 331  
 XPD VERIFY BUILD, 340  
 XPD VERIFY INTEGRITY, 341  
 XQ UNREF'D OPTIONS, 135  
 XQ XUTL \$J NODES, 138, 139  
 XQAB ACTUAL OPTION USAGE, 330  
 XQAB AUTO SEND, 330  
 XQAB ERR DATE/SITE/NUM/ROU/ERR,  
     330  
 XQAB ERROR LOG XMIT, 330  
 XQAB LIST LOW USAGE OPTS, 330  
 XQAB MENU, 330  
 XQAL ALERT LIST FROM DATE, 169  
 XQAL CRITICAL ALERT COUNT, 169  
 XQAL PATIENT ALERT LIST, 169  
 XQAL REPORTS MENU, 168  
 XQAL SET BACKUP REVIEWER, 170  
 XQAL SURROGATE FOR WHICH USERS,  
     171  
 XQAL USER ALERTS COUNT, 170  
 XQAL VIEW ALERT TRACKING ENTRY,  
     170  
 XQALERT, 10, 125  
 XQALERT BY USER DELETE, 168  
 XQALERT DELETE OLD, 167  
 XQALERT MAKE, 168  
 XQALERT MGR, 167  
 XQALERT SURROGATE SET/REMOVE,  
     165, 167  
 XQBUILDTREEQUE, 139, 291  
 XQCOPYOP, 155  
 XQDISPLAY OPTIONS, 132, 133  
 XQHELP-ASSIGN, 183  
 XQHELP-DEASSIGN, 183  
 XQHELP-DISPLAY, 182  
 XQHELPPFIX, 183  
 XQHELP-LIST, 182  
 XQHELP-MENU, 182  
 XQHELP-UPDATE, 182  
 XQHELP-XREF, 183  
 XQKEYALTODEL, 149  
 XQKEYDEL, 149, 159  
 XQLOCK1, 149  
 XQLOCK2, 149  
 XQOOF, 137  
 XQOON, 137  
 XQOON, 137  
 XQOOREDO, 137  
 XQOOSHOFIL, 137  
 XQOOSHOPRO, 137  
 XQOOSHOW, 137  
 XQOOTOG, 137  
 XQOPTFIX, 135  
 XQRESTRICT, 137  
 XQSMD ADD, 158, 160  
 XQSMD BUILD MENU, 155  
 XQSMD COPY USER, 155  
 XQSMD EDIT OPTIONS, 154  
     Example, 154  
 XQSMD LIMITED FM OPTIONS, 156  
     Example, 157  
 XQSMD MGR, 156, 157, 160  
 XQSMD REPLICATE, 160  
 XQSMD SET PREFIX, 156  
 XQSMD USER MENU, 153, 155, 156, 158,  
     159  
 XTLKCLKUP, 345, 350  
 XTLKMODKY, 346, 360  
 XTLKMODPARK, 345, 353, 354  
 XTLKMODPARS, 345, 353, 354  
 XTLKMODSH, 346  
 XTLKMODSH, 358  
 XTLKMODSY, 346, 361  
 XTLKMODUTL, 346, 353, 357  
 XTLKPRTUTL, 345, 352  
 XTLKUSER2, 347  
 XTLKUTILITIES, 353  
 XTMENU, 347  
 XU CHECKSUM REPORT, 319, 341  
 XU DA EDIT, 21, 213  
 XU EPCS DISUSER EXP DATE, 91, 94  
 XU EPCS DISUSER PRIVS, 91, 92, 100  
 XU EPCS DISUSER XDATE EXPIRES, 91,  
     97  
 XU EPCS EDIT DATA, 84, 90, 114  
 XU EPCS EDIT DEA# AND XDATE, 90,  
     91, 93, 114  
 XU EPCS EXP DATE, 91, 93

XU EPCS LOGICAL ACCESS, 91, 92, 106  
 XU EPCS PRINT EDIT AUDIT, 91, 92, 104  
 XU EPCS PRIVS, 91, 92, 98  
 XU EPCS PSDRPH, 91, 92, 102  
 XU EPCS PSDRPH AUDIT, 91, 93, 110  
 XU EPCS PSDRPH AUDIT RAULTTEST,  
 113  
 XU EPCS PSDRPH KEY, 91, 93, 113  
 XU EPCS SET PARMS, 91, 92, 103  
 XU EPCS UTILITY FUNCTIONS, 90, 91  
 XU EPCS XDATE EXPIRES, 91, 96  
 XU FINDUSER, 46  
 XU OPTION QUEUE, 294  
 XU SID EDIT, 208  
 XU SWITCH UCI, 15  
 XU USER SIGN-ON, 22, 23, 24  
 XU USER START-UP, 24  
 XUAUDIT, 131  
 XUAUDIT MENU, 131  
 XUAUTODEACTIVATE, 44, 45  
 XUCOMMAND, 134  
 XUDEVEDIT, 233  
 XUDEVEDITCHAN, 234  
 XUDEVEDITHFS, 204, 218  
 XUDEVEDITRES, 236  
 XUDEVEDITSP, 227  
 XUDEVEDITTRM, 206  
 XUEDITOPT, 128, 173  
 XUEDITSELF, 6, 9, 10, 12, 20, 22, 35  
 XUERRS, 187  
 XUERTRAP, 188  
 XUERTRP AUTO CLEAN, 188  
 XUERTRP CLEAN, 188  
 XUERTRP PRINT ERRS, 190  
 XUERTRP PRINT T-1 1 ERR, 187  
 XUERTRP PRINT T-1 2 ERR, 187  
 XUFILEACCESS, 60, 61, 65, 69, 70, 71  
 XUKERNEL, 208  
 XUKEYALL, 82, 148, 149  
 XUKEYDEALL, 148  
 XUKEYEDIT, 150  
 XUKEYMGMT, 82  
 XUMAIN, 82  
 XUOPTDISP, 131  
 XUOPTPURGE, 131  
 XUOPTUSER, 46  
 XUOPTWHO, 133  
 XUOUT, 214  
 XUPRINT, 133  
 XUPROG, 309, 371  
 XUPROGMODE, 38, 142  
 XURESJOB, 282, 299  
 XUS VISIT USERS, 51  
 XUSAP PROXY CONN DETAIL ALL, 49  
 XUSAP PROXY CONN DETAIL INQ, 50  
 XUSAP PROXY LIST, 47  
 XUSC LIST, 47  
 XUSCZONK, 51  
 XUSEC REMOTE ACCESS, 51  
 XUSER, 43, 54, 60, 65, 70, 87  
 XUSER DIV CHG, 11  
 XUSER KEY RE-INDEX, 151  
 XUSERAOLD, 53  
 XUSERBLK, 26, 38  
 XUSER-CLEAR-ALL, 20, 24  
 XUSERDEACT, 43  
 XUSEREDIT, 34, 35, 84, 87  
 XUSEREDITSELF, 9, 12, 14, 20, 22, 34, 42,  
 212  
 XUSERINQ, 51  
 XUSERINT Option, 16  
 XUSERLIST, 47  
 XUSERNEW, 25, 26  
 XUSERPOST, 22  
 XUSERPURGEATT, 46  
 XUSERREACT, 43, 46  
 XUSERREL, 20, 50  
 XUSERREPRINT, 34  
 XUSERTOOLS, 10  
 XUSESIG, 72, 73  
 XUSESIG BLOCK, 72  
 XUSESIG CLEAR, 73  
 XUSITEMGR, 46, 330  
 XUSITEPARM, 16, 17, 22, 209  
 XU-SPL-ALLOW, 222  
 XU-SPL-BROWSE, 222  
 XU-SPL-DELETE, 222  
 XU-SPL-LIST, 222  
 XU-SPL-MAIL, 223  
 XU-SPL-MGR, 225, 226  
 XU-SPL-PRINT, 223  
 XU-SPL-PURGE, 226  
 XU-SPL-SITE, 226  
 XU-SPL-USER, 225  
 XUSSPKI UPN SET, 87, 90, 115  
 XUSTAT, 38, 52  
 XUTESTUSER, 136  
 XUTIO, 203, 214  
 XUTLOOPBACK, 214  
 XUTM BACKGROUND PRINT, 289  
 XUTM BACKGROUND RECOMMENDED  
 TaskMan, 289

- XUTM CHECK ENV, 283
- XUTM CLEAN, 288
- XUTM DEL, 252, 278
- XUTM DQ, 252, 277, 303
- XUTM ERROR, 185, 295
- XUTM ERROR DELETE, 296
- XUTM ERROR LOG CLEAN RANGE, 296
- XUTM ERROR PURGE TYPE, 296
- XUTM ERROR SCREEN ADD, 186
- XUTM ERROR SCREEN EDIT, 186
- XUTM ERROR SCREEN LIST, 186
- XUTM ERROR SCREEN REMOVE, 187
- XUTM ERROR SHOW, 295
- XUTM INQ, 275
- XUTM MGR, 185, 274
- XUTM QCLEAN, 260, 288, 295, 301
- XUTM REQ, 252, 277, 303
- XUTM RESTART, 286
- XUTM RUN, 287
- XUTM SCHEDULE, 290
- XUTM STOP, 286, 287, 298
- XUTM SYNC, 287
- XUTM TL CLEAN, 278
- XUTM UCI, 260
- XUTM USER, 241, 303
- XUTM UTIL, 185, 279
- XUTM VOLUME, 257
- XUTM WAIT, 286, 287
- XUTM ZTMON, 264, 279, 305
- XUTTEST, 214
- XUUSERDISP, 14
- XUUSERSTATUS, 51
- XUXREF, 132
- XUXREF-2, 133
- Your future tasks, 276
- ZTMQUEUEABLE OPTIONS, 45, 51, 226, 288, 289
- Options in the Option File that are Out-of-Order Option, 137
- Options to be Delegated Option, 159
- Options
  - Secure Menu Delegation, 156
- OR PARAM IRM MENU, 80
- ORGANIZATION (#200.2) Field, 23
- Orientation, xxxix
- ORIGINAL DATA (#.04)
  - XUEPCS DATA (#8991.6) File, 104
- ORMGR, 80
- Other Files
  - TaskMan, 251
- Other Non-TaskMan Mode, 255

- OTHER NON-TASKMAN VOLUME SET
  - Type, 258
- Other Sources of Tasks, 240
- OUT OF ORDER MESSAGE (#2) Field, 137, 140, 172, 173, 178
- Out of Service Set/Clear Option, 214
- OUT OF SERVICE? (#3) Field, 259
- Out-Of-Order Set Management Menu, 136
- OUT-OF-SERVICE DATE Field, 17
- Overflowing Spool Document Storage, 224
- Overview
  - DEA ePCS Utility, 74
  - Multi-Term Look-Up (MTLU), 345
- OVERWRITE**, 328

## P

- P1 Print 1 occurrence of each error for T-1 (QUEUE) Option, 187
- PAC (#14, Programmer Access Code) Field, 38
- Package
  - Definition, 308
- PACKAGE (#9.4) File, 58, 308, 311, 312, 313, 337, 369
- PackMan Messages, 311, 313, 314, 316
- PAGE LENGTH (#3) Field
  - TERMINAL TYPE (#3.2) File, 210, 233
- Parameter, 370
  - Definition, 369
- PARAMETER DEFINITION (#8989.51) File, 170, 368, 369, 370, 371, 372, 375, 376
- PARAMETER ENTITY (#8989.518) File, 369
- PARAMETER TEMPLATE (#8989.52) File, 370
- Parameter Tools
  - Background, 367
  - Definitions, 368
  - Description, 368
  - Entity Definition, 369
  - Example, 376
  - Instance Definition, 370
  - Introduction, 367
  - Parameter Definition, 369
  - Template Definition, 370
  - Value Definition, 370
  - Why Would You Use?, 371
- Parameters
  - Checked during Signon, 17
  - DEA ePCS Utility
    - Enter Site Parameters, 80
  - OpenVMS Interactive Logins, 18

XQ MENUMANAGER PROMPT, 145  
 XUEPCS REPORT DEVICE, 80, 81, 106, 110  
 PARAMETERS (#8989.5) File, 170, 343, 368, 369, 370  
 Parent of Queuable Options Menu, 45, 51  
 PARENT OF QUEUABLE OPTIONS Menu, 138, 226, 289  
 Parents Cross-reference, 183  
 Parsing Algorithms, 34  
 Part 3 of the Kernel Installation (See File Access Security), 36, 54  
 Partition Size, 255  
 PASSWORD Field, 209  
 Passwords  
     Defining, 6  
     Why Longer Passwords?, 8  
 PATCH APPLICATION HISTORY Multiple Field, 312  
 Patches  
     History, xii  
     KIDS, 312, 313, 322, 339  
 PATIENT (#2) File, 60  
 Patient Alert List for specified date Option, 169  
 PATIENT^XQALERT API, 166  
 PAUSE State, 259, 306  
 P-BROWSER Type, 231  
 PERFORM DEVICE CHECKING Field, 17  
 Permitted Devices  
     Options, 138  
 PERMITTED DEVICES Multiple Field, 138  
 PERSON LOOKUP Field, 150  
 Phantom Jumps, 140, 141  
 PHONE #3 (#.133) Field, 39  
 PHONE #4 (#.134) Field, 39  
 PHONE (HOME) (#.131) Field, 12, 39  
 PHYSICAL DISK (#505) Field, 208  
 Pitch, 196  
 PIV  
     Smart Card  
         Digital Certificate, 4  
 PKI SERVER (#53.1) Field, 116  
 Place Taskman in a WAIT State Option, 286  
 P-MESSAGE Device, 207  
 POST SIGN-IN MESSAGE Field, 22  
 Post sign-in Text Edit Option, 22  
 POST-CLOSE EXECUTE (#19.8) Field  
     DEVICE (#3.5) File, 231  
 POST-CLOSE EXECUTE (#8) Field  
     DEVICE (#3.5) File, 200  
 PREFERRED EDITOR (#31.3) Field, 13, 37  
 PREFERRED EDITOR Field, 37  
 PRE-OPEN EXECUTE (#7) Field  
     DEVICE (#3.5) File, 200  
 PRIMARY HFS DIRECTORY (#320) Field, 208  
 Primary Menu, 6, 8, 9, 16, 25, 35, 120, 124, 132, 134, 135, 142, 144, 146  
     Assigning, 25  
     Defining, 128  
     Managing, 134  
     Rebuilding Menu Trees, 139  
     Trees, 139, 140, 141, 144, 146  
 PRIMARY MENU OPTION Field, 16, 25, 35, 46, 154, 155  
 PRIMARY MENU OPTION Field #201), 35  
 Print 2 occurrences of errors on T-1 (QUEUED) Option, 187  
 Print A Spool Document Option, 223  
 Print All Delegates and their Options, 161  
 Print Alpha/Beta Errors  
     (Date/Site/Num/Rou/Err) Option, 330  
 Print Audits for Prescriber Editing Option, 92, 104  
 Print DEA Expiration Date Expires 30 days Option, 91, 96  
 Print DEA Expiration Date Null Option, 91, 93  
 Print DISUSER DEA Expiration Date Expires 30 days Option, 91, 97  
 Print DISUSER DEA Expiration Date Null Option, 91, 94  
 Print DISUSER Prescribers with Privileges Option, 92, 100  
 Print File Entries Option, 58  
 Print Option File Option, 133  
 Print Options Recommended for Queueing Option  
     TaskMan, 289  
 Print Options that are Scheduled to run Option, 289  
 Print Prescribers with Privileges Option, 92, 98  
 Print PSDRPH Key Holders Option, 92, 102  
 Print Server Mode, 255  
 PRINT SERVER NAME OR ADDRESS (#65) Field, 202  
 PRINT SERVER Type, 258  
 Print Setting Parameters Privileges Option, 92, 103  
 Print Sign-on Log Option, 47  
 Print task Option, 244  
 Print Transport Global Option, 320  
 Print Utility Option

- Multi-Term Look-Up (MTLU), 345, 352
  - Example, 353
- Printer Controller Mode, 237
- Printers
  - Slaved, 237, 238
- Printing
  - Loaded Transport Globals (KIDS), 320
  - To Devices, 191
- Priority
  - Interactive Users, 20
- PRIORITY (#3.8) Field
  - Options, 130
  - Server Options, 174
- PRIORITY AT RUN TIME (#25) Field, 265
- Privileges
  - Audit, 60
  - Spooling, 220, 224
- Processes
  - DEA ePCS Utility
    - e-Prescribing, 78
    - Manual Paper-based Process, 77
- Processing Alerts, 162
- Processing Each Transport Global (KIDS), 323
- Producing Reports, Searches, and Statistics
  - Through Standardized Encoding of Diagnoses and Procedures, 345
- Profiles
  - Microsoft® Windows Active Directory, 1
- Programmer mode Option, 38, 148
- Programmer Options Menu, 148, 309, 371
- Progress Bar
  - KIDS Installations, 326
- Prohibited Times
  - Options, 138
- PROHIBITED TIMES FOR SIGN-ON (#15) Field, 39
- PROHIBITED TIMES FOR SIGN-ON Field, 17, 19
- Prompts
  - Terminal Type, 9
- Protocols
  - XU USER TERMINATE, 45
- Protocols Marked Out-of-Order in Protocol File Option, 137
- Provider Key, 149, 150
- Provider Security Key, 44
- Proxies
  - APPLICATION PROXY, 47
  - CONNECTOR PROXY, 47, 49, 50
- Proxy (Connector) Detail Report Option, 49
- Proxy (Connector) Inquire Option, 50

- Proxy User List Option, 47
- PS Anonymous Directories, xlv
- PSDRPH Security Key, 92, 93, 102, 103, 110, 113
- Purge Alerts for a User Option, 168
- Purge Build or Install Files Option, 337
- Purge Data Audits Option, 57
- Purge DD Audits Option, 57
- Purge Error Log Of Type Of Error Option, 296
- Purge Inactive Users' Attributes Option, 46
- Purge Log of Old Access and Verify Codes Option, 53
- Purge old spool documents Option, 226
- Purge Sign-On log Option, 51
- Purging
  - ^UTILITY(\$J, 138
  - ^XTMP, 138
  - Alerts, 167, 168
  - Audited options, 131
  - BUILD File, 329
  - Error Trap, 188
  - Failed Access Attempts Log Purge, 52
  - Inactive Users' Attributes, 46
  - INSTALL File, 329
  - Mail for Inactive Users, 46
  - Old Access and Verify Codes, 53
  - Old Job Nodes in XUTL, 138
  - Options (unreferenced), 135
  - Security Keys for Inactive Users, 46
  - Selected Entries (KIDS), 338
  - SIGN-ON LOG (#3.081) File, 51, 52
  - Signon Nodes, 138
  - Spool Documents, 222, 226
  - Taskman Error Log Menu, 187, 296
  - Tasks, 288, 301
- Purpose for Granting File Access, 56

## Q

- Quality, 196
- Question Mark Help, xliii, 8, 22, 38, 39, 55, 64, 120, 121, 123, 124, 127, 134, 147, 181, 184, 186, 187, 189, 192, 201, 242, 244, 277, 282, 283, 323
- Queueable Task Log Clean Up Option, 288
- QUEUED TO RUN AT WHAT TIME (#2) Field, 290, 291, 292, 294
- QUEUED TO RUN AT WHAT TIME Field, 290
- QUEUED TO RUN ON VOLUME SET (#5) Field, 290, 291, 292

- Queuers
  - TaskMan, 245
- Queuing
  - Device Handler, 193
  - File Access Specifications, 65
  - Forced Queuing, 200
  - KIDS Installations, 323
  - Options, 290
  - Output
    - TaskMan User Interface, 240
    - To Slaved Printers, 239
    - To the Spooler, 220
- QUEUEING (#5.5) Field
  - DEVICE (#3.5) File, 200
- QUEUEING REQUIRED Multiple Field, 138

**R**

- Reactivate a User Option, 43, 46
- Reactivating
  - Users, 43, 46
- READ Access, 36, 54, 56, 58, 59, 66, 70, 128
- Re-answering Installation Questions (KIDS), 324
- Reasons to Retain BUILD and INSTALL File Entries (KIDS), 339
- Rebuilding Primary Menu Trees, 139
- Recover Deleted Option Set Option, 137
- Recovering from an Aborted Distribution Load (KIDS), 327
- Redefining
  - Common Menu, 134
- Reference Materials, xliv
- Reindex the users key's Option, 151
- Reindexing All Users' Security Keys Option, 151
- Rejection Messages
  - TaskMan, 304
- Release user Option, 50
- Release User Option, 20
- Remote Access User Sign-on Log Option, 51
- REMOTE APPLICATION (#8994.5) File, 63
- REMOTE PRINTER NAME (#67) Field, 202
- Remove Error Screens Option, 187
- Remove Options Previously Delegated Option, 160
- Remove Out-Of-Order Messages from a Set of Options Option, 137
- Remove Taskman from WAIT State Option, 287
- REPLACE**, 328
- Replace a Delegate Option, 160

- REPLACEMENT VOLUME SET (#7) Field, 259
- Replicate or Replace a Delegate Option, 158, 160
- Report Menu for Alerts Menu, 168
- Reports
  - Alerts, 168, 169, 170, 171
  - First Occurrence of Each Error, 187
  - First Two Occurrences of Each Error, 187
  - Secure Menu Delegation, 161
- Reprint Access Agreement Letter Option, 34
- REQ^%ZTLOAD API, 303
- Requeue Tasks Option, 173, 252, 277, 303
- REQUIRED VOLUME SET? (#4) Field, 259
- Requirements
  - DEA ePCS Utility, 75
- RESCHEDULE FREQUENCY (#6) Field, 290, 291, 292
- RESCHEDULING FREQUENCY (#6) Field, 292, 294
- RESOURCE (#3.54) File, 235
- Resource Device Edit Option, 236
- Resource Devices
  - Editing, 236
- RESOURCE SLOTS (#35) Field, 173, 176
- DEVICE (#3.5) File, 235, 236
- Resources
  - Creating Resource Devices, 236
  - Devices
    - RESOURCE (#3.54) File, 235
    - Limiting Simultaneous Running of a Particular Task, 235
    - Running Sequences of Tasks, 236
    - Special Devices, 235
    - SYNC FLAGS, 236
    - System Management, 235
- RESOURCES Device Type, 173
- Response Time, 20, 255
- Restart Install Of Package(s) Option, 327
- Restart Session Option, 125
- Restart Task Manager Option, 286
- Restart TaskMan Option, 270
- RESTART^ZTMB Direct Mode Utility, 270
- Restarting Aborted Installations (KIDS), 327
- Restrict Availability of Options Option, 137
- RESTRICT DEVICES Field, 138
- Retrieving Spool Documents, 222
- Return Codes
  - Display
    - Attributes, 21
- Reverse Locks, 148, 151

REVERSE/NEGATIVE LOCK Field, 151  
 Revision History, ii  
     Patches, xii  
 RIGHT MARGIN (#1) Field  
     TERMINAL TYPE (#3.2) File, 210  
 Rollup Patches into a Build Option, 339  
 ROOM-BED (#405.4) File, 369  
 ROUTINE (#25) Field, 172, 174, 179  
 ROUTINE (#9.8) File, 319, 340, 341  
 Routine Tools  
     Compare local/national checksums report  
         Option, 319, 341  
 Routines  
     %ZTER\*, 185  
     ^%ZTMSH, 265  
     ^XTLKDICL, 346, 366  
     ^XTLKWIC, 363  
     ^ZU, 24  
     CHECK^XTSUMBLD, 319, 341  
     CHECK1^XTSUMBLD, 319, 341  
     Component Editing, 340  
     Cross-references, 183  
     **DIC**, 56  
     **DIE**, 56  
     DIP, 146  
     INIT, 308, 313  
     NVSTNSET, 202  
     XPAREDIT, 81  
     XQ12, 24  
     XTER\*, 185  
     XTLATSET Routine, 202  
     XTLKTOKN, 346  
     XUINCON, 70  
     XUSCLEAN, 139  
     ZSTU, 263  
 RPC Broker Documentation Website, 5  
 Rubber-band Jump, 124, 127  
 RUN Node, 250, 280, 286, 298  
 RUN State  
     TaskMan, 306  
 Running  
     File Access Security Conversion, 65  
         Advance Preparation, 65  
         Advantages, 65  
     Sequences of Tasks, 236  
     TaskMan with a DCL Context, 267  
 Running tasks Option, 276

## S

SAC, 135, 288

SCHEDULE File, 245, 249, 250, 251, 253, 254,  
 279, 282, 301, 302, 303, 305  
     **TaskMan**, 297  
 SCHEDULE II NARCOTIC (#55.1) Field, 98,  
 100  
 SCHEDULE II NON-NARCOTIC (#55.2)  
     Field, 98, 100  
 SCHEDULE III NARCOTIC (#55.3) Field, 98,  
 100  
 SCHEDULE III NON-NARCOTIC (#55.4)  
     Field, 98, 100  
 SCHEDULE IV (#55.5) Field, 98, 100  
 Schedule List, 250, 281  
     **Node**, 297  
 SCHEDULE V (#55.6) Field, 98, 100, 102, 103,  
 105, 106, 110, 113, 114, 115  
 Schedule/Unschedule Options Option, 130, 288,  
 290, 294  
 Scheduling  
     Installations (KIDS), 323  
     Options, 130  
         TaskMan, 289  
 SCHEDULING RECOMMENDED (#209)  
     Field, 130, 290, 292  
 Scratch Global, 231  
 Screen Editor  
     VA FileMan, 10, 20, 37  
**Scripts**  
     **GET\_METRIC.COM**, 264  
     **METRIC\_SCHEDULE.COM**, 264  
**SDP**  
     Devices, 236  
 Search File Entries Option, 58  
 SECONDARY \$I (#52) Field, 204, 206, 208  
 SECONDARY HFS DIRECTORY (#320.2)  
     Field, 208  
 Secondary Menu, 39, 121, 124, 132, 133, 134,  
 135, 141, 143, 149, 153, 154  
     Assigning, 134  
     Trees, 134, 142  
 SECONDARY MENU OPTIONS (#203)  
     Multiple Field, 35  
 SECONDARY MENU OPTIONS Multiple  
     Field, 39, 134, 143, 155  
 Secure Menu Delegation, 35, 43, 153  
     Build a New Menu Option, 155  
     Copy Everything About an Option to a New  
         Option Option, 155  
     Copy One Users Menus and Keys to others  
         Option, 155  
     Delegate's Menu Management Menu, 153



- Delegating Keys, 159
- Delegating Options
  - Select Options to be Delegated, 158
- Delegation Levels, 159
- Edit a User's Options, 154
- Limited File Manager Options (Build), 155
- Menu Prefix, 161
- Options too Sensitive to Delegate, 160
- Remove Options Previously Delegated Option, 160
- Replicate or Replace a Delegate, 160
- Reports, 161
- System Management, 157
- User Interface
  - Acting as a Delegate, 153
- Secure Menu Delegation Menu, 156, 157, 158, 160
  - Utilities, 147
- Secure Menu Management Menu, 153, 156
- Security
  - Devices, 209
  - File Access Security, 57
- Security Assertion Markup Language (SAML)
  - Tokens, 16, 23
- SECURITY Field, 17, 36, 209
- Security Forms, 26
- SECURITY KEY (#19.1) File, 148, 150, 151, 184
- Security Keys
  - XTLKZMGR, 353, 354
- Security Keys, 134, 147
  - Allocating Keys, 148
  - Assign the XUEPCSEEDIT Security Key, 82
  - Creating, 150
  - De-allocating Keys, 148
  - Delegating, 149, 159
  - Delegation Levels, 149, 152, 154, 159
  - Deleting, 151
  - Editing, 150
  - Exploding Key, 150
  - Exported, 151
  - Key Management, 148
  - Person Lookup, 150
  - Provider, 44, 149, 150
  - PSDRPH, 92, 93, 102, 103, 110, 113
  - Purging, 46
  - Reverse Locks, 151
  - Subordinate Keys, 150
  - System Management, 148
  - User Interface, 147
  - XMNOPRIV, 151
  - XQAL-DELETE, 168
  - XQSMDFM, 156
  - XTLKZMGR, 345, 353
  - XUAUTHOR, 183
  - XUEPCSEEDIT, 82, 92, 103, 114
  - XUMGR, 25, 26, 35, 73, 148, 149, 159, 225
  - XUPROG, 38, 135, 147, 148, 309
  - XUPROGMODE, 38, 148, 188
  - XUSPF200, 25, 26, 35
  - ZTMQ, 252, 275, 277, 278
- Security Keys
  - XUPROG, 371
- Security Token, 23
- SECURITY TOKEN SERVICE (#200.1) Field, 23
  - Select another task Option, 244
- Select Options to be Delegated Option, 158, 160
- SELECTABLE AT SIGN-ON (#.02) Field
  - TERMINAL TYPE (#3.2) File, 210, 213
- SELECTABLE AT SIGN-ON Field
  - TERMINAL TYPE (#3.2) File, 21
- Selecting
  - Common Options with the Double Quote, 125
  - Software Names for Purging (KIDS), 338
- Tasks
  - TaskMan User Interface, 242
- Send Alpha/Beta Usage to Programmers Option, 330
- Send Test Pattern to Terminal Option, 214
- Sending Output to the Spooler, 220
- Sequential Disk Processor (SDP), 236
  - Device Types, 211, 236
- SERVER ACTION (#221) Field, 173, 174, 175, 176
- SERVER AUDIT (#223) Field, 174, 175
- SERVER BULLETIN (#220) Field, 174, 175
- SERVER DEVICE (#227) Field, 173, 176
- SERVER MAIL GROUP (#222) Field, 175
- Server Options, 172
  - Denying Server Requests, 172
  - Errors and Warnings, 178
  - How Can the Number of Instances of a Server Option Be Controlled?, 173
  - Server Request, 172
  - Setting up a Server Option, 173
  - System Management, 172
  - Testing, 176
  - What Can Server Options Do?, 172
  - What is a Server Option?, 172
- XQSCHK Utility, 177
- XQSPING Utility, 176

- SERVER REPLY (#225) Field, 175
- Servers
  - Compute Mode, 255
  - General Processor, 255
  - Other Non-TaskMan, 255
  - Print Server Mode, 255
- SERVICE/SECTION (#29) Field, 38
- SERVICE/SECTION (#49) File, 34, 38, 369
- SERVICE/SECTION Field, 34
- Set Backup Reviewer for Alerts Option, 170
- SET LOGINS/INTERACTIVE DCL Command, 18
- Setting up a Server Option, 173
- Setup
  - TaskMan and DCL Context in Cache/VMS, 267
- SEX (#4) Field
  - NEW PERSON (#200) File, 25
- Shared Device and Terminal Type Attributes, How are They Used, 211
- Shortcuts
  - Double Quote and Option Name, 125
  - Multi-Term Look-Up (MTLU), 345, 357
    - Point to a Single Word or Phrase, 347
  - Signon, 8
  - Up-arrow Jump, 124, 125
- Shortcuts Option
  - Multi-Term Look-Up (MTLU), 346, 358
    - Example, 362
- Show a Delegate's Options, 161
- Show Error Log Option, 295
- Show the Security Keys of a Particular User Option, 159
- Show Users with Selected Primary Menu Option, 133
- SIGNATURE BLOCK PRINTED NAME (#20.2) Field, 72
- SIGNATURE BLOCK PRINTED NAME Field, 72
- SIGNATURE BLOCK TITLE (#20.3) Field, 72
- Signature Codes, 13
- Signoff
  - Error Handling, 9
    - Normal, 9
- Signon, 4
  - Audits, 51
  - Devices, 212
  - Enabling/Disabling Logons, 24
  - Flow Chart, 19
  - Jump Start, 8
  - Lock-out Times, 17
  - Multiple Sign-On Restriction, 20
  - Parameters Checked, 17
  - Process, 16
  - Selecting Devices, 212
  - Shortcuts, 8
  - Statistics, 52
  - Terminal Type Selection, 213
- Signon Attempts, 17
- SIGN-ON LOG (#3.081) File, 46, 47, 50, 51, 52
  - Purging, 51
- Signon/Security
  - Introductory Text, 16
  - Summary, 15
  - System Management, 16
    - Add a New User to the System Option, 25
    - Grant Access by Profile Option, 26
  - User Interface, 4
    - Change my Division Option, 11
    - Edit User Characteristics Option, 12
    - Switch UCI Option, 15
- SIGN-ON/SYSTEM DEVICE (#1.95) Field
  - DEVICE (#3.5) File, 199, 212, 215, 216
- Site Parameters, 16, 254
- Site Parameters Edit Option, 265
- SLAVE FROM DEVICE Field, 239
- Slaved Printers, 237, 238
  - Auto Print Mode, 237
  - Copy Print Mode, 237
  - Device and Terminal Type File Entries, 238
  - Printer Controller Mode, 237
  - Processing Steps, 239
  - Queuing, 239
  - System Management, 237
  - Transparent Print Mode, 237
  - User Interface, 237
- Smart Card
  - Digital Certificate, 4
- Software
  - Components, 249, 311, 339, 341
  - Exported, 308, 311, 320
  - KIDS Installations, 315
- Software Disclaimer, xl
- SPAWN Command, 246, 256
- Special Devices, 229
  - Browser Device, 229
  - Magtape, 233
  - Network Channel Device Edit Option, 234
  - Network Channel Devices, 234
  - Resources, 235
  - SDP, 236
- SPECIAL QUEUEING (#9) Field, 290, 292

- Specify Allowable New Menu Prefix Option, 156, 161
- Specifying
  - Right Margin and Page Length, 193
  - Special Subtype, 194
- SPOOL DATA (#3.519) File, 224
- Spool Device Edit Option, 227
- SPOOL DOCUMENT (#3.51) File, 196, 211, 224, 225, 228
- Spool Documents
  - Making into Mail Messages, 38
  - Name, 196, 211, 220, 228
  - Name—An Exception, 196
- Spool Management Menu, 225, 226
- SPOOLER Device, 220
- Spooler Menu, 222, 223, 225
- Spooler Site Parameters Edit Option, 226
- Spooling, 220
  - Attributes, 220
  - Auto-despooling, 227
  - Document Name Prompt, 220
  - Generating Names, 228
  - Granting Privileges, 224
  - Making Into Mail Messages, 223
  - Managing Spool Documents, 225
  - Printing spool documents, 223
  - Privileges, 38
  - Privileges, 220
  - Privileges, 220
  - Privileges, 224
  - Privileges, 224
  - Purge old Spool documents Option, 226
  - Retrieving Spool Documents, 222
  - Sending Output to the Spooler, 220
  - Spool Device Edit Option, 227
  - Spool Device Types, 227
  - Spool Document Name, 196, 211
  - Spool Document Storage, 224
    - Overflowing, 224
  - Spool Management Menu, 224
  - Spooler Menu, 222, 223, 225
  - Storage Overflows, 224
  - System Defaults, 226
  - System Management, 224
  - User Interface, 220
  - Viewing spool documents, 222
- SSN (#9) Field
  - NEW PERSON (#200) File, 25, 26, 35
- SSN Field
  - PATIENT (#2) File, 60
- STACK Variable, 187
- Standard Device Chart
  - Multi-Term Look-Up (MTLU), 349
- Standard Distributions, 313, 314
- START NEXT Field, 287
- Starting Up, Pausing, and Stopping Multiple Managers, 263
- Startup List Node**, 299
- States
  - Messages
    - TaskMan, 305
- Statistics
  - Signon, 52
- Statistics Option, 58
- STATUS (#.02) Field, 334
- Status Codes
  - TaskMan, 302
- STATUS Field, 326
- Status List, 250, 280
  - Node**, 299
- Stop Node**, 299
- Stop Task Manager Option, 287
- Stop task Option, 243
- Stop TaskMan Option**, 297, 307
- Stopping Tasks, 243
- Storing Host Files in a Specific Directory, 231
- Sub Node**, 299
- SUBJECT ORGANIZATION (#205.2) Field, 23
- SUBJECT ORGANIZATION ID (#205.3) Field, 23
- SUBMANAGER RETENTION TIME (#5) Field, 255
- Submanagers
  - TaskMan, 245, 247
- SUBORDINATE KEY Multiple Field, 150
- Subordinate Keys, 150
- SUBTYPE (#3) Field
  - DEVICE (#3.5) File, 199, 210, 233
- Summary
  - Device Handler, 197
  - File Access Security Conversion, 68
  - Menu Manager, 127
  - Signon/Security, 15
  - TaskMan
    - User Interface, 244
- SUPPRESS BULLETIN Field(#224), 175
- SUPPRESS FORM FEED AT CLOSE (#11.2) Field, 232
- Surrogate for which Users? Option, 171
- Surrogates
  - Alerts, 165, 167
- Switch Identities Option, 136

- Switch UCI Option, 15
- Switching
  - UCIs, 139, 254
- Symbols
  - Found in the Documentation, xli
- SYNC FLAG Field, 287
- SYNC flag file control Option, 287
- SYNC FLAGS, 236, 287
- Synonym
  - Options, 122
- Synonym Option
  - Multi-Term Look-Up (MTLU)
    - Example, 363
- Synonyms
  - Devices, 215
  - Multi-Term Look-Up (MTLU), 345, 357
    - Associated with Multiple Terms, 347
    - Multiple Tokens, 347
  - Options, 120, 122, 124, 130, 144, 181
- Synonyms Option
  - Multi-Term Look-Up (MTLU), 346, 361
- System Administrator Setup to Enable Building
  - Options from Templates, 156
- System Configuration
  - TaskMan Terminology, 252
- System Management
  - Alerts, 166
  - Browser Device, 231
  - Device Handler, 198
  - Electronic Signatures, 72
  - Error Processing, 185
  - File Access Security, 55
  - Form Feeds, 232
  - Help Processor, 182
  - Host Files, 218
  - KIDS
    - Installations, 308
    - Utilities, 331
  - Magtape Devices, 233
  - Managing Delegates, 157
  - Menu Manager, 128
  - Network Channel Devices, 234
  - Resources, 235
  - Secure Menu Delegation, 157
  - Security Keys, 148
  - Server Options, 172
  - Signon/Security, 16
  - Slaved Printers, 237
  - TaskMan
    - Configuration, 253
    - Operation, 274

- Overview, 245
- System Manager
  - Introduction, 2
- System Parameters, 16
- Systems Management
  - Multi-Term Look-Up (MTLU), 363
- Systems Manager Menu, 82, 84, 87, 309

## T

- Table of Contents, xiii
- Task Allocation Audit of PSDRPH Key Report
  - Option, 93, 110, 113
- Task Changes to DEA Prescribing Privileges
  - Report Option, 92, 106
- Task File Cleanup, 288
- Task List, 250, 282
  - Node**, 299
- TASK PARAMETERS (#15) Field, 290, 292
- TASK PARAMETERS Field, 53, 167, 188
- TASK PARTITION SIZE (#4) Field, 255
- Task Rejection Messages
  - TaskMan, 304
- Task Status Codes
  - TaskMan, 302
- TaskMan, 240
  - ^%ZTSCH Global**, 249
  - ^%ZTSK Global**, 249
  - API, 245
  - Check Taskman's Environment Option, 283
  - Clean Task File Option, 288
  - Cleanup Task List Option, 278
  - Configuration, 253
    - DEVICE (#3.5) File, 265
    - Multiple Managers, 263
    - Standardized VA Caché and GT.M, 262
  - DCL Context, 267
    - Batch Queues, 273
    - Cache/VMS, 267
    - OpenVMS User TASKMAN on ALPHA
      - AXP Systems, 273
    - Restarting, 270
    - TASKMAN Queue, 273
    - ZTMSWDCL.COM, 272
    - ZTMWDCL.COM, 271
  - Defining Environments, 253
  - Delete Tasks Option, 278
  - Dequeue Tasks Option, 277
  - DESCRIPTION Field, 292
  - DEVICE FOR QUEUED JOB OUTPUT (#3)
    - Field, 290, 291

- Division of Labor, 245
- Error Screens, 250
- Files, 249
- Header Page, 265
- Inspecting the Tasks in the Monitor's Lists, 283
- IO List, 281
- Job Limit, 255
- Job List, 282
- List Tasks Option, 274
- Load Balancing, 263
- Manager, 245, 246
  - Startup, 263
- Monitor Action Prompt, 282
- Multiple Managers and Load Balancing, 263
- Option Scheduling, 289
  - List Background Options, 289
  - One-time Option Queue Option, 294
  - PARENT OF QUEUABLE OPTIONS Menu, 289
  - Problems, 294
  - Queuing an option, 290
  - Schedule/Unschedule Options Option, 290
  - Through the OPTION SCHEDULING (#19.2) File, 246
  - Which Options to Queue, 289
- Other Files, 251
- QUEUED TO RUN AT WHAT TIME (#2) Field, 294
- QUEUED TO RUN AT WHAT TIME (#2) Field, 290, 291, 292
- QUEUED TO RUN ON VOLUME SET (#5) Field, 290, 291, 292
- Queuers, 245
- Queuing an Option, 290
- Queuing Output, 240
- Rejection Messages, 304
- Remove Taskman from WAIT State Option, 287
- Requeue Tasks Option, 277
- RESCHEDULE FREQUENCY (#6) Field, 290, 291, 292
- RESCHEDULING FREQUENCY (#6) Field, 292, 294
- Restart Task Manager Option, 286
- Restarting
  - DCL Context, 270
- SCHEDULE File, 250, 297
- Schedule List, 281
- Select another task Option, 244
- Sequences of Tasks, 236
- SPECIAL QUEUEING (#9) Field, 290
- Starting Up, Pausing, and Stopping Multiple Managers, 263
- Startup, 263
- States
  - BALANCE, 264, 305
  - ERROR, 305
  - Messages, 305
  - PAUSE, 259, 306
  - RUN, 306
  - WAIT, 263, 286, 287, 307
- Status Codes, 302
- Stop Task Manager Option, 287
- Stopping, 287
  - Tasks, 243
- Submanagers, 245, 247
- SYNC flag file control Option, 287
- SYNC FLAGS, 236
- System Management
  - Configuration, 253
  - Operation, 274
  - Overview, 245
- Task List, 282
- TASK PARAMETERS (#15) Field, 290
- Task Rejection Messages, 304
- Task Status Codes, 302
- Taskman Error Log
  - Menu, 295
- TaskMan Error Log, 185, 250, 282, 288, 295
- TaskMan Management Menu, 274
- Taskman Management Utilities
  - Menu, 279
- TaskMan's Reach, 254
- TaskmMn Error Log
  - Node, 297
- TASKS (#14.4) File, 251, 301
- Terminology, 252
- Troubleshooting, 281, 283, 297, 305
- User Interface, 240
  - Background Jobs, 240
  - Creating Tasks, 240
  - Display Status of Tasks, 243
  - Editing Tasks, 243
  - Listing and Printing Tasks, 244
  - Other Sources of Tasks, 240
  - Queuing Output, 240
  - Select another task Option, 244
  - Selecting Tasks, 242
  - Stopping Tasks, 243
  - Summary, 244
  - Tasks in the Task List, 242

- Working with Tasks, 241
- Working with Tasks, 241
- ZTMQ Security Key, 252
- TASKMAN ERROR File, 282
- Taskman Error Log
  - Menu, 295
- TaskMan Error Log, 185, 250, 282, 288, 295
  - Node, 297
- Taskman Error Log Menu, 185
  - Add Error Screens Option, 186
  - Clean Error Log Over Range Of Dates Option, 296
  - Delete Error Log Option, 296
  - Edit Error Screens Option, 186
  - List Error Screens Option, 186
  - Purge Error Log Of Type Of Error Option, 296
  - Remove Error Screens Option, 187
- Taskman Error Log Menu
  - Show Error Log Option, 295
- TASKMAN FILES UCI (#5) Field, 259
- TASKMAN FILES VOLUME SET (#6) Field, 259
- TASKMAN HANG BETWEEN NEW JOBS (#7) Field, 255
- TASKMAN JOB LIMIT (#6) Field, 255
- TASKMAN JOB LIMIT Field, 18, 253
- Taskman Management Menu, 185
  - Cleanup Task List Option, 278
  - Delete Tasks Option, 278
  - Dequeue Tasks Option, 277
  - List Tasks Option, 274
  - Requeue Tasks Option, 277
- TaskMan Management Menu, 274
- Taskman Management Utilities
  - Check Taskman's Environment Option, 283
  - Clean Task File Option, 288
  - Menu, 279
  - Monitor Taskman, 279
  - Place Taskman in a WAIT State Option, 286
  - Queuable Task Log Clean Up Option, 288
  - Remove Taskman from a WAIT State Option, 287
  - Restart Task Manager Option, 286
  - Stop Task Manager Option, 287
  - SYNC flag file control Option, 287
- Taskman Management Utilities Menu, 185
- TASKMAN PRINT A HEADER PAGE? (#26) Field, 265

- TASKMAN SITE PARAMETERS (#14.7) File, 18, 249, 251, 253, 254, 258, 262, 263, 269, 281
- BOX-VOLUME PAIR (#.01) Field, 254, 255
- Load Balance Routine, 263
- LOAD BALANCE ROUTINE (#21) Field, 257
- LOG TASKS? (#2) Field, 254
- MODE OF TASKMAN (#8) Field, 255
- Standardized VA Caché and GT.M Configuration, 262
- SUBMANAGER RETENTION TIME (#5) Field, 255
- TASK PARTITION SIZE (#4) Field, 255
- TASKMAN HANG BETWEEN NEW JOBS (#7) Field, 255
- TASKMAN JOB LIMIT (#6) Field, 255
- VAX ENVIRONMENT FOR DCL (#9) Field, 256
- TaskMan User Option, 241, 242, 243, 303
  - Display Status of Tasks, 243
  - Editing Tasks, 243
  - Listing and Printing Tasks, 244
  - Stopping Tasks, 243
  - Summary, 244
  - Tasks in the Task List, 242
  - Working with Tasks, 241
- Tasks
  - Creating, 235
  - Editing, 243
  - In the Task List, 242
  - KILL, 282
  - Waiting for a Volume Set, 246
  - Waiting to Start on a Compute Server, 250
- TASKS (#14.4) File, 243, 245, 246, 247, 249, 251, 253, 254, 255, 275, 276, 277, 278, 288, 290, 291, 295, 297, 299, 301, 303, 305
- Tasks waiting for a device Option, 276
- TEAM (#404.51) File, 369
- Telnet Device, 207
- TELNET PORT (#66) Field, 202
- Templates
  - Definition, 370
  - LOGIN Menu, 8, 126
  - System Administrator Setup to Enable Building Options from Templates, 156
  - XUEDIT CHARACTERISTICS, 42
- Terminal Type
  - Attributes, 20, 211, 212
  - Entries, 194, 213, 238
  - Identity, 8

- Information Retained by User, 212
- Naming Conventions, 211
- P-BROWSER, 231
- Prompt, 9, 21
- Query, 8, 9
- Selection at Signon, 213
- Setup, 20, 42
- Specifications, 196
- TERMINAL TYPE (#3.2) File, 20, 21, 194, 198, 199, 210, 211, 213, 215, 232, 233, 238
- BACK SPAC (#4)E Field, 233
- BACK SPACE (#4) Field, 210
- CLOSE EXECUTE (#7) Field, 210, 232, 238, 239
- CLOSE EXECUTE Field, 197
- FORM FEED (#2) Field, 210, 233
- Global Location**, 198
- NAME (#.01) Field, 210
- Naming Conventions, 211
- OPEN EXECUTE (#6) Field, 210, 238, 239
- OPEN EXECUTE Field, 197
- PAGE LENGTH (#3) Field, 210, 233
- RIGHT MARGIN (#1) Field, 210
- SELECTABLE AT SIGN-ON (#.02) Field, 210, 213
- SELECTABLE AT SIGN-ON Field, 21
- Terminating
  - Users, 43
- TERMINATION DATE (#9.2) Field, 39, 43, 44, 95, 100
- TERMINATION DATE Field, 26, 44, 46, 174
- Termination Process, 45
- Terminology
  - KIDS, 308
  - TaskMan, 252
- Testing
  - User's Menus, 136
  - XQSCHK Server Option, 177
- TEXT TERMINATOR (#31.2) Field, 13
- TEXT TERMINATOR Field, 42
- TIED ROUTINE Field, 16
- Time Option, 125
- TIME PERIOD (#.01) Field, 138
- TIMED READ (#200.1) Field, 38
- TIMED READ Field, 22
- TIMES/DAYS PROHIBITED (#3.91) Multiple Field, 173, 174
- TITLE (#3.1) File, 35
- TITLE (#8) Field, 12, 35
- TMP Global**, 138, 139
- TO UCI (#3) Field, 261
- TO VOLUME SET (#2) Field, 261
- Toggle Options/Protocols On and Off Option, 137
- Tokenizing Routine, 346
- Tokens
  - Security, 23
  - Security Assertion Markup Language (SAML), 16, 23
- Toolbox
  - Display User Characteristics Option, 14
  - Electronic Signature code Option, 72
  - Menu, 6, 9, 10, 11, 12, 14, 72, 73, 125, 126, 222, 241
- Toolkit Queuable Options menu
  - Errors Logged in Alpha/Beta Test (QUEUED) Option, 330
- Transfer Entries Option, 58, 59
- Transfer File Entries Option, 58
- Transfer Lines from Another Document Option, 55, 57
- TRANSLATION (#.847) Subfield, 62
- Transparent Print Mode, 237
- Transport a Distribution Option, 313, 335
- TRANSPORT BUILD NUMBER (#63) Field, 319, 341
- Transport Global, 308
  - Backup, 322
  - Compare, 311, 314, 320
  - Components, 315
  - Create, 310, 313, 340
  - Definition, 308
  - Environment Check, 314
  - Export, 310
  - Install, 311
  - Load from Distribution, 311, 314, 316
  - Load from PackMan Messages, 311, 314
  - Print, 311, 314, 320
  - Processing, 323
  - Verify, 340
  - Verifying Checksums, 319
- Transport Mechanism
  - Distributions, 313
- TRM or VTRM Device Edit Option, 206
- TRM Type, 239
- Troubleshooting
  - Device Handler, 213
  - Menu Manager Variables, 146
  - TaskMan, 281, 283, 297, 305
- Turn Data Audit On/Off Option, 57
- TYPE (#.1) Field
  - VOLUME SET (#14.5) File, 258, 259

TYPE (#2) Field  
     DEVICE (#3.5) File, 199, 265  
 TYPE (#4) Field  
     OPTION (#19) File, 172, 174  
 TYPE Field  
     DEVICE (#3.5) File, 201  
 TYPE-AHEAD (#.09) Field, 62  
 TYPE-AHEAD (#200.09) Field, 13, 38  
 TYPE-AHEAD Field, 22  
 Types  
     BROWSER, 231  
     COMPUTE SERVER, 258  
     FILE SERVER (Obsolete), 258  
     GENERAL PURPOSE VOLUME SET, 258  
     OTHER NON-TASKMAN VOLUME SET,  
         258  
     P-BROWSER, 231  
     PRINT SERVER, 258  
     RESOURCES, 173  
     TRM, 239

## U

UCI  
     Definition, 252  
     Switching, 139, 254  
 UCI ASSOCIATION (#14.6) File, 249, 251,  
     253, 260, 304  
     FROM UCI (#.01) Field, 261  
     FROM VOLUME SET (#1) Field, 261  
     Standardized VA Caché and GT.M  
         Configuration, 262  
     TO UCI (#3) Field, 261  
     TO VOLUME SET (#2) Field, 261  
 UCI Association Table Edit Option, 260  
 UCI ASSOCIATION TABLE Field, 261  
 Unassign Editor Option, 183  
 Understanding DUZ (User Number), 61  
 Unload a Distribution Option, 327  
 Unsuccessful tasks Option, 276  
 Up-arrow Jump, 120, 124, 125, 126, 127, 139  
**Update Node**, 299  
 Update Routine File Option, 340  
 URLs  
     Acronyms Intranet Website, 382  
     Adobe Website, xliv  
     Enterprise Program Management Office  
         Website, xl  
     Glossary Intranet Website, 382  
     KAAJEE Documentation Website, 5  
     Kernel Website, xliv

RPC Broker Documentation Website, 5  
 VA FileMan Documentation Website, 36, 54,  
     57  
 VA Software Document Library (VDL)  
     Website, xliv  
 Usage Considerations  
     Multi-Term Look-Up (MTLU), 346  
 USE AS LINK FOR MENU ITEMS Action,  
     315, 323  
 USE Command, 247  
 Use of Slaved Printer  
     Processing Steps, 239  
 USE PARAMETERS (#19.5) Field  
     DEVICE (#3.5) File, 200  
 Use this Manual, How to, xxxix  
 USE TIMEOUT ON OPENS (#2009.5) Field  
     DEVICE (#3.5) File, 234  
 User Alerts Count Report Option, 170  
 USER CHARACTERISTICS TEMPLATE  
     Field, 42  
 USER CLASS (#9.5) Field, 47  
 User Inquiry Option, 51  
 User Interface, 1  
     Alerts, 162  
     Browser Device, 229  
     Device Handler, 191  
     Electronic Signatures, 72  
     Error Processing, 185  
     File Access Security, 54  
     Form Feeds, 232  
     Help Processor, 180  
     Host Files, 217  
     Menu Manager, 120  
     Multi-Term Look-Up (MTLU), 347  
     Secure Menu Delegation  
         Acting as a Delegate, 153  
     Security Keys, 147  
     Signon/Security, 4  
     Slaved Printers, 237  
     Spooling, 220  
     TaskMan, 240  
 User Management menu, 87  
 User Management Menu, 43, 46, 54, 60, 65, 70,  
     84  
     Operations Management Menu, 46  
     User sign-on event Option, 22, 23, 24  
 User Stacks, 138, 139, 141  
     Nodes, 141  
 User start-up event Option, 24  
 User Status Report Option, 51  
 USER^XQALERT API, 166



- User's Toolbox Menu, 6, 9, 10, 11, 12, 14, 72, 73, 125, 126, 222, 241
  - Display User Characteristics Option, 14
  - Electronic Signature code Option, 72
- Users
  - Adding New, 25
  - Attributes, 16, 25, 26, 34
  - Deactivating, 43
  - Deactivating Automatically, 44
  - Introduction, 1
  - Reactivating, 46
  - Terminating, 43
- Users with Foreign Visits Option, 51
- Using
  - File Access Options, 61
  - Multi-Term Lookup (MTLU) Option, 350
  - Print Utility Option, 352
  - Ranges of File Numbers, 64
  - Security Keys with Reverse Locks, 151
  - Utilities for MTLU Option, 353
- USR CLASS (#8930) File, 369
- Utilities
  - ^%ZTMOVE
    - Toolkit, 303
  - Block Count, 183
  - DIFROM, 308, 311, 313
  - Secure Menu Delegation Menu, 147
  - XQSCHK Server Option, 177
  - XQSPING, 176
  - XTSPING, 176
- Utilities For MTLU Menu, 353
- Utilities Menu
  - KIDS, 331
- Utility Functions Menu, 58
- UTILITY(\$J Global, 68, 138, 139
  - Purging, 138

**V**

- VA FileMan
  - Browser Device, 229
  - File Access Security
    - Properties, 57
  - Limited File manger Options (Build) Option, 155
  - Line Editor, 13, 37, 55, 57
  - Menu, 54
  - Screen Editor, 10, 20, 37
  - What Happened to DIFROM, 313
- VA FileMan Documentation Website, 36, 54, 57
- VA Handbook 6500, 45

- Appendix D, 45
- VA Software Document Library (VDL)
  - Website, xliv, 343
  - Website, 343
  - Website, 343
  - Website, 344
- VA# (#53.3) Field, 98, 100
- Value
  - Definition, 370
- Variables
  - \$HOROLOG, 280, 299
  - \$STACK, 187
  - %ZISQUIT, 200
  - DIDEL**, 56, 57
  - DLAYGO**, 56, 57
  - DTIME, 22, 38
  - DUZ, 61
  - DUZ("AG"), 22
  - DUZ("AUTO"), 22
  - DUZ(0), 36, 55, 56, 59, 60, 65, 156, 209
  - DUZ(2), 21
  - IO, 130
  - IONOFF, 232
  - Menu Manager, Troubleshooting, 146
  - XQABTST**, 146
  - XQACNDEL, 164
  - XQDIC**, 146
  - XQMM("J"), 141
  - XQPSM**, 146
  - XQT**, 146
  - XQUIT, 140, 174
  - XQUR**, 146
  - XQUSER**, 146
  - XQXFLG**, 146
  - XQY**, 146
  - XQY0**, 146
  - ZTCPU, 267
  - ZTQPARAM, 292
  - ZTSTOP, 303
- VAX ENVIRONMENT FOR DCL (#9) Field, 256, 267
- Verify a Build Option, 340
- Verify Checksums in Transport Global Option, 319
- VERIFY CODE (#7.2) Field, 13, 35
- VERIFY CODE Field, 35
- Verify Codes, 4, 5, 6, 7, 8, 9, 13, 16, 17, 21, 25, 35, 43, 52, 53, 61, 174, 179
  - Defining, 6
  - Log, 53
  - Old, 53

- Purging, 53
- Verify Package Integrity Option, 341
- Verifying Checksums in a Transport Global (KIDS), 319
- VERSION Multiple Field, 312
- Versions to Retain (KIDS), 337
- View Alerts "VA" Option, 163
- View Alerts "VA" Option, 10, 125, 162
- View Alerts Option, 125
- View data for Alert Tracking file entry Option, 170
- Virtual Devices
  - VMS Systems, 212
- Virtual Terminals, 212
- VMS
  - Systems
    - Virtual Devices, 212
- VMS DEVICE TYPE (#63) Field, 202
- VOICE PAGER (#.137) Field, 12, 39, 72
- VOLD Cross-reference, 53
- Volume
  - Set Definition, 252
- VOLUME SET (#.01) Field
  - VOLUME SET (#14.5) File, 258
- VOLUME SET (#14.5) File, 24, 249, 251, 253, 257, 261, 288, 304, 305, 306
  - DAYS TO KEEP OLD TASKS (#8) Field, 260
  - INHIBIT LOGONS? (#1) Field, 259
  - LINK ACCESS (#2) Field, 259
  - OUT OF SERVICE? (#3) Field, 259
  - REPLACEMENT VOLUME SET (#7) Field, 259
  - REQUIRED VOLUME SET? (#4) Field, 259
  - Standardized VA Caché and GT.M Configuration, 262
  - TASKMAN FILES UCI (#5) Field, 259
  - TASKMAN FILES VOLUME SET (#6) Field, 259
  - TYPE (#.1) Field, 258, 259
  - VOLUME SET (#.01) Field, 258
- VOLUME SET (#41) Multiple Field
  - KERNEL SYSTEM PARAMETERS (#8989.3) File, 255
- Volume Set Edit Option, 257
- VOLUME SET Multiple Field
  - KERNEL SYSTEM PARAMETERS (#8989.3) File, 18
- VOLUME SET(CPU) (#1.9) Field
  - DEVICE (#3.5) File, 199, 212, 215, 216, 265, 291

## W

- Wait Node, 299
- WAIT State, 299
  - TaskMan, 263, 286, 287, 307
- Waiting List, 250
- Waivers
  - Academic Afiliation Waiver, 45
- Websites
  - Acronyms Intranet Website, 382
  - Adobe Website, xliv
  - Enterprise Program Management Office Website, xl
  - Glossary Intranet Website, 382
  - KAAJEE Documentation Website, 5
  - Kernel Website, xliv
  - RPC Broker Documentation Website, 5
  - VA FileMan Documentation Website, 36, 54, 57
  - VA Software Document Library (VDL) Website, xliv, 343, 344
- What Can Server Options Do?, 172
- What Happened to DIFROM, 313
- What in VA FileMan is Still Protected by the File Manager Access Code?, 56
- What is a Server Option?, 172
- When is File Access Security Checked?, 56
- When the Distribution is Split Across Diskettes (KIDS), 316
- When the KIDS Installation is Queued, 323
- Where am I? Option, 125
- Which Options to Queue
  - TaskMan, 289
- Who Needs File Access?, 57
- Why Longer Passwords?, 8
- Why Would You Use Parameter Tools?, 371
- Working with Tasks, 241
- WRITE Access, 36, 54, 56, 59, 128

## X

- XMB Global, 224
- XMBS Global, 224
- XMNOPRIV Security Key, 151
- XPAR EDIT BY TEMPLATE Option, 375
- XPAR EDIT KEYWORD Option, 375
- XPAR EDIT PARAMETER Option, 80, 374
- XPAR LIST BY ENTITY Option, 372
- XPAR LIST BY PACKAGE Option, 373
- XPAR LIST BY PARAM Option, 372
- XPAR LIST BY TEMPLATE Option, 374

XPAR MENU TOOLS Menu, 80, 371  
 XPAR MENU TOOLS Option, 145  
 XPAREDIT Routine, 81  
 XPD BACKUP Option, 322  
 XPD COMPARE TO SYSTEM Option, 320  
 XPD CONVERT PACKAGE Option, 334  
 XPD DISTRIBUTION MENU, 310  
 XPD EDIT INSTALL Option, 334  
 XPD INSTALL BUILD Option, 323  
 XPD INSTALLATION MENU Menu, 311, 315  
 XPD LOAD DISTRIBUTION Option, 316, 317  
 XPD MAIN Menu, 309  
 XPD PRINT BUILD Option, 332  
 XPD PRINT CHECKSUM Option, 319  
 XPD PRINT INSTALL FILE Option, 333  
 XPD PRINT INSTALL Option, 320  
 XPD PRINT PACKAGE PATCHES Option,  
   337  
 XPD PURGE FILE Option, 337  
 XPD RESTART INSTALL Option, 327  
 XPD ROLLUP PATCHES Option, 339  
 XPD ROUTINE UPDATE Option, 340  
 XPD UNLOAD DISTRIBUTION Option, 327  
 XPD UTILITY Menu, 331  
 XPD VERIFY BUILD Option, 340  
 XPD VERIFY INTEGRITY Option, 341  
 XQ MENUMANAGER PROMPT Parameter,  
   145  
 XQ Nodes, 142  
 XQ UNREF'D OPTIONS Option, 135  
 XQ XUTL \$J NODES Option, 138, 139  
 XQ12 Routine, 24  
 XQAB ACTUAL OPTION USAGE Option,  
   330  
 XQAB AUTO SEND Option, 330  
 XQAB ERR DATE/SITE/NUM/ROU/ERR  
   Option, 330  
 XQAB ERROR LOG XMIT Option, 330  
 XQAB LIST LOW USAGE OPTS Option, 330  
 XQAB MENU Menu, 330  
**XQABTST Variable**, 146  
 XQACNDEL Variable, 164  
 XQAL ALERT LIST FROM DATE Option,  
   169  
 XQAL BACKUP REVIEWER, 170  
 XQAL CRITICAL ALERT COUNT Option,  
   169  
 XQAL PATIENT ALERT LIST Option, 169  
 XQAL REPORTS MENU Menu, 168  
 XQAL SET BACKUP REVIEWER Option, 170  
 XQAL SURROGATE FOR WHICH USERS  
   Option, 171  
 XQAL USER ALERTS COUNT Option, 170  
 XQAL VIEW ALERT TRACKING ENTRY  
   Option, 170  
 XQAL-DELETE Security Key, 168  
 XQALERT BY USER DELETE Option, 168  
 XQALERT DELETE OLD Option, 167  
 XQALERT MAKE Option, 168  
 XQALERT MGR Menu, 167  
 XQALERT Option, 10, 125  
 XQALERT SURROGATE SET/REMOVE  
   Option, 165, 167  
 XQBUILDTREEQUE Option, 139, 291  
 XQCOPYOP Option, 155  
**XQDIC Variable**, 146  
 XQDISPLAY OPTIONS Menu, 132, 133  
 XQHELP-ASSIGN Option, 183  
 XQHELP-DEASSIGN Option, 183  
 XQHELP-DISPLAY Option, 182  
 XQHELPPFIX Option, 183  
 XQHELP-LIST Option, 182  
 XQHELP-MENU Menu, 182  
 XQHELP-UPDATE Option, 182  
 XQHELP-XREF Option, 183  
 XQKEYALTODEL Option, 149  
 XQKEYDEL Option, 149, 159  
 XQLOCK1 Option, 149  
 XQLOCK2 Option, 149  
 XQMM("J") Variable, 141  
 XQOOFF Option, 137  
 XQOON Menu, 136  
 XQOONMAKE Option, 136  
 XQOON Option, 137  
 XQOORED0 Option, 137  
 XQOOSHOFIL Option, 137  
 XQOOSHOPRO Option, 137  
 XQOOSHOW Option, 137  
 XQOOTOG Option, 137  
 XQOPTFIX Option, 135  
**XQPSM Variable**, 146  
 XQRESTRICT Option, 137  
 XQSCHK Server Option  
   Errors and Warnings, 178  
   Testing, 177  
 XQSERVER Bulletin, 174, 178  
 XQSMD ADD Option, 158, 160  
 XQSMD BUILD MENU Option, 155  
 XQSMD COPY USER Option, 155  
 XQSMD EDIT OPTIONS Option, 154  
   Example, 154

XQSMDFM Security Key, 156  
 XQSPING Utility, 176  
 XQSRV Namespace, 175  
 XQT Nodes (MENU Templates), 142  
**XQT Variable**, 146  
 XQUIT Variable, 140, 174  
**XQUR Variable**, 146  
**XQUSER Variable**, 146  
**XQXFLG Variable**, 146  
**XQY Variable**, 146  
**XQY0 Variable**, 146  
 XTER\* Routines, 185  
 XTLATSET Routine, 202  
 XTLKCLKUP Option, 345, 350  
 XTLKMODKY Option, 346, 360  
 XTLKMODPARK Option, 345, 353, 354  
 XTLKMODPARS Option, 345, 354  
 XTLKMODPARS Options, 353  
 XTLKMODSH Option, 346, 358  
 XTLKMODSY, 346  
 XTLKMODSY Option, 361  
 XTLKMODUTL Option, 346, 353, 357  
 XTLKPRUTL Option, 345, 352  
 XTLKTOKN Routine, 346  
 XTLKUSER2 Menu, 347  
 XTLKUTILITIES, 353  
 XTLKZMGR Security Key, 345, 353, 354  
 XTMENU Menu, 347  
 XTMP Global, 137, 138, 139, 314, 316, 327  
 XTSPING Utility, 176  
 XU CHECKSUM REPORT Option, 319, 341  
 XU DA EDIT Option, 21, 213  
 XU EPCS DISUSER EXP DATE Option, 91, 94  
 XU EPCS DISUSER PRIVS Option, 91, 92, 100  
 XU EPCS DISUSER XDATE EXPIRES  
   Option, 91, 97  
 XU EPCS EDIT DATA Option, 84, 90, 114  
 XU EPCS EDIT DEA# AND XDATE Option,  
   90, 91, 93, 114  
 XU EPCS EXP DATE Option, 91, 93  
 XU EPCS LOGICAL ACCESS Option, 91, 92,  
   106  
 XU EPCS PRINT EDIT AUDIT Option, 91, 92,  
   104  
 XU EPCS PRIVS Option, 91, 92, 98  
 XU EPCS PSDRPH AUDIT Option, 91, 93, 110  
 XU EPCS PSDRPH AUDIT RAULTTEST  
   Option, 113  
 XU EPCS PSDRPH KEY Option, 91, 93, 113  
 XU EPCS PSDRPH Option, 91, 92, 102  
 XU EPCS SET PARMS Option, 91, 92, 103  
 XU EPCS UTILITY FUNCTIONS Menu, 90,  
   91  
 XU EPCS XDATE EXPIRES Option, 91, 96  
 XU FINDUSER Option, 46  
 XU OPTION QUEUE Option, 294  
 XU SID EDIT Option, 208  
 XU SWITCH UCI Option, 15  
 XU USER SIGN-ON Extended Action, 23  
 XU USER SIGN-ON Option, 22, 23, 24  
 XU USER START-UP Extended Action, 24  
 XU USER TERMINATE Protocol, 45  
 XUAUDIT MENU, 131  
 XUAUDIT Option, 131  
 XUAUTHOR Security Key, 183  
 XUAUTODEACTIVATE Option, 44, 45  
 XUCOMMAND Menu, 134  
 XUDEVEDIT Option, 233  
 XUDEVEDITCHAN Option, 234  
 XUDEVEDITHFS Option, 204, 218  
 XUDEVEDITRES Option, 236  
 XUDEVEDITRESPL Option, 227  
 XUDEVEDITTRM Option, 206  
 XUEDIT CHARACTERISTICS Template, 42  
 XUEDITOPT, 37  
 XUEDITOPT Option, 128, 173  
 XUEDITSELF Option, 6, 9, 10, 12, 20, 22, 35  
 XUEPCS DATA (#8991.6) File, 92, 104, 106  
 XUEPCS PSDRPH AUDIT (#8991.7) File, 93,  
   110  
 XUEPCS REPORT DEVICE parameter, 80,  
   106, 110  
 XUEPCS REPORT DEVICE Parameter, 81  
 XUEPCSEDIT Security Key, 82, 92, 103, 114  
 XUERRS Menu, 187  
 XUERTRAP Option, 188  
 XUERTRP AUTO CLEAN Option, 188  
 XUERTRP CLEAN Option, 188  
 XUERTRP PRINT ERRS Option, 190  
 XUERTRP PRINT T-1 1 ERR Option, 187  
 XUERTRP PRINT T-1 2 ERR Option, 187  
 XUFI Namespace, 68  
 XUFILEACCESS Menu, 60, 61, 65, 69, 70, 71  
 XUINCON Routine, 70  
 XUKERNEL, 208  
 XUKEYALL Option, 82, 148, 149

XUKEYDEALL Option, 148  
 XUKEYEDIT Option, 150  
 XUKEYMGMT Menu, 82  
 XUMAINT Menu, 82  
 XUMGR Security Key, 25, 26, 35, 73, 148, 149, 159, 225  
 XUOPTDISP Option, 131  
 XUOPTPURGE Option, 131  
 XUOPTUSER Menu, 46  
 XUOPTWHO Option, 133  
 XUOUT Option, 214  
 XUP API, 231  
 XUPRINT Option, 133  
 XUPROG Menu, 309, 371  
 XUPROG Security Key, 38, 135, 147, 148, 309, 371  
 XUPROGMODE Option, 38, 142  
 XUPROGMODE Security Key, 38, 148, 188  
 XURESJOB Option, 282, 299  
 XUS VISIT USERS Option, 51  
 XUSAP PROXY CONN DETAIL ALL Option, 49  
 XUSAP PROXY CONN DETAIL INQ Option, 50  
 XUSAP PROXY LIST Option, 47  
 XUSC LIST Option, 47  
 XUSCLEAN Routine, 139  
 XUSCZONK Option, 51  
 XUSEC Cross-reference, 151  
 XUSEC REMOTE ACCESS Option, 51  
**XUSEC(0, Global**, 52, 138  
 XUSEC(0,"CUR",DUZ,DATE), 139  
 XUSER COMPUTER ACCOUNT Help Frame, 27  
 XUSER DIV CHG Option, 11  
 XUSER KEY RE-INDEX Option, 151  
 XUSER Menu, 43, 54, 60, 65, 70, 87  
 XUSERAOLD Option, 53  
 XUSERBLK Option, 26, 38  
 XUSER-CLEAR-ALL Option, 20, 24  
 XUSERDEACT Option, 43  
 XUSEREDIT Option, 34, 35, 84, 87  
 XUSEREDITSELF Option, 9, 12, 14, 20, 22, 34, 42, 212  
 XUSERINQ Option, 51  
 XUSERINT Option, 16  
 XUSERLIST Option, 47  
 XUSERNEW Option, 25, 26  
 XUSERPOST Option, 22  
 XUSERPURGEATT Option, 46  
 XUSERREACT Option, 43, 46  
 XUSERREL Option, 20, 50  
 XUSERREPRINT Option, 34  
 XUSERTOOLS Menu, 10  
 XUSESIG BLOCK Option, 72  
 XUSESIG CLEAR Option, 73  
 XUSESIG Option, 72, 73  
 XUSITEMGR Menu, 46, 330  
 XUSITEPARM Option, 16, 17, 22, 209  
 XUSPF200 Security Key, 25, 26, 35  
 XU-SPL-ALLOW Option, 222  
 XU-SPL-BROWSE Option, 222  
 XU-SPL-DELETE Option, 222  
 XU-SPL-LIST Option, 222  
 XU-SPL-MAIL Option, 223  
 XU-SPL-MGR Menu, 225, 226  
 XU-SPL-PRINT Option, 223  
 XU-SPL-PURGE Option, 226  
 XU-SPL-SITE Option, 226  
 XU-SPL-USER Option, 225  
 XUSSPKI SAN Bulletin, 115  
 XUSSPKI UPN SET Option, 87, 90, 115  
 XUSTAT Option, 38, 52  
 XUTESTUSER Option, 136  
 XUTIO Menu, 203, 214  
**XUTL Global**, 138, 139, 140, 146, 212  
     Display Nodes, 142  
     Jump Nodes, 144  
     Structure and Function, 141  
     User Stacks, 141  
 XUTL("XQ", \$J, "T") Node, 142  
 XUTL("XQ", \$J, "XQM") Node, 142  
 XUTLOOPBACK Option, 214  
 XUTM BACKGROUND PRINT Option, 289  
 XUTM BACKGROUND RECOMMENDED Option  
     TaskMan, 289  
 XUTM CHECK ENV Option, 283  
 XUTM CLEAN Option, 288  
 XUTM DEL Option, 252, 278  
 XUTM DQ Option, 252, 277, 303  
 XUTM ERROR DELETE Option, 296  
 XUTM ERROR LOG CLEAN RANGE Option, 296  
 XUTM ERROR Menu, 185, 295  
 XUTM ERROR PURGE TYPE Option, 296  
 XUTM ERROR SCREEN ADD Option, 186  
 XUTM ERROR SCREEN EDIT Option, 186  
 XUTM ERROR SCREEN LIST Option, 186  
 XUTM ERROR SCREEN REMOVE Option, 187  
 XUTM ERROR SHOW Option, 295

XUTM INQ Option, 275  
XUTM MGR Menu, 185, 274  
XUTM QCLEAN Option, 260, 288, 295, 301  
XUTM REQ Option, 252, 277, 303  
XUTM RESTART Option, 286  
XUTM RUN Option, 287  
XUTM SCHEDULE Option, 290  
XUTM STOP Option, 286, 287, 298  
XUTM SYNC Option, 287  
XUTM TaskMan Namespace, 249  
XUTM TL CLEAN Option, 278  
XUTM UCI Option, 260  
XUTM USER Option, 241, 303  
XUTM UTIL Menu, 185, 279  
XUTM VOLUME Option, 257  
XUTM WAIT Option, 286, 287  
XUTM ZTMON Option, 264, 279, 305  
XUTTEST Option, 214  
XUUSERDISP Option, 14  
XUUSERSTATUS Option, 51  
XUXREF Option, 132  
XUXREF-2 Option, 133

## Y

Your future tasks Option, 276

## Z

Z Namespace, 161  
ZIS Global, 251

**ZIS(1, Global**, 198  
**ZIS(2, Global**, 198  
**ZIS(3.22, Global**, 198  
ZISL Global, 235  
ZISQUIT Variable, 200  
ZOSF Nodes, 306  
ZOSF("VOL") Node, 258  
ZSTU Routine, 263  
ZTCPU Variable, 267  
ZTER Global, 185, 188  
ZTER\* Routines, 185  
ZTLOAD API, 235, 245, 246, 303  
ZTM TaskMan Namespace, 249  
ZTMOVE Utility  
    Toolkit, 303  
ZTMQ Security Key, 252, 275, 277, 278  
ZTMQUEUABLE OPTIONS Menu, 45, 51,  
    226, 288, 289  
ZTMSH Routine, 265  
ZTMSWDCL.COM, 272  
ZTMWDCL.COM, 271  
ZTQPARAM Variable, 292  
ZTSCH Global, 245, 249, 251, 259, 263, 290,  
    297, 302  
ZTSK Global, 245, 249, 259, 263, 275, 288,  
    301, 302  
ZTSK(task #, 0) Node, 251  
ZTSK(task#, .3) Node, 251  
ZTSTOP Variable, 303  
ZU Routine, 24  
**ZUA(3.05 Global**, 52