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DEFENSE TECHNICAL INFORMATION CENTER

EXECUTIVE INFORMATION SYSTEM

Documentation and User's Manual

Contract Number MDA903-88-C-0186

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19. ABSTRACT (Continue on reverse if necessary and identify by block number) Technical documentation and a user's manual are presented. DTIC's "Tactical Plan for Automated Management Information Systems", March 1987, defines the need for statistical decision-making information and trend reporting. A DTIC-EIS prototype was developed from the SMDR and Checkbook Systems. The prototype was extended to include active use within specific DTIC-L application areas. Data capture for three applications with data organized in an EIS database, supported by presentation methods was accomplished. Hardware and software constraints are presented in order to complete a fully operational DTIC-EIS.						
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Section I. - INTRODUCTION.

A. Background.

REFERENCES:

- a. Task Order from DTIC to DAITC Oct 88 (Phase I).
Task Order from DTIC to DAITC May 89 (Phase II).
Task Order from DTIC to DAITC Sep 89 (Phase II ext.).
- b. DTIC "Tactical Plan for Automated Management Information System", March 1987.
- c. DTIC-EIS Prototype Report (DAITC/TR-89/5), 7 April 1989.

The Defense Technical Information Center recognized a need to provide certain information items to senior managers in a more effective manner. While much of the information existed, it was unclear as to how it should be organized, how it would best be presented, and to whom. The DTIC Special Projects Office (SPO) was requested, through Reference a, to assist by demonstrating the potential of its EIS technology, using DTIC data.

Reference b describes a manual process of daily management reports, submitted to DTIC-L, where they are consolidated and summarized into a daily "pipeline report" by mid-afternoon. (The daily process has since been discontinued.) This and other information is assembled into a monthly "Summary Management Data Report" (SMDR). DTIC-L also produces a monthly report of Budget status from its "Checkbook" system running on a personal computer.

Accession For	
NTIS CRA&I	☒
DTIC TAB	☐
Unannounced	☐
Justification	
By	
Distribution	
Availability Codes	
Dist	Avail and/or Special
A-1	

Reference b clearly articulates the DTIC need for "quick and easy access to managerial statistical decision making information" and "trend reporting." The Management Information System envisioned by this Tactical Plan is comprehensive. It would incorporate data details about any and all DTIC activities; production statistics, internal operations, customer histories, special projects, etc. Such a system would ultimately serve the needs of not only the senior managers, but also the middle managers, analysts and data entry staff.

An initial DTIC EIS Prototype was developed around sample data from the SMDR and Checkbook systems. The Prototype also included applications of EIS technology for Unit Costing data, Production Backlog statistics, Organizational structure and Personnel Management. The Prototype experience is summarized in Reference c and was formally briefed to the DTIC Management Team on 7 April 1989. As a result of the initial Prototype experience and its favorable reception by the DTIC Managers, it was decided to extend the Prototype to active use within specific applications areas.

The objective of this Task was to establish the routine methods of capturing data for three specific applications, organize the data into an EIS data base, and provide presentation methods suitable for routine use by DTIC Staff members. This was to be accomplished as an extension of the initial prototype, but still be less than a fully operational Executive Information System.

The DTIC Management Reporting, Personnel Management and Financial Management Systems were selected as the initial applications for the prototype extension. While it was recognized that extensive other data sources exist at DTIC, it was decided that these three sources provided a broad initial base to which additional data sources could be added. The three applications were developed in parallel within the resource constraints of this Task.

This Task was approached as a Rapid Prototyping exercise. Iterative and interactive exchange between the DTIC SPO developers and the DTIC users was expected as an ongoing feature of the process. DTIC was to provide the functional guidance in each of the applications areas and the DTIC SPO was to accomplish the technical implementation. As soon as practical, DTIC users were permitted to have on-line access to the developing applications so as to provide continuing guidance and direction to the development effort.

These applications should not be considered "operational" until such time as DTIC obtains in-house hardware and software to support the applications. The resources for this step are beyond the scope of this Task.

This was not to be a traditional Life-Cycle development effort. The technology of EIS does not lend itself to such a format. Decisions regarding specific data sources, particular

screen designs, levels of documentation, etc. were made when and as needed. These decisions were made after necessary coordination among DTIC offices and with the DTIC SPO developers. Connectivity between DTIC CARES system and the EIS was accomplished to share data regarding the three applications and provide faster user access to the EIS. The focus of the Task was the development of EIS applications and not the establishment of new networking capabilities. DTIC was responsible for establishing the needed links to data sources and for user access to the EIS, based upon advice from the DTIC SPO developers.

The economic benefits of an EIS are difficult to quantify, but none-the-less important. Every effort should be made to substantiate potential and actual cost savings of these three EIS applications to DTIC. This need not entail a comprehensive economic analysis, but should provide at least an initial step in that direction.

The DTIC SPO accomplished this Task, in an Executive format, using the existing DTIC SPO resources of a MicroVax II computer, IBM-AT workstation and Pilot Command Center Software. The DTIC SPO also investigated the potential of running this prototype from a MacIntosh workstation using the Pilot software package for the MacIntosh, which is expected to be available in early 1990. Access to the prototype was through the existing DTIC SPO/DTIC network. The same network could be used to establish the electronic connectivity to source data for the selected applications.

B. EIS Technology.

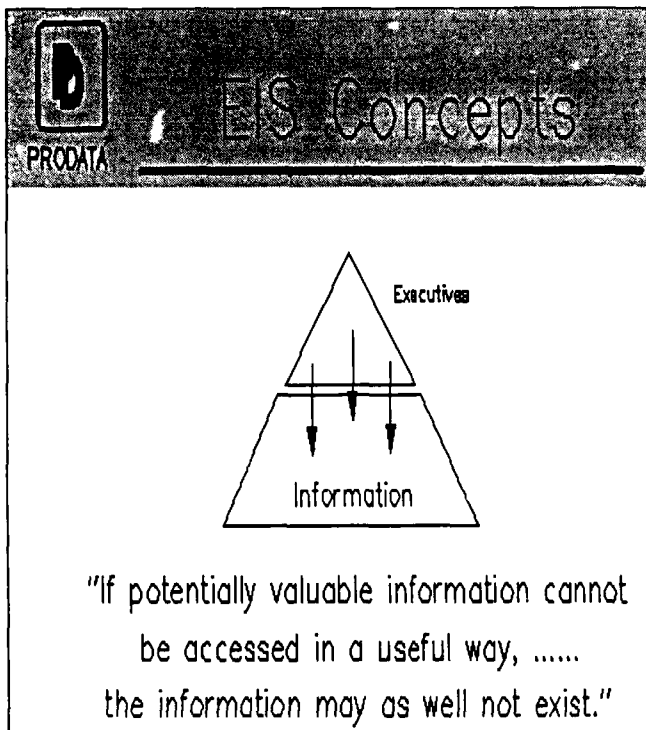
What is an Executive Information System (EIS)?

Imagine that you've just returned to the office after an absence of several weeks. Maybe it was that well deserved annual leave or just an extended business trip. In any case, you need to catch up with what has been going on at the office during your absence. And, you need to do so fast. Your boss has requested that you "stop by" in half an hour and then your regular weekly staff meeting is in an hour. What are the ten most significant items of information that you need, right now, to reestablish your command of the office situation?

The answer to that question is the definition of YOUR EIS!

A commercial executive might want to see current sales figures, profit and loss statements, investment status reports, and recent personnel actions. Certainly the ten choices would vary with each individual executive and with the type of business involved. A government executive may be more concerned about recent congressional inquiries, the status of legislative actions, current procurement actions, budget performance, personnel actions, media inquiries, project management information, and internal organizational politics.

Any system that can accurately supply the needed information within the time available is an effective Executive Information



System or EIS. An efficient Executive Secretary may have anticipated the need and have a "catch-up book" lying on your desk. In some cases that would be an excellent EIS. In other situations the EIS might be electronically based and delivered to the you via a

color, touch-screen workstation. The key is a method, any method, which separates the wheat from the chaff in the allotted time.

Why would you want an EIS? To Plan, Organize, Direct and Control, that's why! These are the four traditional functions of management. We may vary the terminology, but these are the things managers do. Each executive will do some functions better than other functions, but all four are essential to success. Success of both the executive and the organization. A well designed EIS can support these objectives.

Specifically:

From deep within the pyramid of exhaustive information available to you, you can extract the selected information which is most important to you at the moment.

You can depend upon the EIS to "red flag" items that violate your personally prescribed parameters. A tool for MBO, management by objectives.

You can analyze massive amounts of data at a glance with the graphical displays of your new EIS.

You can quickly spot trends that were not visible in the static reports which you formerly used. This allows you to act before the trend turns into a full blown problem. Analysis of data over time is one of the most powerful and unique aspects of a well designed EIS.

You can establish automated connections to data sources external to your organization. You can then integrate this vital data with your own organizational sources to reach your management decisions from a broader perspective.

How do you get started?

Be the Champion of EIS in your organization.

Build a Prototype/Demonstration using a "critical mass" of data and/or executive users.

Mold your implementation strategy and system architecture to fit your organization; not vice versa.

EIS vs. DSS vs. et. al.

Terminology can seriously detract from the accomplishment of significant progress in an organization. Throughout the "computer revolution" or "information age", if you prefer that term, we have witnessed a variety of acronyms that were held out to be the panacea for all our administrative problems. Each "new" concept held forth the hope of fulfilling the dream of total automation

and satisfying the unfulfilled promises of its predecessor. A cynical observation is that they all failed to deliver on their promises and EIS is just another "buzzword" to keep the marketing momentum moving.

A more positive outlook is that each of these terms defined a subset of the whole, offered unique approaches to automation within that subset, and continues to provide important contributions. Management Information Systems (MIS), Information Resource Management (IRM), Information Systems (IS), Automated Information Systems (AIS), Decision Support Systems (DSS), Executive Information Systems (EIS), Executive Support Systems (ESS), Electronic Briefing Systems, War/Board Room Systems, et. al. give us unlimited opportunity to define and differentiate among technology products and academic management theories. An academic may discover a new concept or twist and wishes to apply a distinctive label so that others can clearly communicate regarding this important discovery. Vendors are very selective in categorizing their products so that they can claim some leadership position or unique feature within their chosen niche. These positions, by academics and vendors, are from the outside, looking in at an organization.

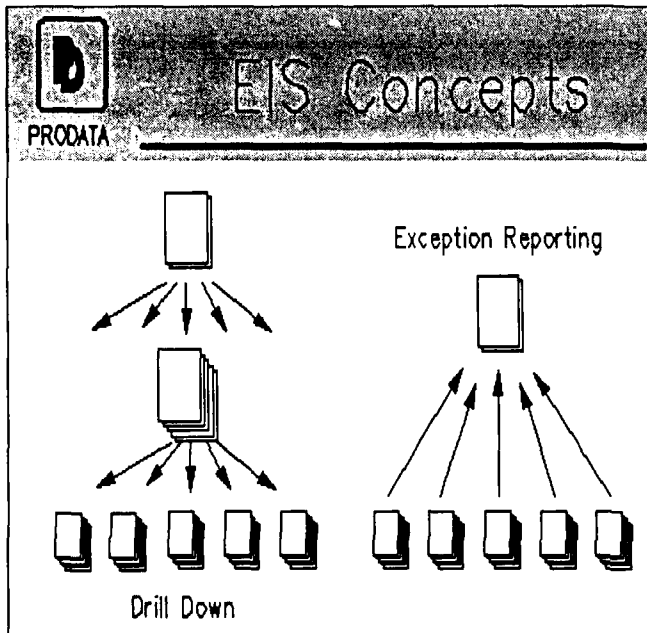
When viewed from the organization's perspective, "a rose by any other name would smell as sweet." The organization has requirements related to its functional mission. Innovative automation projects must address the real, unique requirements of

the organization. Throughout this report, the term Executive Information System (EIS) is used in the broadest possible way. It implies all of the technology necessary to address the real, unique requirements of the organization. It includes the hardware, software, procedures, and people necessary to make a positive contribution toward the requirements.

There is no intent to limit the use of EIS to just the executive suite. As top executives begin to use an EIS, their subordinates will want to have access also. Eventually the entire management team becomes active in the EIS. Supporting staff members also become involved, either as analysts or in some information entry capacity. This is not an MIS; an MIS tends to be mainframe computer oriented and focused upon the recording and processing of information. An EIS is more focused upon the delivery of information. This is not a DSS; a DSS tends to be very sophisticated and targeted at the needs of analysts and model builders. Certainly, an EIS supports the decision making processes of its users, but in a less sophisticated and less analytical way than a DSS might.

What, then, are the common threads that bind an EIS? First and foremost, an EIS is intended to deliver information to the cognitive processes of managers. Generally, the information is an aggregation or summary of the current status of the organization. To be effective, the information must be timely and accurate. The EIS architecture must assure some advantage over the

current methods of delivering this information to the manager. The EIS design must account for data entry, transfer from other systems, and updates. Given that the information is accessible, the EIS must provide tools for the manager to cope with the phenomenon of "information overload."



Some capability to probe the details of a problem area is necessary. This concept is sometimes called "drill-down." It gives the manager a way to pick and choose the scope and level of detail that the EIS delivers. Managers are too busy to blindly probe the vast pyramid of information on a

routine basis. Therefore, a parallel feature of any good EIS must be an exception reporting mechanism.

Management involves planning and controlling. To support these time oriented activities, an EIS needs to effectively deliver trends and/or forecasts to the manager. This implies the use of charts and graphs. The effectiveness of the delivery is enhanced by the appropriate use of color. The design of the user interface is also critical. If the EIS is not easy and intuitive, managers will not take the time to learn how to use the sys-

tem, particularly if the current methods yield adequate results. This emphasizes the need for an EIS to add value to current techniques.

EIS is a synergistic approach. All aspects of the situation must be considered simultaneously, with the result being more beneficial than if the individual components had been addressed separately. A major contribution of a new EIS project is that it causes the organization to question its current methods. The EIS becomes a catalyst for change. Some individuals, in any organization, find change threatening and oppose the EIS. More visionary individuals welcome the change. Even if the EIS project does not become fully operational, the exercise of questioning current practices can be very healthy.

Implementation Issues.

Plan for success!

The implementation of EIS technology is not a well defined science. It has more of the characteristics of an art than a science. The potential surprises due to unforeseen circumstances are myriad. This leads some approval authorities to be prudently cautious. It is a good idea to include review points and even decisions about continuing the EIS, at all, into the implementation plan.

Notwithstanding these review points, the implementation plan must anticipate success and approval-to-continue. This means, for example, that the resources necessary for phase 2 should be ordered, with an appropriate cancellation clause, prior to the formal approval of the results of phase 1. The underlying concept is to keep the momentum and enthusiasm for the evolving EIS at an optimum level. Interruptions in the evolution of an EIS project are serious setbacks, costly in many ways and sometimes even fatal.

Planning for success keeps the momentum and enthusiasm alive without obligating the organization to any inappropriate or irrevocable steps.

Build upon a specific need of an EIS zealot!

Enthusiasm is contagious. It emanates from a visionary person who perceives the potential of EIS technology. When such a visionary can begin to actually apply EIS technology to specific functional requirements, the enthusiasm grows and is shared with others in the organization. It helps if the visionary is in a position of authority, but that is not essential. The critical point is that the visionary obtains access to the EIS technology and begins to actively use it in meeting daily requirements of the job.

An implementation plan that supports the requests of one or more visionaries will become accepted via this user "pull" far more quickly than one that tries the technology "push" approach.

Emphasize the added values to current Information Systems!

The benefits of EIS are elusive, but usually quite real and important. For example, an EIS that delivers electronic versions of data weeks ahead of the current printed method is making a real contribution. Also, printed reports are limited in the formats, charts and graphs that are economical to deliver. An electronic EIS of the same data can support drill down, exception reporting, ad hoc charts, and robust analysis to suit each user. This is a powerful added value, without any change or addition to the basic data.

It is important for an evolving EIS to highlight such contributions, even if they can not be quantified as a financial benefit.

An EIS is never finished! Plan the evolution!

Use phased development. Start with a well defined, real requirement. Maybe a functional area, such as Management-To-Payroll (MTP); or a lateral application, i.e. the top layer of executives; or possibly a hierarchical EIS for the financial management "stovepipe."

Define the EIS "users". Will they be just the managers, or will support staff perform the queries?

Obtain accurate, timely data. Can it be imported from existing sources? Where will the "Master Database" reside? Is direct data entry required? Will this create an additional class of "users?" Will this conflict with the Master Database file?

Keep an eye on the future to be prepared for increases in numbers of users and numbers of applications. Be sure that adequate communications, host processing hardware, and workstation software are available to respond quickly to growth. Training of users and technical support staff are also important growth concerns.

Prepare for the Developmental Surge!

Implementation of an EIS is a team requirement. The organization must be committed to the end goal of an EIS and willing to support the evolutionary process. It is hard to define a required composition for the EIS implementation team. Every situation is different and demands a unique solution. In any case, it is safe to conclude that multiple skills are required on the team and that it is unlikely that these skills can be found in a single individual.

Foremost is the need for the organizational proponent. This could be simply a directive from a senior executive, or the enthusiasm of an EIS zealot, or the discovery of a technical

support staff member. The result is at least one person who knows the organization, can effectively work the organizational politics that are bound to surface, and can keep the implementation focused upon the correct targets of organizational need. There are three aspects to the organizational proponent; a senior sponsor, a functional area specialist, and a technical information specialist. Sometimes three people emerge to fill these roles, sometimes roles are combined and one or two people assume the responsibilities.

Other skills are also required in the development of an EIS. These could be tapped from within the organization or contracted from the outside. Some examples of the necessary skills are: computer science, programming, psychology, management science, administration, user interface design, human factors, organizational dynamics, change management, operations research, telecommunications, information resource management, et. al. Many of these disciplines are the focus of full professional careers. Most of them have complex underlying bodies of theory which are studied by academics at the Doctoral level. It is clear that a team composed of "experts" would demand at least one person for each discipline. That is an unreasonable team composition for most EIS projects. It is more practical to seek individuals with sufficient understanding of several disciplines who can guide the EIS implementation away from the most serious complications.

The EIS implementation team is a surge requirement. This multi-disciplinary approach is essential during the early stages

of EIS development, but need not continue for the life cycle of the EIS. Once the EIS architecture has been established, the initial tone for screen designs, data base techniques, and modeling approaches determined, etc., the need for specific skills lessens. Once an organization begins to actively use an EIS, its future directions will be driven by organizational needs. Changes will be rather specific and require technical support staff, versus concept designers. The level of on-going technical support is an important consideration in EIS implementation planning. In any case, however, on-going support will be significantly less than the initial surge of development support.

Section II - USER'S MANUAL.

A: Preamble.

The following pages provide detailed comments and specific instructions regarding each of the customized screen formats which collectively comprise the user interface of the Defense Technical Information Center - Executive Information System (DTIC-EIS). Since the DTIC-EIS is still in an evolutionary development stage, these instructions must be viewed as preliminary and subject to frequent change. Furthermore, these instructions are supplemental to the general user instructions necessary to effectively use any Pilot Command Center application.

The basic architecture of the DTIC-EIS application consists of software components operating simultaneously and cooperatively on a host computer (currently a MicroVax II) and on an intelligent user workstation (currently Zenith-248 PC). The host component manages the data base for the application and stores the instructions, permissions, and other information necessary for each user. The host component is automatically activated when an authorized DTIC-EIS user logs on to the system. Logging on requires the usual sequence of "username" and "password" authentication. Any changes to this aspect of the DTIC-EIS would require the intervention of trained technical support personnel.

The communications link between the user workstation and the host computer is another area requiring trained technical support. There are a variety of communications pathways available to DTIC users. Each of the current DTIC-EIS active workstations have been set up to use at least one of these communications alternatives. The communications pathways are subject to frequent changes or interruptions which may affect the communications link to the host computer. Difficulties in this area should be brought to the attention of DTIC's internal communications specialists.

The workstation component of the Pilot Command Center software is placed in the "pilot" directory of the workstation's hard disk. See MS-DOS reference manuals for additional information about the creation and naming of hard disk directories. The minimum software consists of a ".bat" file which is used to activate the EIS workstation software component. The ".bat" file calls the executable software file, "vaxmain.exe", which may use a customized sequence of start-up instructions which are stored in the file "login.pro." Detailed instructions on the creation of such a workstation set-up are provided in the Pilot technical reference material. Generally, these steps should be delegated to trained technical support staff.

The result of a properly constructed workstation set-up and customized host component is that the user simply issues the ".bat" file command, answers the appropriate log-in prompts, and the DTIC-EIS Main Screen is automatically displayed.

The DTIC-EIS has been designed to be operated primarily via a two button mouse. The left button is the equivalent of "enter or return" on the keyboard. Pilot sometimes refers to this function as "select." The right mouse button is the equivalent of the "escape or cancel" on the keyboard. Keyboard arrow keys can be used to position the "cursor", but this is not recommended. We shall use the term "click" to represent the activity of positioning the cursor on top of a specified area of the screen and "selecting" or pressing the left mouse button.

Pilot screens consist of color representations of labels, data, or instructions. As the cursor is moved around on the screen, some of these colored areas will "highlight" or change color. We shall refer to such areas as "hot buttons" or simply "buttons."

The fundamental user instruction for all Pilot applications is that if a button highlights, you should be able to click on it and obtain intuitively obvious results. A second, equally fundamental concept of EIS implementation is that every screen should contain information. In other words, no screen should act only as a menu to get to some other screen which does contain information. Unfortunately, both of these objectives are elusive and yet to be attained in the DTIC-EIS. It will require the cooperation of active users and skilled EIS developers to ultimately achieve these two goals.

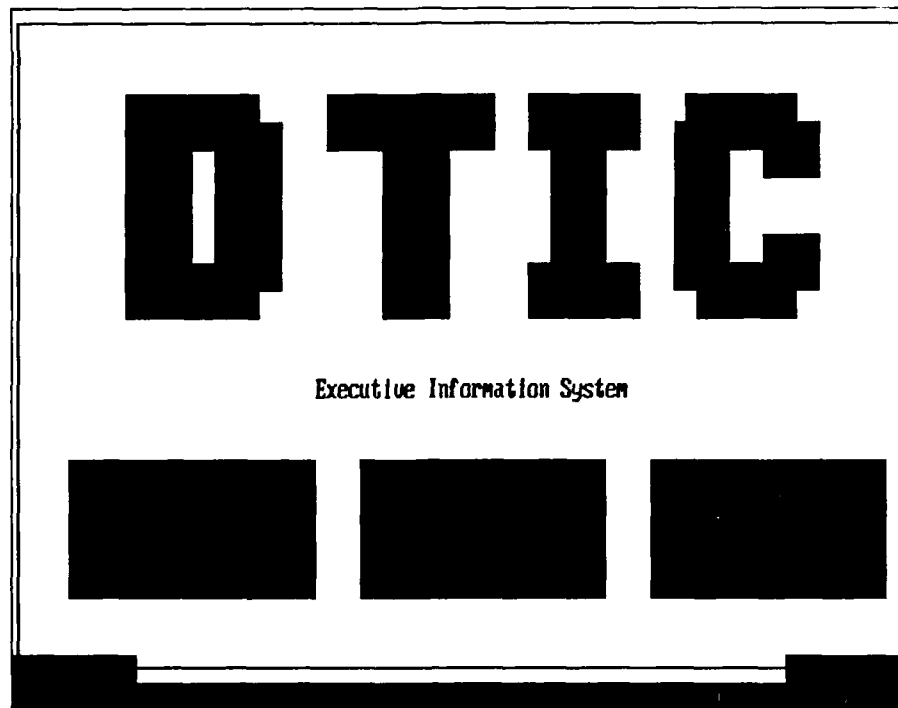
The Pilot software implements a concept called "dynamic menus." This has two important connotations. First, is the already explained concept of hot buttons. The content of a hot button may be text which is obtained from the EIS data base. If the data base content is changed, the hot button content will automatically be altered to match. The second connotation of "dynamic menus" deals with the display of numeric data. The data itself can be color coded to convey information, such as over or under budget. The data itself can also serve as a hot button to "drill down" and explore the reasons for the particular color coding.

While the user is viewing any of the DTIC-EIS screens, that screen may be printed, using the standard "Print Screen" function of the workstation. Specialized printing requirements may call for technical assistance. Rarely, the DTIC-EIS application will encounter a fatal error. This is most often indicated by a message in red letters along the bottom line of the screen and a shift of the cursor to the upper left corner of the screen, next to a question mark (?). If possible, the red letter message should be recorded and reported to EIS technical support staff. The situation can be overcome by typing "call go" at the ? and pressing the "enter" key. (Do not include the "" when typing call go.) If all else fails, the entire Pilot process may be terminated by simultaneously pressing the "Alt" and "F10" keys. This is an inelegant and ungraceful way to exit the DTIC-EIS. The preferred approach is to use the appropriate hot buttons on the DTIC-EIS screens.

Pilot performs periodic communications checks between the Host computer and the Workstation. Sometimes a correctable communications error may occur. Pilot uses a small box in the lower right hand portion of the screen to inform you when such an event happens. The box contains the letters "ERR." There is no reason to be concerned about this error indicator, unless other symptoms are also present. You may turn the indicator off by pressing any of the keyboard LOCK keys (CAPS, NUM, SCROLL). Notice that each of these keys has its own indicator box on the screen. You may also ignore the presence of the ERR box. Contact your technical EIS/communications support staff, if you feel there is a more serious problem with the communications at your particular workstation.

Additional user instructions may be found in the Pilot Manual, "The Personal Computer Operations Guide."

B: A tour of DTIC EIS Screens.



This is the main DTIC-EIS screen. It provides three hot buttons for access to the three principle components of the DTIC application, Personnel, Financial and Summary Management Data Report (SMDR). There are also two utility buttons, Logout and Jump, on the next to the last line of the screen. The Logout button is the preferred method of terminating the DTIC-EIS. Also note the three buttons on the last line. These are simply indicator lights, corresponding to similar lights on most keyboards that show the status of "scroll LOCK", "NUM lock", and "CAPS lock." The space between "LOCK" and "NUM" is used by Pilot to indicate a temporary error condition with the "ERR" light.

Click on the JUMP button!



The JUMP button appears on most DTIC-EIS screens. It provides a convenient way to branch to various sections of the application without returning to the main screen. The PERSON and POSITION buttons are special features of the personnel application. The CHECKBOOK button is equivalent to clicking on the FINANCIAL button on the main screen. The TRANSACTION and AUTHORIZATION buttons are special features within the financial application. The SMDR button is equivalent to the SUMMARY MANAGEMENT DATA REPORT button on the main screen. The RETURN button clears the Jump selections and returns you to the underlying screen, in this case it would be the main screen.

Click SMDR!


```

Retrace Menu

TOP MENU
DTIC SMDR PROTOTYPE (MATRIS) MANPOWER AND TRAINING RESEARCH INFORMATION SYSTEM
DTIC SMDR PROTOTYPE TECHNICAL REPORTS PG1 SMDR INDEX

LOGOUT      Up One      ♦  Utilities

```

TOP MENU

LOGOUT

◆ Utilities

You may click on UP ONE and obtain the equivalent results of using the BACK ONE button which was explained on the last screen. You may also select (click on) any of the screens listed in the main part of the retrace screen. This list represents an historical trail of the previous screens which you have been viewing. In effect, you can go directly back to any previous screen which still appears on the retrace list. From time to time, the retrace list is replaced by a new sequence, as determined by the program logic. The UTILITIES button presents another "pop-up" menu, similar to the JUMP button.

Retrace Menu	
TOP MENU DTIC SMDR PROTOTYPE (MATRIS) MANPOWER AND TRAINING RESEARCH INFORMATION SYSTEM DTIC SMDR PROTOTYPE TECHNICAL REPORTS PG1 SMDR INDEX	
LOGOUT	Up One
Change Password Edit Pay Table FLUSH RETURN Utilities	

The FLUSH button clears the retrace history list and returns you to the main screen. You may sometimes wish to use this function to insure that the workstation has not retained some old versions of data screens which you no longer want to see. The most logical reason and, in fact, the only necessary reason for FLUSHing is after editing new data onto one of the many screens with such capability. In such a case, the FLUSH will assure that you see your new data, the next time that screen is displayed. The RETURN button sends you back to the retrace screen. CHANGE PASSWORD provides access to the VMS utility for resetting your MicroVax password.

Click on CHANGE PASSWORD!

Old password:
New password:
Verification:

The system will request your old password and then ask for your new one. The verify step insures that you do not make a typographical error in entering your new password. None of the keys which you press will be echoed onto the screen for security reasons. When you have completed the three step process, you will be automatically returned to the previous retrace screen.

Click EDIT PAY TABLE!

Tablename: PAY		Records: 461
Select: *		
Field:	Type:	Value: ?
SERVICE	C	GM
GRADE	N	13
STEP	N	0
SALARY_FLAG	N	19.7034
SALARY_HOUR	N	19.7034
EFFECTIVE_DATE	N	88001

Up Top Down Bottom Next Record Clear Erase Make Update

This utility provides a means of data entry into tables that are not otherwise visible in the DTIC-EIS application. Notice the Question mark (?) in the upper right corner. This is a HELP button. Clicking on it will toggle all of the buttons on the screen from their normal action to display short explanations of their function. Click HELP again to turn the toggle off and resume normal operation. See the Pilot Manual, "Enter-View User's Guide", for more detailed instructions. Click on RETURN and observe the instructions on the bottom line of the screen to select (i.e. click the left mouse button) again. This will return you to the retrace screen.

Click on the last line in the retrace list to return to the SMDR selection screen. Click DESIGN COMMENTS!

Summary Management Data Report DTIC SMDR PROTOTYPE		9/89
CATEGORY	TABLE	
TECHNICAL REPORTS	Auto Doc Dist Subscripts	
DATABASE Collection	Bib Database Retrieval	
DOD Small Business	Demand Orders Processed	
DROLS	DmndSucs InHouse TR Bibs	
INDEPENDENT R&D	IAC New Records	
PRINTING PLANT	New Record Collection	
PROGRAM SUMMARY	Reports Distributed	
QUALITY ASSURANCE	Special Document Process	
(MATRIS) MANPOWER AND	STINFO Reference Sucs	
WORK UNIT INFORMATION	Tech Screen Srvy Exempt	
	Tech Screen Srvy Reviewd	
	Tech Screen Srvy U2 Rpts	
DTIC SMDR PROTOTYPE TECHNICAL REPORTS PG1 SMDR INDEX		
Type your comments on these three lines. #1 #2 #3 Press enter when done.		
RETURN		CANCEL
Press RETURN to log your comments or CANCEL to abort		

This opens up a text entry box where the user may send messages to the EIS design team. It is important to use this feature often and freely, with frank comments about the system and how you think it could be improved. Type in your comments on the three lines provided and press the enter key. You now have three buttons to choose among. You may click on the text box to revise your comments, click on CANCEL to ignore your comments or click RETURN to record them in the developer's log file.

Either RETURN or CANCEL will remove the pop-up window and give you access to the full SMDR selection screen. Click on any Table from the list on the right!

TECHNICAL REPORTS Bib Database Retrieval							9/89
							EDIT 5
PAGE 1	Total	Total	Total	Total	Actual	Projected	GRAPH LINE
Month	Non-DTIC	Products	Products	Products	Products	Products	Variance
	Inter'gtns	Mailed	Remote	In-House*	Cum %	Cum %	
FY 87							
FY 88							
Oct 88							
Nov							
Dec							
Jan 89							
Feb							
Mar							
Apr							
May							
Jun							
Jul							
Aug							
Sep							
YTD 89							
Program	0.0	16,500.0	0.0	0.0	100.0	100.0	0.0

This is the principle SMDR data presentation screen. Note the buttons in the upper left. Columns 1-7 are shown on "page 1" and columns 8-14 on "page 2." You may also switch to the corresponding data set for other years. The EDIT button in the upper right is a toggle switch. When EDIT is "on", you may enter new or revised data, directly into the data base. This can be tricky at times. You may need to use the retrace screen's utility and FLUSH the old version of this screen before you will see your new entries properly displayed. You must turn EDIT "off" before proceeding. The GRAPH button in the upper right allows you to select among several types of graphical displays. These graphs display predetermined formats in a standardized way. User customized displays are addressed later in the WORKSHEET feature. The RETRACE, BACK ONE, JUMP, and DESIGN COMMENTS buttons are as before.

Click on FOOTNOTES!

COL 1 7	TECHNICAL REPORTS						9/89
COL 8-14	Bib Database Retrieval						EDIT 5
NEXT YEAR							LINE
LAST YEAR							
PAGE 1	Total	Total	Total	Total	Actual	Projected	Variance
	Non-DTIC	Products	Products	Products	Products	Products	
	Inter'gtns	Mailed	Remote	In-House*	Cum %	Cum %	
87	449,457.0	15,085.0	9,548.0	5,537.0	89.0	100.0	-11.0
88	432,713.0	13,563.0	8,217.0	5,346.0	81.0	100.0	-19.0
88	32,593.0	961.0	596.0	365.0	6.0	8.0	-2.0
	32,607.0	1,015.0	585.0	450.0	12.0	17.0	-5.0
	28,089.0	900.0	576.0	332.0	18.0	25.0	-7.0
89	33,031.0	876.0	525.0	351.0	23.0	33.0	-10.0
	31,166.0	945.0	561.0	384.0	29.0	42.0	-13.0
	34,243.0	1,079.0	575.0	504.0	35.0	50.0	-15.0
	32,084.0	1,072.0	618.0	454.0	42.0	58.0	-16.0

*Searches performed in-house on demand from users.

**25 cycles in FY 87.

***No counts kept for previous years and for FY 89 to date.

PG 1

^

▼

EDIT

RETURN

If any footnotes apply to this data set, they will be displayed here. You may page through the footnote file using the buttons on the right. As with all editing features of the DTIC EIS, you must have appropriate permissions to use the feature. When adding or editing text data, you are automatically transferred to the host computer's text editor. (The special control keys for using the VAX EDT Text Editor are found on page B-7 of the Pilot Personal Computer Operations Guide.) The RETURN button sends you back to the data screen.

Click RETURN!

Once you are back viewing the data screen, click WORKSHEET!

TECHNICAL REPORTS Bib Database Retrieval							9/89 EDIT 5
							GRAPH LINE
PAGE 1	Total Non-DTIC Inter'gtns	Total Products Mailed	Total Products Remote	Total Products In-House*	Actual Products Cum %	Projected Products Cum %	Variance
Month							
FY 87							
FY 88							
Oct 88							
Nov							
Dec							
Jan 89							
Feb							
Mar							
Apr							
May							

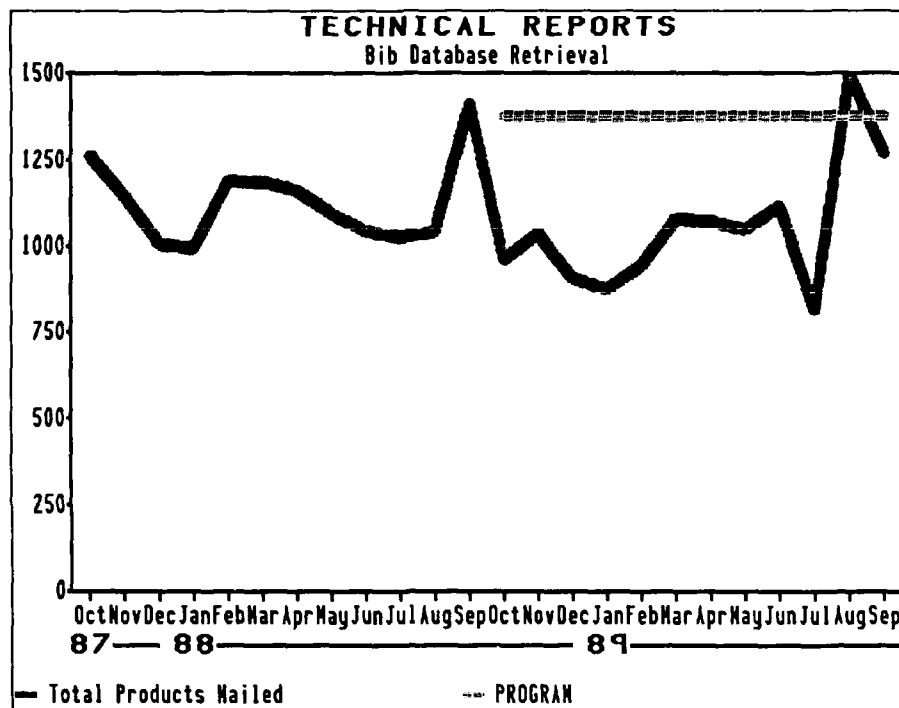
This provides the means for you to select any of the seven displayed columns of data by clicking on the column's title in the pop up window. You may also select the average monthly level for the programmed activity of any column by clicking on the appropriate program button. If you click on RETURN, you will go back to the data screen.

Click on GO TO WORKSHEET!

Worksheet		?
Actual Products Cum % Prog Total Non-DTIC Inter'gins Program	Line Bar Stack Area Text	CALC OFF + - Mov Avg / * Lead % = Lag Trend Cum Constant
Rename Delete Download Go to PC Dates Clear		

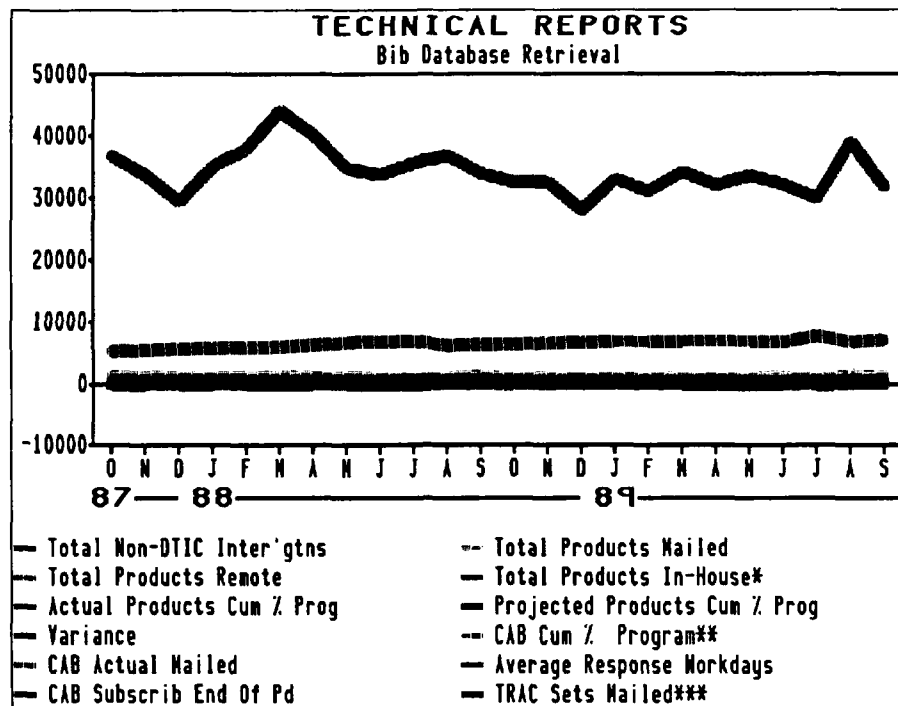
For full details on the operation of the worksheet utility, see the Pilot Manual, "Worksheet, Retrace, and Electronic Paperclip User's Guide." The ? in the upper right is another help toggle. You may select data sets from various SMDR screens to place on the Worksheet. Then you may select any combination of them for graphing or use the calculator for creating special data combinations. Also notice the special utility buttons at the bottom of the screen.

Click RETURN! To get back to the SMDR data screen.



Each button in the YTD row will produce an individual graph of that column of data, including the monthly program levels, according to the format which you specified in the GRAPH button.

Click the left mouse button to return to the data screen.



The buttons in the program row all produce the same graph which shows one line for each column of data. No program levels are displayed.

Click the left mouse button to return to the data screen.

This completes the tour of the SMDR application. We will now look at the Financial application. We can start it by either using the JUMP button and clicking on CHECKBOOK or by going to RETRACE and picking the TOP screen on the list and then clicking on the middle box, FINANCIAL. These two alternatives are equivalent.

HELP

9/89

CHARGEABLE OFFICE

List Choices List Data

Type

SHOW SUBORDINATES

YES

OBJECT CLASS

List Choices List Data

Type

PROJECT NUMBER

List Choices List Data

Type

PRODUCT NUMBER

List Choices List Data

Type

Our four standard utility buttons are at the bottom. We also have the "as of" date in the upper right. In the upper left is the HELP button. This is the same concept as described earlier, however help files have not yet been established for the main part of the DTIC EIS. The CLEAR button erases any entries in the four left boxes. SHOW SUBORDINATES is a special data modifier; "YES" means that the lowest office level available will be displayed, "NO" aggregates the data at the highest office level.

Click on LIST CHOICES in the object class box!

Summary Selection Screen		9/89
DTIC FINANCE		
CHARGEABLE OFFICE		Please Choose One or CANCEL 11.5 Overtime 12.63 PCS 21 Travel 22.16 Trans of Things 23.12 Rentals 23.22 Communications 24 Printing 25.16 Purch Svcs Govt 25.21 Maintenance 25.27 Purch Svcs Coml 26.5 Supplies 31 Equipment ♦
List Choices	List Data	
Type		
OBJECT CLASS		
List Choices	List Data	
Type		
PROJECT NUMBER		
List Choices	List Data	
Type		
PRODUCT NUMBER		
List Choices	List Data	
Type		
RETRACE BACK ONE SHOW DATA Pick One		
UP DOWN TOP BOTTOM CLEAR		

The pop up window allows you to select any one item from the list. When you click on it, it will automatically fill in the box on the selection screen. Notice the self explanatory control buttons for searching the pop up list. CLEAR returns you to the selection screen and erases whatever entry you had in that box.

Click on 24 from the Object Class list!

Click LIST DATA in the PROJECT NUMBER box.

Authorization	Committed
711.06 715.02 721.03 NA	Obligated

Click SELECT (left mouse) to return to the data display.

Click on 711.06 in the left column!

Transaction Details							9/89
OBJECT CLASS is 24 and PROJECT_CODE is 711.06							
PAGE 1	OBJ	PROJ	PROD				
OFFICE CLASS	NUMBER	NUMBR	DESCRIPTION	CONTRACT NUM	COMMITTED	OBLIGATED	
			Directory				
TOTAL SELECTED:							

This produces a "drill down" effect. We now see the individual transaction list for this Project Code.

Click on DIRECTORY in the Description column!

TRANSACTION FILE		DATE
OFFICE	DTIC	
OBJECT CLASS	DTIC	
PROJECT CODE	DTIC	
PRODUCT CODE	DTIC	
CONTRACT NUMBER	DTIC	
DTIC NUMBER	DTIC	
DOCUMENT NUMBER	DTIC	
OBLIGATED	DTIC	
COMMITTED	DTIC	
DESCRIPTION		
COMMENT		
Transaction date is not available at this time.		
RETRACE*		

This is the lowest drill down level in the transaction file. This shows all of the detailed information about the specific transaction.

Use RETRACE to get back to the Checkbook selection screen.

Imaginative use of this screen can be very powerful. For example, several different DTIC wide summaries can be produced by not making any selection and clicking on the LIST DATA buttons in the boxes on the left.

Click on SHOW DATA at the bottom of the screen!

Transaction Selection Screen			9 /89
Current Number of Records 2342 ▾			
OFFICE List Choices Type		DESCRIPTION List Choices Type	
OBJECT CLASS List Choices Type		PRODUCT NUMBER List Choices Type	
DTIC NUMBER List Choices Type	CONTRACT NUMBER List Choices Type	OBLIGATIONS List Choices Type	
DOCUMENT NUMBER List Choices Type	PROJECT NUMBER List Choices Type	COMMITMENTS List Choices Type	
RETRACE	BACK ONE	SHOW DATA	CLEAR JUMP Design Comments

This is another of the powerful selection screens provided by the DTIC EIS. This screen allows you to specify the criteria for selecting a custom group of transactions. The functions of the active buttons on this screen have been described on previous screens. The notable new item on this screen is the transaction count box in the upper center of the screen. In this example, there are 2342 transactions from the DTIC Commitments and Obligations (C&O) Ledger, as of 9/89.

Click on TYPE in the Product Number box and fill in Product Number 730. Press the enter key or left mouse button to complete the entry.

Transaction Selection Screen			0 789
Current Number of Records 76 *			
OFFICE List Choices Type:		DESCRIPTION List Choices Type:	
OBJECT CLASS List Choices Type:		PRODUCT NUMBER List Choices 730	
DTIC NUMBER List Choices Type:	CONTRACT NUMBER List Choices Type:	OBLIGATIONS List Choices Type:	
DOCUMENT NUMBER List Choices Type:	PROJECT NUMBER List Choices Type:	COMMITMENTS List Choices Type:	
RETRACE BACK ONE SHOW DATA CLEAR JUMP Design Comments Enter in the Value			

Notice that this entry has reduced the selected number of transactions to 76.

Click SHOW DATA!

HELP

9 / 89

Current Number of Records 2

OFFICE

List Choices

Type

PRODUCT NUM

List Choices

Type

OBJECT CLASS

List Choices

PROJECT NUMBER

List Choices

Type

ITEM

List Choices

Type

COMMENT

List Choices

Type

enter in the Value

SHOW DATA

Here we have another selection screen. The operation of the AUTHORIZATION selection screen is similar to the CHECKBOOK and TRANSACTION selection screens. Only the subject matter is different. The purpose of this section of the DTIC EIS is to manage and track authorizations and their periodic changes throughout the year.

Use TYPE to enter 24 in the Object Class selection box. Notice that there are two authorizations in this object class.

Click CLEAR!

HELP

9 / 89

Current Number of Records 9

OFFICE

List Choices

PRODUCT NUM

List Choices

Type

OBJECT CLASS

List Choices

Type

PROJECT NUMBER

List Choices

Type

ITEM

List Choices

Type

COMMENT

List Choices

Type

SHOW DATA

Use TYPE to enter L in the Office selection box. Notice that there are nine authorizations in this group.

Click SHOW DATA!

Authorization Listing 1					9/89			
PAGE 1								
L	18.00	NA	N/A	Not	278,545	264,549	264,549	264,672
L	21.00	NA	N/A	Not	500	6,100	11,100	2,100
L	23.12	NA	N/A	Not	0	2,500	0	0
L	23.22	NA	N/A	Not	325,000	325,000	325,000	325,000
L	25.16	NA	N/A	Not	0	8,000	0	0
L	25.27	NA	N/A	Not	18,000	4,700	130,400	0
L	26.50	NA	N/A	Not	0	1,600	0	0
L	31.00	NA	N/A	Not	1,400	100	0	12,700
L	11.50	NA	N/A	Not	1,500	1,200	1,900	1,500
					687,945	613,049	731,549	684,672

This screen shows the quarterly authorization levels for the nine object classes used by the office "L."

Click on one of the rows, by using the hot buttons in the left column. This will "drill down" to a more detailed view of this particular authorization.

HELP OFF		Authorization changes detail History of Changes to this Authorization								9/89
PAGE 1	PG UP	OFFICE	OBJECT	11.5	PROJ	NA	PROD	N/A	ITEM	Not
COMMENT			DATE	1 QTR	2 QTR	3 QTR	4 QTR			
Not Available			10/30/89		500	500	500	200		
Not Available			10/30/89		500	500	500	500		
Not Available			10/30/89		900	500	500	500		501

PG DOWN

RETRACE BACK ONE JUMP Design Comments

The green row is the final record

This screen shows the historical trail of all of the authorization changes which have been recorded, to date, for this particular authorization.

This completes the overview of the Financial application. Use the RETRACE button to return to the TOP screen. Then, click on PERSONNEL!

Organization Listing 1 DTIC PERSONNEL PROTOTYPE		9/89
PAGE 1	Attrition: 0.8% Benefits: 14.7%	STAFF 60000 150000 1000
DTIC PERSONNEL 60000 150000 1000	DTIC PERSONNEL 60000 150000 1000	DTIC PERSONNEL 60000 150000 1000
DTIC PERSONNEL 60000 150000 1000	DTIC PERSONNEL 60000 150000 1000	DTIC PERSONNEL 60000 150000 1000
DTIC PERSONNEL 60000 150000 1000	DTIC PERSONNEL 60000 150000 1000	DTIC PERSONNEL 60000 150000 1000

The Personnel application begins with a organization chart. There are several familiar buttons on this screen. They function in the same manner as described for the other applications. The UP ONE button acts to move your view of the Organization to the next higher hierarchical level. Note the distinction from the BACK ONE button which sent you back to the previous screen. You may "drill down" into the organization by clicking on the any desired office symbol.

The STAFF box in the upper right corner will show DTIC totals, on this top screen only. On other screens, the staff box will provide information on the headquarters element of the Office shown in the top center box.

Click on any of the PEOPLE buttons!

Person Listing 2				9/89	
VACANCY					
NAME	VACANCY	STATUS	CS	CS	
ORG	LO	RATES	1515	1515	
TITLE	OPER RESEARCH ANAL	AGE	13	13	
SSN	713823000	SEX	N/A		
DOB	3323N000	ED			
		ED	UNKNOWN		
		ED	NONE		
L-013-89					

This is the person detail screen. Notice that it too may be edited, at least for an interim period. There should be strict controls placed on the viewing and editing of this screen, particularly the information related to pay rates.

Click on the content of the TITLE field. This will take you to full details about the Position which this person occupies.

Position Listing 2		9/89	
OPER RESEARCH ANAL			
OPER RESEARCH ANAL	VACANCY	GS	1515 13 N/A
LO			
GS			
1515			
13			
1			

Now we can see the full details about the Position, including a list of all the People who are assigned to this Position. In the above example, we have a vacancy and the Position only calls for one "slot." For positions with multiple slots recognized, the list on the right would be longer. You may click on the name of any person on the list to obtain the details about that person.

Click COST ESTIMATES!

Personnel Cost Estimates Position OPER RESEARCH ANAL Office LO						1 9/89
First Estimate	Incumbents	SF52	Best Estimate	Authorized Expenditure	GRAPH TYPE Committed & Obligated	Delta
Oct				0	0	
Nov				0	0	
Dec				0	0	
Jan				0	0	
Feb				0	0	
Mar				0	0	
Apr				0	0	
May				0	0	
Jun				0	0	
Jul				0	0	
Aug				0	0	
Sep				0	0	
Tot				0	0	
GRAPH						

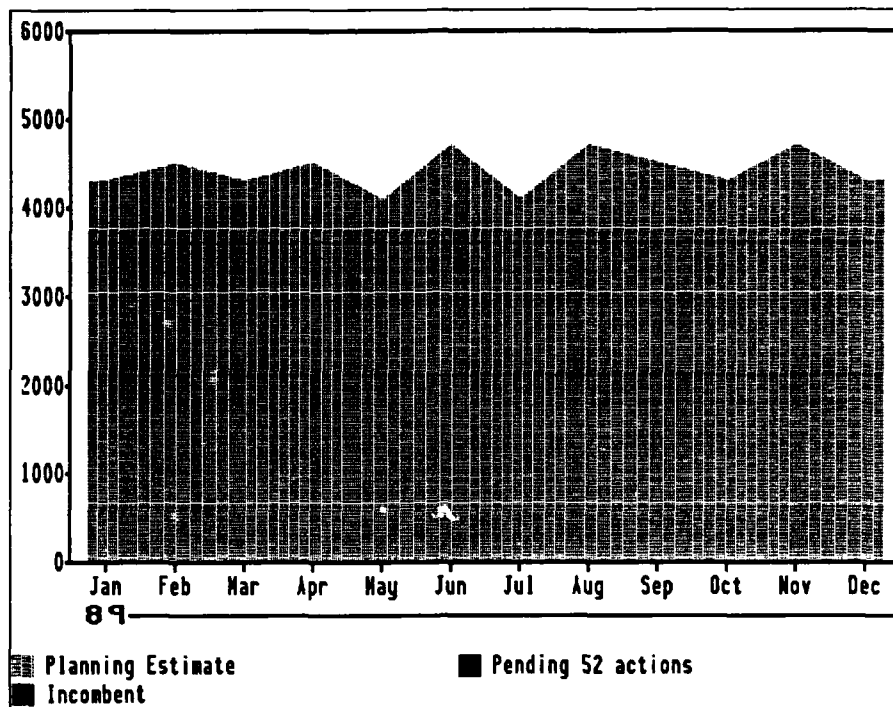
This screen shows, by month, the estimated, authorized and actual costs of the position or group of positions which were selected. Currently, DTIC only maintains actual personnel costs at the Directorate Level. At lower levels, as in the example above, the columns may not all be filled. You may wish to explore several of these screens to get the full impact of their potential.

The FIRST ESTIMATE column reflects the estimated cost, if all recognized "slots" for this position were filled at the mid step of the recognized grade. This is determined by applying the benefit rate for the office to which this position belongs to the calculated salary total. Special categories, such as night differential, are not considered in this estimate.

The INCUMBENT and SF-52 columns reflect the precise (to the day) estimates for each group. For INCUMBENTS, special and normal pay rates are determined from tables and multiplied by eight hours per weekday in that month. With-in-grade-increases (WIGI) and scheduled departures are considered and the appropriate benefit rate added. For SF-52s, the predicted start date for a mid-step employee is used, plus benefits. WIGI and special rates are not considered.

The BEST ESTIMATE column adds the INCUMBENT and SF-52 columns and applies the attrition rate for the particular office. Attrition and benefit rates for each office appear on the organizational chart screen, when that office is in the top center box. Each office may have its own rates or automatically inherit the rates of its parent organization. The rates may be changed using the EDIT feature on the organizational chart screen.

Note the GRAPH and FOOTNOTE buttons which function the same way as described for previous screens. Select the GRAPH TYPE "AREA" and click on GRAPH!



This is one example of Personnel Cost Graphs. Press the left mouse button to return to the previous screen.

Use RETRACE or a series of BACK ONE clicks to return to the organizational chart screen. Then....

Click on any of the POSITION buttons!

						1
						1000
First Estimate	Incumbents	SF52	Best Estimate	Authorized Expenditure	GRAPH TYPE Committed & Obligated	DELTA
Oct						
Nov						
Dec						
Jan						
Feb						
Mar						
Apr						
May						
Jun						
Jul						
Aug						
Sep						
Tot						
BACK-ONE						NUM

This is the same personnel cost format which we saw for an individual position. This time, however, it reflects the costs of a group of positions. Since we chose a Directorate level example, the Authorization column is filled. In the future the actual column (Committed & Obligated) will be filled. This provides the basis for calculating the DELTA, or difference between authorized and actual. The sum of the DELTA column, shown in the lower right is the most important number on this screen. It reflects the projected end of year status of this organization's personnel budget.

Click JUMP! Click PERSON.

HELP		9 /89	
Current Number of People 512			
OFFICE List Choices Type		NAME List Choices Type	
SCC List Choices Type		PD NUMBER List Choices Type	
SERVICE List Choices Type	SERIES List Choices Type	COMMENT List Choices Type	
GRADE List Choices Type	STEP List Choices Type	WIGI List Choices Type	
NUM			

This is another of the powerful DTIC EIS Selection screens. Notice the "Current Number of People" in the top center of the screen. This is the number of "records" in the employee data file. Most of these are actual names, but some are just place holders, usually with the word "Vacancy" in place of an actual name. The buttons function as previously described for other screens. This screen permits the selection of any ad hoc group of employees. Clicking on SHOW DATA will lead to a Person list as we have seen before.

Click JUMP! Click POSITION!

HELP		9 /89	
Current Number of Positions 275			
OFFICE List Choices Type		NUMBER RECOGNIZED List Choices Type	
TITLE List Choices Type		SEQUENCE List Choices Type	
SERVICE List Choices Type		SERIES List Choices Type	
GRADE List Choices Type		COMMENT List Choices Type	
NUM			

This is the final screen in our tour. It is also a selection screen. This time for positions. The "Current Number of Positions" represents the number of different positions. Many of these have multiple "recognized slots." The POSITION DATA will lead to a Position list screen, as before. The COST DATA will lead to a cost screen for the selected group of positions. Any idea how much all of the positions in your series are costing DTIC each year?

Note that these last two selection screens permit choices across organizational lines and other boundaries. That is a key difference from the PEOPLE and POSITION buttons on the organizational chart screens.

C: Postlude.

The DTIC EIS provides many BENEFITS. Some of them are listed below.

Quick, easy access to information.
Up-to-data information.
Relevant information.
Accurate information.
Product (unit) cost capability.
Project cost account reports.
Trend reporting capability.
Graphs and charts readily available.
Drill down capability.
Eliminate time consuming manual work ups.
SMDR faster.
Checkbook faster.
Paper reduction.
Historical statistics.
Present MMR & PRRE program statistics.
Access to new information.
Quick counts on personnel, positions or transactions.
Better cooperation when we all use the same data.
Data errors more quickly located, when data is shared.
Point & click friendly user interface to DTIC EIS.
Authorization history tracking.
Personnel costing model on-call vs. annual guesstimate.
Integration of budget, personnel and workload statistics.

The DTIC EIS is far from complete. The project team has developed a long list of ideas for enhancement and improvement. You are encouraged to use the DESIGN COMMENTS button freely and frequently to add your comments and suggestions.

The key to DTIC EIS success is ACTIVE use of the system by anyone who can benefit from it. You, the users, will then make the DTIC EIS fit your needs. EIS users and advocates must be proactive bridge builders to overcome the obstacles created by the occasional wall builder.

SECTION III-TECHNICAL.

The following document describes the organization of the DTIC EIS. It presumes a working knowledge of Pilot's Command Center language, DEC's VMS command language, MS DOS and elementary structured programming techniques.

1. What is Command Center?

The Defense Technical Information Center Executive Information System (DTIC EIS) is implemented with a product called Command Center from a company named Pilot. This product allows applications to be built that present a mouse driven user interface on an IBM PC or compatible (EIS PC) that is linked via an asynchronous communications link to a Digital Equipment Corporation computer running the VMS operating system (EIS Host). Command Center consists of a command interpreter, a forms editor, a data manipulation language, a compiler, a communications tool for the VMS host and an executable file for the PC that performs graphics and communication functions.

2. What are the components of this EIS application?

This EIS application consists of a database and a graphic user interface to present and manipulate that data. The database is stored on the EIS Host in the form of several Pilot tables. The data is displayed on screen forms or menus whose descriptions are stored on the EIS Host in menu files. Procedures stored on the EIS Host fill

the menus with data from the database and control navigation through the application.

2.1. How is this application organized?

The source code for the application is divided into two different catalogs. The DTIC2 catalog contains the executing system and data tables. The TOOLS catalog contains the procedures to update the data and other auxiliary code. A third catalog, DTIC2TEXT, contains the footnotes to the Summary Management Data Report screens. There are two Pilot applications embedded within the DTIC application. The Worksheet allows you to perform ad hoc graphs and mathematical calculations. Interview is used for editing of the pay table. These two applications do not follow all of the conventions outlined below.

2.2. What are the Types of Files?

2.2.1. Menus.

Menus are screen images or forms that can be displayed on the EIS PC. Menus are a more advanced form of the traditional database form. Command Center's menus can display any printable character in the ASCII character set. Menus are created with a tool provided by Pilot called the Menu Editor. There are three different types of menus in this

application based on the amount of information needed to invoke them. The retrace screen does not require any data. To call a selection screen, only the time period of interest is needed. The data screens require a database reference that specifies the data to be displayed in addition to the date.

2.2.2. Procedures.

This application contains several different types of procedures. There are procedures to fill menus with data, control the navigation between menus, display graphs, import new data, and perform utility functions. Procedures are written in a fourth generation like code that is proprietary to Pilot and are then compiled with Pilot's compiler into an intermediate form. This intermediate form is then interpreted at run time.

2.2.3. Data Tables.

The DTIC EIS application has over a dozen tables. There are tables for storing information about people, organizations, money spent, and budgets. Tables are created, updated, referenced and destroyed by Command Center commands. These commands can be issued directly to the interpreter or can be assembled into procedures. Pilot does not consider Command Center to be a relational database. Therefore,

their product does not contain all of the functionality that is expected of a database management system.

2.2.4. Text Files.

This application includes several text files. These are ASCII files, maintained on the EIS Host, that contain textual comments about various subjects. These files consist mainly of footnotes to the Summary Management Data Report screens.

2.3. How does the Control Flow?

The DTIC EIS application code is structured in an object oriented manner. The basic object in this application is the screen image or menu. All of the screens can be called from anywhere else and are not history sensitive. This allows the control to flow between different screens in a directed graph manner instead of the typical rooted tree structure. The standard flow of control to run a typical menu is as follows.

2.3.1. Run Menu.

The user takes an action which initiates a run menu command (Either from the command line or by selecting a button on an active menu). At this time the following parameters are passed to the menu: Current Month, Current Year, Title, Database Reference, Page, Return Menu.

2.3.2. Call Fill Procedure.

The menu then calls a procedure named FILL*. This procedure takes the same parameters as the run menu call. This procedure will then perform the following steps:

2.3.2.1. Determine if This is a Cached Menu.

Determine if this is a cached menu and if so recall any auxiliary information from the blind cells, add its name to the retrace list and return to the initial actions of the calling menu.

2.3.2.2. Check if There is a Cached Version of the Current Menu.

Check to see if a cached version of this menu with this data on this page exists and if so, return its name in the return menu variable.

2.3.2.3. Retrieve Data.

Query the database and retrieve the data indicated in the data reference variable.

2.3.2.4. Format Data.

The data is then formatted and displayed.

2.3.2.5. Save Parameters in Blind Cells.

The parameters passed into this procedure and auxiliary information is stored in blind cells.

2.3.2.6. Include in Retrace.

A procedure is called to include the current menu in the retrace list.

2.3.2.7. Cache Current Menu.

Finally, the current screen image is assigned a name and cached. Control is returned to the initial action of the menu.

2.3.3. Run Cached Menu If Exists.

If the fill procedure returned the name of an existing cached menu, then the cached menu is run with the parameters passed into the original menu.

2.3.4. Wait For User Input.

Control is then passed to the user. The user can then select one of three different types of buttons.

2.3.4.1. Link Buttons.

Link buttons are buttons that lead to other application screens. They use the following control logic:

2.3.4.1.1. Retrieve Values From Blind Cells.

First, gather the necessary control information from the blind cells and the cell that was selected.

2.3.4.1.2. Verify Data Exists.

Next, some button actions verify if there is data for the next screen that will be called and abort if not.

2.3.4.1.3. Run New Menu.

Finally the new menu is run.

2.3.4.2. Graph Buttons

Graph buttons are buttons that call procedures to graph the data currently on the screen. Most graph buttons just call the graph procedure and let it fetch all the necessary information from the screen.

2.3.4.3. Control Buttons.

Control buttons change the state of the current screen. They are used to toggle between graph types, to toggle help and edit features on and off, to change values when editing, and to save edit changes.

3. How is the Data Updated.

3.1. Overview.

3.1.1. Source Data Files.

Several different tools are utilized in the process of updating the databases. All of the update procedures follow the same basic steps. The first step is to convert the data into an easily interpreted ASCII form. The form that was chosen was the VisiCalc spreadsheet format. The reason this format was chosen is because tools exist to convert most other types of PC data files into this ASCII format. These files have an extension of .DIF. A complete description of this format can be found in the procedure DIF2QDK. A copy of this file can be found in appendix B. DBASE 3 files can be converted using the DBASE command "COPY TO FILENAME TYPE DIF". Lotus or Symphony files can be converted using the utility that is part of the Symphony package named WRKDIF.EXE.

3.1.2. Uploading Data Files.

Files in the DIF format can then be uploaded to the Pilot application using the Pilot command "UPLOAD TEXT". The

procedure DIF2QDK can then be used to convert the DIF file into a Pilot table. This table contains all of the original rows and columns and adds a column named RECNUM which is an integer field that represents the row number in the original spreadsheet or database. The DIF2QDK procedure will also convert values that can not be represented in Pilot databases to the string value "N/A". This is necessary because of wild card conflicts between Pilot and the PC software programs from which the data came. This program also converts numeric fields from VisiCalc's scientific notation format to real numbers represented in a string format. The convention of naming these files (text file name)_TB has been followed throughout the application.

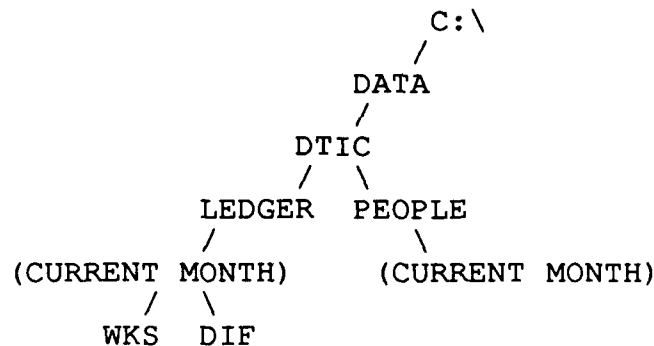
3.1.3. Integrating New Data With Old.

The last step is to merge these new Pilot tables with the original database. This is the function of the EXT files in the TOOLS catalog. These files are what will require change when the data layout of the original source data changes.

3.2. Assumptions.

The following procedures will assume that the data will be moved from its various sources to an IBM PC that is connected to the EIS server (A DEC Micro Vax II). The PC must have the directory structure in figure 1. It must also have DBASE 3, Pilot and the Symphony utilities in it's path. This PC will be referred to as the EIS PC in the following sections.

Figure 1



3.3. Updating the Personnel Application Database.

3.3.1. The Source Of the Data.

The source of the personnel data is a DBASE application maintained on a PC in DTIC-L. The following steps are required to integrate this data into the Pilot personnel application. This section will

explain how to import data for October of 1989. The same procedure can be used to import data from other periods by substituting the proper month.

Note: All procedures assume that the current data is the most recent. Therefore updates must be applied in chronological order.

3.3.2. Acquiring Control of the Data.

The data files are kept under the MPWR subdirectory on Arlene Rowland's PC. The files named MPOSIT.DBF MEMPLOY.DBF and MACTIVE.DBF should be moved to the EIS PC from which the update will take place and into the current month directory under \DATA\DTIC\PEOPLE. For example the commands to move the October data would be:

On Arlene Rowland's PC:

```
A:\ COPY C:\MPWR\MPOSIT.DBF A:MPOSIT.DBF
A:\ COPY C:\MPWR\MEMPLOY.DBF A:MEMPLOY.DBF
A:\ COPY C:\MPWR\MACTIVE.DBF A:MACTIVE.DBF
```

And then on the EIS PC:

```
A:\ MKDIR C:\DATA\DTIC\PEOPLE\OCT
A:\ COPY A:MPOSIT.DBF C:\DATA\DTIC\PEOPLE\OCT\MPOSIT
A:\ COPY A:MEMPLOY.DBF C:\DATA\DTIC\PEOPLE\OCT\MEMPLOY
A:\ COPY A:MACTIVE.DBF C:\DATA\DTIC\PEOPLE\OCT\MACTIVE
```

3.3.3. Converting Data to a Standard Format.

The DBASE files must now be converted into a standard format. The standard format chosen for this application is the format of a Visicalc spreadsheet. The following series of commands will perform this transformation.

```
C:\ CD \DATA\DTIC\PEOPLE\OCT
C:\DATA\DTIC\PEOPLE\OCT\ DBASE
DBASE> USE MACTIV52
DBASE> COPY TO ACTIVE TYPE DIF
DBASE> USE MEMPLOY
DBASE> COPY TO EMPLOY TYPE DIF
DBASE> USE MPOSIT
DBASE> COPY TO POSIT TYPE DIF
DBASE> QUIT
C:\DATA\DTIC\PEOPLE\OCT\ RENAME *.DIF *.TXT
```

3.3.4. Uploading the Data.

Now the text files are ready to be uploaded to the EIS Server. They will be placed in a temporary catalog named TEMP to keep them isolated from the application until they are in the proper format.

```
C:\DATA\DTIC\PEOPLE\OCT\ Pilot
(log into the EIS Server and start Pilot)
? SET USER TEMP
? UPLOAD TEXT ACTIVE
? UPLOAD TEXT POSIT
? UPLOAD TEXT EMPLOY
```

3.3.5. Converting to Pilot's Format.

The following set of commands will convert these text files into Pilot tables.

```
? SET USER TEMP
? PATH TOOLS
? CALL DIF2QDK("ACTIVE","ACTIVE_TB")
? CALL DIF2QDK("POSIT","POSIT_TB")
? CALL DIF2QDK("EMPLOY","EMPLOY_TB")
```

3.3.6. Merging the Data With the Application.

The tables are now ready to be merged with the applications tables. To prevent problems with active users, the production tables are moved into the TEMP catalog, the tables merged and then moved back over writing the original. The extract procedures will display status information and indicate if there were any errors in the input data.

```
? SET USER TEMP
? PATH TOOLS
? COPY DTIC2.PERSON PERSON
? COPY DTIC2.POSITION POSITION
? COPY DTIC2.SF52 SF52
? CALL EXTRACTPEOPLE("EMPLOY_TB","PERSON")
? CALL EXTRACTPOSITION("POSIT_TB","POSITION")
? CALL EXTRACTSF52("ACTIVE_TB","SF52")
```

3.3.7. Executing the Cost Model.

The personnel data has now been integrated with the existing data. The following steps are necessary to run the cost estimation model against the new data. The SF52_FIXES file changes the format of the dates in the import data and the COMP* procedures compute the actual costs. The COMP* procedures may indicate missing data in the pay table. If the information exists, it should be input into the pay table and then the compute procedures run again.

```
? SET USER TEMP
? PATH TOOLS,DTIC2
? CALL SF52_FIXES
? CALL COMP_SF52_COST(10,89)
? CALL COMP_POSITION_COST(10,89)
? CALL COMP_PERSON_COST(10,89)
? CALL MOVE_COSTS
```

3.3.8. Installing the New Tables.

The final step is to verify the tables and then move them into the production area. If the verify table displays any errors, read the relevant sections of the Pilot manuals and then start over from step 4.

```
? SET USER TEMP
? VERIFY TABLE PERSON
? VERIFY TABLE POSITION
? VERIFY TABLE SF52
? COPY OVERWRITE TEMP.PERSON DTIC2.PERSON
? COPY OVERWRITE TEMP.POSITION DTIC2.POSTION
? COPY OVERWRITE TEMP.SF52 DTIC2.SF52
```

This completes the updating of the personnel application. To update the pay table, pick that option from the utility popup menu on the retrace screen.

3.4. Updating the financial database.

3.4.1. General Precautions.

There are several known bugs in Pilot version 3c. The most significant of these is with aggregated queries. Syntactically correct queries may corrupt a data table if it is in a writeable state. The procedures above will open up the table for write only when necessary. If a verify table command reports an error, then the current table is corrupt and must be erased and restored from a backup or recreated. Another bug in the Pilot database may prevent transactions with descriptions that are longer than 20 characters from being correctly retrieved when

queried by the description field. This problem only affects character fields. This is more of an issue with the SMDR database but it could arise in this application.

There was some discussion about reformatting the ledger spreadsheets for fiscal year 1990. If the ledgers were reformatted then a new set of extract procedures will need to be created.

3.4.2. Source of the Data.

The source of the financial data is a set of Lotus spreadsheets maintained by Ms. Debbie Fersch. Ms. Fersch has been providing monthly copies of these spreadsheets for the EIS applications. This data should then be copied to the \DATA\DTIC\LEDGER\OCT\WKS directory. The following commands will move the data. (The source data is on two 360K floppy disks)

```
(Insert first floppy disk in the A drive)
A:\ MKDIR C:\DATA\DTIC\LEDGER\OCT
A:\ COPY A:*. * C:\DATA\DTIC\LEDGER\OCT
(Remove the first floppy and insert
the second floppy in A drive.)
A:\ COPY A:*. * C:\DATA\DTIC\LEDGER\OCT
```

3.4.3. Convert Data to a Standard Format.

Next, the Lotus spreadsheets should be translated into VisiCalc worksheets. This is performed by a Lotus translation utility named WRKDIF.EXE or by an option under the translate utility depending on the version of Lotus. The following batch command procedure will convert all of the files using the WRKDIF.EXE program. This procedure can be found in the \DATA\DTIC\ directory on the EIS PC. The file named CONVERT.BAT contains the following commands.

```
CD WKS
MKDIR TEMP
FOR %%F IN (*.WKS) DO WRKDIF %%F TEMP\%%F
CD ..
COPY WKS\TEMP\*.WKS DIF\*.TXT
CD WKS\TEMP
DELETE *.WKS
CD ..
RMDIR TEMP
CD ..
DIR DIF\ >DIF\NAMES.DAT
```

This command procedure can be called in the following manner.

```
C:\ CD \DATA\DTIC\LEDGER\OCT
C:\DATA\DTIC\LEDGER\OCT ..\..\CONVERT.BAT
```

After running this procedure, the *.DIF files should be verified. If the file size of any of the *.DIF files is 0,

this may indicate that the hard disk drive is full. Some types of errors are logged in the TRANS.\$\$\$ file in the \DIF directory so this file should also be checked.

3.4.4. Upload Data.

The next step is to upload the data files to the EIS Server. The file named "UPLOAD_TEXT" in the TOOLS catalog will perform this step.

```
C:\ CD \DATA\DTIC\LEDGER\OCT
C:\DATA\DTIC\LEDGER\OCT Pilot
(log into the EIS Server and start Pilot)
? SET USER TEMP
? PATH TOOLS
? CALL UPLOAD_TRANSACTION
```

3.4.5. Convert to Pilot Format.

Then the text files in VisiCalc format must be converted into Pilot database tables. The following commands will perform this task.

```
? SET USER TEMP
? PATH TOOLS
? CALL CONVERT_TO_TABLES
```

3.4.6. Combine into One Table.

Consolidating these tables into a single table is performed by the "EXTRACT_LEDGER" procedure. This

procedure assumes the existence of an empty table named C&O_TRANSACTION. This table may be created and filled in the following manner.

```
? SET USER TEMP
? PATH TOOLS, DTIC2
? CALL MY_MAKETABLE("C&O_TRANSACTION")
? CALL EXTRACT_LEDGER
? UPDATE TABLE C&O_TRANSACTION READONLY
```

3.4.7. Verify Data.

At this point the ledger data must be verified! First the error log that EXTRACT_LEDGER creates must be reviewed and then object class totals should be double checked against the original Lotus spreadsheet total lines. There are four different types of errors that could be present at this point. If the OC_CHECK procedure shows any discrepancies then take the necessary error correction steps. OC_CHECK may be run in the following manner.

```
? SELECT TEMP.C&O_TRANSACTION:
? CALL TOOLS.OC_CHECK
```

3.4.8. Error Correction Steps.

3.4.8.1. Incorrect Object Class.

Some transactions represent more than one office or object class. At present, this information is not represented in a machine interpretable fashion so these errors can not be detected or corrected.

3.4.8.2. New Office Symbols.

New and wonderful office symbols may have been used in one or more of the transaction files. This is the most frequent type of problem. These problems may be corrected by adding the new office symbol to the TOOLS.SYNONYMS: table. This table contains a list of all the valid office names in the term column and all the aliases that have been recorded so far in the alias column. The extract procedures lookup valid names in this table. They flag names not found in this file as invalid. After adding the new symbols to this table, the C&O_TRANSACTION file in the TEMP catalog must be deleted and recreated. This is necessary because the extract

procedures have to place exactly one entry in the C&O_TRANSACTION table for each record in the source files including those with new office symbols for the totals to be accurate. The following commands will add the alias "DTIC_LRE" to the database as another name for "LRE" and then erase the transaction table. After performing this step, all steps following the step to convert the source data into Pilots format must be performed again.

```
? SELECT TOOLS.SYNONYM:
? MAKE RECORD FIELD ALIAS -
-? "DTIC_LRE:" FIELD TERM "LRE"
? UPDATE TABLE TEMP.C&O_TRANSACTION -
-? NOREADONLY
? ERASE TABLE TEMP.C&O_TRANSACTION:
```

3.4.8.3. Invalid Characters in Input.

Special characters could have been used for office names. If a special character is used in a text field in the original spreadsheets that Pilot can not represent in its database and that character is not already treated specially in DIF2QDK, the record may not have been created in the *_TB table. The only way to correct for

this type of error is to modify
DIF2QDK.

3.4.8.4. Extraneous Subtotals.

Subtotal transaction records may have been imported. The travel and training expenses are recorded in separate worksheets from the rest of their object class. If the physical location of the total records is moved in these spreadsheets, it will get imported. If this happens the subtotal record must be deleted and the extract procedure that imported the record updated to reflect the new location of this record. This can be done by modifying the RECNUM constant in the extract procedure and recompiling.

3.4.9. Manual Data Cleanup.

Several additional checks must be performed before the summary procedure can be run. This involves making sure that all of the records have valid project codes. If any of the transactions have project codes of "" then the summary procedure

will fail. This situation can be corrected with the following set of commands

```
? UPDATE TABLE C&O_TRANSACTION NOREADONLY
? SELECT TEMP.C&O_TRANSACTION:
? UPDATE RECORD PROJECT_CODE < "      -
-?  0" FIELD PROJECT_CODE "NA"
? UPDATE TABLE C&O_TRANSACTION READONLY
```

3.4.10. Compute Summary Records.

At this point the transaction data is ready to be summarized into the summary table. The following set of commands will append the new information to the existing summary information.

```
? SET USER TEMP
? PATH TOOLS, DTIC2
? COPY DTIC2.C&O_SUMMARY TEMP.C&O_SUMMARY
? UPDATE TABLE C&O_TRANSACTION NOREADONLY
? UPDATE TABLE C&O_SUMMARY NOREADONLY
? CALL UPDATE_SUMMARY("C&O_TRANSACTION", -
-? "C&O_SUMMARY", 10, 89)
? UPDATE TABLE C&O_TRANSACTION READONLY
? UPDATE TABLE C&O_SUMMARY READONLY
? SELECT TEMP.C&O_SUMMARY:
? CALL OC_CHECK
? VERIFY TABLE
```

3.4.11. Installation of New Tables.

If the object class check is correct then the tables can be moved into the production area. It is strongly recommended that the system be backed up to tape before the new data is installed! There

should not be anybody using the application when the following step is performed.

```
? COPY OVERWRITE TEMP.C&O_TRANSACTION DTIC2.  
? COPY OVERWRITE TEMP.C&O_SUMMARY DTIC2.
```

3.4.12. Allowing Users to See Updates.

The last step is to update the procedure GO so that the users will see the new data by default when they log in. This is done by editing the procedure GO and replacing the values of CMONTH and CYEAR with the month and year of the data just loaded.

3.5. Updating the SMDR Database.

The SMDR database can be updated and corrected using the menu interface's edit facility in the SMDR application.

3.6. Updating the Authorization Database.

There is currently no method of updating the authorization database other than through the menu interface.

3.7. Updating the Pay tables.

The only method currently available uses Interview. This is sufficient for making small modifications but inconvenient for major updates.

3.8. Updating the Privilege Table.

Updating the privilege table is currently performed from the Pilot command line.

3.9. Updating the Object Class Detail Table.

Updating of the object table is currently performed from the command line.

3.10. Updating the Organization Table.

The organization table can be updated from the application using the "edit" feature or the Pilot command line. Some operations can only be performed from the Pilot command line. These operations include adding or removing an organization from the structure.

3.11. Updating the Salary Flag Table.

The salary flag table can only be updated from the Pilot command line.

APPENDIX A

The Files in the Prototype.

Following is a list of all of the files in this application and a short explanation of when they are called and what they do. It begins by listing the procedures executed when the application is run. Next is the list of menus displayed during application execution. Following is a list of procedures and text files that are used for updating and maintenance.

File Name	Procedures in the DTIC2 Catalog. Function
BUDGET1_FIX_DBR	This procedure is called from BUDGET1. It cleans up a database reference before passing it to BUDGET2.
BUDGET2_FIX_DBR	This procedure is called from BUDGET2. It cleans up a database reference before passing it to BUDGET3.
DAINSTL	This procedure installs Interview in a user catalog. It is part of the Interview suite of code but is not called in this application.
DAPROCS	This procedure contains most of Interview's supporting code.
DATSPRO	This procedure contains the rest of Interview's code.
EDITBUDGET2	This procedure is called when a button is selected when in edit mode on BUDGET2. It performs the actual database updates.
EDITENNABLEBUDGET2	This procedure is called when the edit button on BUDGET2 is called. It changes the text of the edit button and enables cells that can be edited and disables those that can not.
EDITENABLEORGAN1	This procedure is called when the edit button on ORGANIZATION1 is called. It changes the text of the edit button and enables cells that can be edited and disables those that can not.
EDITENABLEPERSON1	This procedure is called when the edit button on PERSON1 is called. It changes the text of the edit button and enables cells that can be edited and disables those that can not.

Procedures in the DTIC2 Catalog.

File Name	Function
EDITENABLEPERSON2	This procedure is called when the edit button on PERSON2 is called. It changes the text of the edit button and enables cells that can be edited and disables those that can not.
EDITENABLEPOSITION1	This procedure is called when the edit button on POSITION1 is called. It changes the text of the edit button and enables cells that can be edited and disables those that can not.
EDITENABLEPOSITION2	This procedure is called when the edit button on POSITION2 is called. It changes the text of the edit button and enables cells that can be edited and disables those that can not.
EDITENABLESMDR1	This procedure is called when the edit button on SMDR1 is called. It changes the text of the edit button and enables cells that can be edited and disables those that can not.
EDITORGAN1	This procedure is called when a button is selected when in edit mode on ORGANIZATION1. It performs the actual database updates.
EDITPERSON1	This procedure is called when a button is selected when in edit mode on PERSON1. It performs the actual database updates.
EDITPERSON2	This procedure is called when a button is selected when in edit mode on PERSON2. It performs the actual database updates.
EDITPOSITION1	This procedure is called when a button is selected when in edit mode on POSITION1. It performs the actual database updates.
EDITPOSITION2	This procedure is called when a button is selected when in edit mode on POSITION2. It performs the actual database updates.
EDITSMDR1	This procedure is called when a button is selected when in edit mode on SMDR1. It performs the actual database updates.
FILLBUDGET1	This procedure fetches data from the database and loads it into the cells of BUDGET1.

Procedures in the DTIC2 Catalog.

File Name	Function
FILLBUDGET2	This procedure fetches data from the data-base and loads it into the cells of BUDGET2.
FILLBUDGET3	This procedure fetches data from the data-base and loads it into the cells of BUDGET3.
FILLCOST1	This procedure fetches data from the data-base and loads it into the cells of COST1.
FILLEDDGER1	This procedure fetches data from the data-base and loads it into the cells of LEDGER1.
FILLEDDGER2	This procedure fetches data from the data-base and loads it into the cells of LEDGER2.
FILLEDDGER3	This procedure fetches data from the data-base and loads it into the cells of LEDGER3.
FILLEDDGER4	This procedure fetches data from the data-base and loads it into the cells of LEDGER4.
FILLORGAN1	This procedure fetches data from the data-base and loads it into the cells of ORGANIZATION1.
FILLPERSON1	This procedure fetches data from the data-base and loads it into the cells of PERSON1.
FILLPERSON2	This procedure fetches data from the data-base and loads it into the cells of PERSON2.
FILLPOPLIST	This procedure fetches data from the data-base and loads it into the cells of POPLIST.
FILLPOSITION1	This procedure fetches data from the data-base and loads it into the cells of POSITION1.
FILLPOSITION2	This procedure fetches data from the data-base and loads it into the cells of POSITION2.
FILLSELECTION1	This procedure fetches data from the data-base and loads it into the cells of SELECTION1.

Procedures in the DTIC2 Catalog.

File Name	Function
FILLSELECTION2	This procedure fetches data from the database and loads it into the cells of SELECTION2.
FILLSELECTION3	This procedure fetches data from the database and loads it into the cells of SELECTION3.
FILLSELECTION4	This procedure fetches data from the database and loads it into the cells of SELECTION4.
FILLSELECTION5	This procedure fetches data from the database and loads it into the cells of SELECTION5.
FILLSMDR1	This procedure fetches data from the database and loads it into the cells of SMDR1.
FILLSMDR2	This procedure fetches data from the database and loads it into the cells of SMDR2.
FILLWORKSHEET_POP1	This procedure fetches data from the database and loads it into the cells of WORKSHEET_POP1.
GO	This is the procedure that starts the application. It is called directly by a user or from their startup procedure. It establishes the default date, determines a users privileges, calls RINIT and calls the top menu.
GRAPH1COST1	This procedure graphs the data shown on the COST1 screen. It is called by the graph buttons on that screen.
GRAPH1LEDGER3	This procedure graphs the data shown on the LEDGER3 screen. It is called by the graph buttons on that screen.
GRAPH1SMDR1	This procedure graphs the data shown on the SMDR1 screen. It is called by the graph buttons on that screen.
LEDGER3_BUILD_DBR	This procedure is called by the link buttons on LEDGER3 to clean up the database reference before running LEDGER4.

Procedures in the DTIC2 Catalog.

File Name	Function
LEDGER_AGGR_OFFICE	This procedure is called by FILLEDGER1 and FILLEDGER3 to aggregate data based on offices.
MAKESELECTION1	This procedure builds a database reference as the user selects items from the associated selection screen.
MAKESELECTION2	This procedure builds a database reference as the user selects items from the associated selection screen.
MAKESELECTION3	This procedure builds a database reference as the user selects items from the associated selection screen.
MAKESELECTION4	This procedure builds a database reference as the user selects items from the associated selection screen.
MAKESELECTION5	This procedure builds a database reference as the user selects items from the associated selection screen.
MYTRACE	This is a very slightly modified version of Pilot's retrace procedure. This procedure is called by almost every menu to add a screen to the retrace stack.
PRINTFILE	This procedure loads a text file into an array for display in COMMENT:FOOTNOTE.
RTINIT	This procedure will initialize the retrace stack, it is called from go.
SELECTION1FIXDBR	This procedure modifies the office clause in a data base reference to include subordinates. It is called when the include subordinates button is selected.
SELECTION4FIXDBR	This procedure modifies the office clause in a data base reference to include subordinates. It is called when the include subordinates button is selected.
SELECTION4_MAKE_TTL	This procedure creates a title for the next screen. It is called by some of the link buttons on SELECTION4.

Procedures in the DTIC2 Catalog.

File Name	Function
SELECTION_LIST	This procedure is called by all of the MAK-ESELECTION procedures. It packages the calls to and parses the results from calls to popup lists.
SELECTION_TYPE	This procedure is called by all of the MAK-ESELECTION procedures. It interprets the data a user types in response to a "Type" cell on a selection screen. It will call selection_list as a response to ambiguous input .
SMDR_CALC_COL	This procedure will calculate column totals when a monthly value is changed while editing data on the SMDR1 screen.
UPONE	This procedure is called by the "UPONE" buttons on almost every screen. It pops the name of the cached menu that is at the top of the retrace stack.
WORKSHEET_SMDR1	This procedure retrieves the necessary control information and then calls the menu WORKSHEET_POP1.
WSCALC	This procedure is part of Pilot's worksheet application.
WSFILL	This procedure is part of Pilot's worksheet application.
WSGRAPH	This procedure is part of Pilot's worksheet application.
WSINSTL	This procedure is part of Pilot's worksheet application.
WSPROCS	This procedure is part of Pilot's worksheet application.
WSSRPOP	This procedure is part of Pilot's worksheet application.
WSSTART	This procedure is part of Pilot's worksheet application.

Menus in the DTIC2 Catalog.
In file DTIC2.MENUFILE:

Menu Name	Function
BUDGET1	This menu is a listing of authorizations.
BUDGET2	This menu displays details about a specific authorization.
BUDGET3	This menu displays the history of an authorization.
COST1	This menu displays cost details from the personnel application.
LEDGER1	This menu presents summaries of office vs object class vs project code.
LEDGER2	This menu presents listings of transactions.
LEDGER3	This menu displays checkbook summaries aggregated across one dimension.
LEDGER4	This menu displays transaction details.
ORGANIZATION1	This menu displays an organization chart.
PERSON1	This menu presents a list of several people.
PERSON2	This menu presents details on one person.
POPLIST	This menu presents a list of options and allows the user to select one option.
POPLIST2	This menu presents a two column list and allows the user to select one option from the left column.
POSITION1	This menu presents a list of several positions.
POSITION2	This menu displays details on 1 position and the occupants names.
SELECTION1	This menu allows the user to select a group of people to list.
SELECTION2	This menu allows the user to select a group of positions to list
SELECTION3	This menu allows the user to select a group of transactions to list.

**Menus in the DTIC2 Catalog.
In file DTIC2.MENUFILE:**

Menu Name	Function
SELECTION4	This menu allows the user to select groups of offices, object classes, project codes and program codes and display summaries or transactions.
SELECTION5	This menu allows the user to select authorizations to list.
SMDR1	This menu displays the SMDR details.
SMDR2	This menu allows the user to select the SMDR table to show details about.
TOP	This is the DTIC prototype entry screen.
UTIL1	This menu allows the user to edit the pay table, change passwords or flush cached menus after editing data.
WORKSHEET_POP1	This menu allows the user to select what data they would like to copy from LEDGER1 into the worksheet.

**Menus in the DTIC2 Catalog.
In file DTIC2.COMMENT:**

Menu Name	Function
FOOTNOTE	This menu displays the SMDR footnotes.
INPUT	This menu allows the user to enter design comments.

**Menus in the DTIC2 Catalog.
In file DTIC2.RT:**

Menu Name	Function
RETRACE	This menu allows the user to pick any menu in the retrace list and jump directly to it.

Menus in the DTIC2 Catalog.

In file DTIC2.DA:

All menus in this file are part of the Pilot Interview application.

Menu Name	Function
STRMEN	Data Entry String Menu
TABLE	Data Entry Main Menu
TSMEN	Data Entry Timeseries Menu
TSPER	Period Pop-up called from TSMEN

Menus in the DTIC2 Catalog.

In File DTIC2.DAHELPM:

All menus in this file are part of the Pilot Interview application.

HBOTTOM	HCLEAR	HDOWN	HERASE	HEXIT
HFIELD	HMAKE	HNEXTRECO	HSELECT	HTABLE
HTOP	HTSBOTTOM	HTSDATA	HTSDELETE	HTSDOWN
HTSEXIT	HTSFIRST	HTSLABEL	HTSLAST	HTSPERIOD
HTSSTORE	HTSTITLE	HTSTOP	HTSTYPE	HTSUP
HTSVAR	HUP	HUPDATE	HVALUE	HVALUE2

Menus in the DTIC2 Catalog.

In file DTIC2.WS:

All menus in this file are part of the Pilot Worksheet application.

Menu Names	Function
WORKSHEET	Worksheet Menu

Menus in the DTIC2 Catalog.

In file DTIC2.WSH:

All menus in this file are part of the Pilot Worksheet application.

Menu Name	Function
CALCCONSTANTHELP	Calc Constant Help Pop-up
CALCCUMHELP	Calc Cum Function Help Pop-up
CALCOPERSHELP	Calc Math Operators Help
CALCTRENDHELP	Trend Function Help Pop-up
CLEARHELP	Clear Button Help Pop-up
DATESHELP	Dates Button Help Pop-up
DELETEHELP	Delete Button Help Pop-Up

Menus in the DTIC2 Catalog.

In file DTIC2.WSH:

All menus in this file are part of the Pilot Worksheet application.

Menu Name	Function
DOWNLOADHELP	Download Button Help Pop-up
GOTOPCHELP	Go to PC Button Help Pop-up
GRAPHHELP	Graph Button Help Pop-up
LEADLAGHELP	Calc Lead/Lag Function Help
MOVAVGHELP	Moving Average Function Help
RENAMEHELP	Rename Button Help Pop-Up
RETURNHELP	Return Button Help Pop-up
REVERSEHELP	Reverse Button Help Pop-up
WCELLSHELP	Worksheet Items Help Pop-up

Files in the Tools Catalog.

File name

CALC_GM_PAY	This procedure copies all of the "GS" records in the pay table and changes their service to "GM".
COMPUTE_NIGHT_DIF	This procedure creates the night differential records at a percentage rate of the normal scale.
COMP_PERSON_COST	This procedure will compute the incumbent portion of the personnel cost model.
COMP_POSITION_COST	This procedure will compute the first estimate portion of the cost model.
COMP_SF52_COST	This procedure will compute the impact of SF 52's on the cost model.
CONVERT_TO_TABLES	This procedure will take the ledger text files and convert them to tables.
DESIGN_COMMENT_TBL	This procedure will output the contents of the design comments table with embedded UNIX tbl commands for printing.
DIF2QDK	This procedure will convert a VisiCalc spread sheet into a Pilot table.

Files in the Tools Catalog.
File name

EXTL115	This procedure will extract the relevant records from a table formatted like the one DIF2QDK produces when given the Visicalc equivalent of the ledger file L115.WKS and insert them into the C&O_Transaction table.
EXTL1263	This procedure will extract the relevant records from a table formatted like the one DIF2QDK produces when given the Visicalc equivalent of the ledger file L1263.WKS and insert them into the C&O_Transaction table.
EXTL2216	This procedure will extract the relevant records from a table formatted like the one DIF2QDK produces when given the Visicalc equivalent of the ledger file L2216.WKS and insert them into the C&O_Transaction table.
EXTL24	This procedure will extract the relevant records from a table formatted like the one DIF2QDK produces when given the Visicalc equivalent of the ledger file L24.WKS and insert them into the C&O_Transaction table.
EXTPAY	This procedure will extract records from a text file formatted like TOOLS.GSTABLE and insert them into the pay table.
EXTRACT52	This procedure will extract the relevant records from a table formatted like the one DIF2QDK produces when given the VisiCalc equivalent of MACTIVE.DBF personnel file.
EXTRACTAUTH	This procedure will extract the relevant records from a table formatted like the one DIF2QDK produces when given the VisiCalc equivalent of Gary Skipper's authorization spread sheet.
EXTRACTLEDGER	This procedure will call the EXTL* procedures with the proper parameters to convert a complete ledger as represented in files produced by DIF2QDK into one table.
EXTRACTPEOPLE	This procedure will extract the relevant records from a table formatted like the one DIF2QDK produces when given the VisiCalc equivalent of MEMPLOY.DBF personnel file.

Files in the Tools Catalog.
File name

EXTRACTPOSITION	This procedure will extract the relevant records from a table formatted like the one DIF2QDK produces when given the VisiCalc equivalent of MPOSIT.DBF personnel file.
EXTTRAINING	This procedure will extract the relevant records from a table formatted like the one DIF2QDK produces when given the VisiCalc equivalent of the ledger file TRAINING.WKS and insert them into the C&O_Transaction table.
EXTTRAVEL	This procedure will extract the relevant records from a table formatted like the one DIF2QDK produces when given the VisiCalc equivalent of the ledger file TRAVEL.WKS and insert them into the C&O_Transaction table.
FILL_TRANSACTION_TAB	This is another version of EXTRACTLEDGER.
MAKE_TABLE_OLD	This is a utility program which will dump a table into a form that can be edited by a word processor and then rebuilt.
MOVE_COSTS	This procedure will move the incumbent and SF52 costs into the position table so they can be maintained and displayed.
MY_MAKETABLE	This procedure will create an empty table for this application depending on the definition in the table.
TABLE_DETAIL	This is a table that contains descriptions of all of this applications tables and the fields in them.
OC_CHECK	This procedure will produce a list of summaries that should coincide with the totals at the bottom of each Lotus spread sheet that compose the ledger.
PERSON_OFFICE_CREATE	This procedure was used initially to fill the office field in the person table.
RECOMPUTE_PAY_WG	This procedure was used to recompute the WG pay rates after they were entered incorrectly.

Files in the Tools Catalog.
File name

RECOMPUTE_PAY_WS	This procedure was used to recompute the WG pay rates after they were entered incorrectly.
SF52_FIXES	This procedure patches the SF52 table before costs can be calculated from it.
SMDRCUM	This procedure was used to recompute the cumulative values in the SMDR database after the FLOW attribute had been changed in the monthly data.
SMDRLOAD	This procedure was used to subtly change the format of the SMDR database.
SMDRRENAMEFOOTNOTE	This procedure renamed the footnote files when the above change took place. Note: this procedure does not work correctly.
SMDR_CALC_YTD	This procedure is used on update the Year to date figures after edits have taken place. Due to the nature of Year to Date averages, this procedure computes incorrect figures for averaged fields.
SMDR_CHECK	This procedure was used to determine the FLOW attribute of the SMDR database.
SMDR_FIX_OCT	This procedure was used to correct corrupted SMDR data.
SMDR_FLOW	This procedure was used to correct corrupted SMDR data.
SMDR_TRUNCATE	This procedure was used to correct corrupted SMDR data.
SMDR_TRUNC_CUM	This procedure was used to correct corrupted SMDR data.
TBL	This procedure will dump the table_detail table into a text file with UNIX tbl commands embedded for printing.
UPDATE_SUMMARY	This procedure will take the C&O_TRANSACTION table and aggregate it into the C&O_SUMMARY table.
UPLOAD_TRANSACTION	This procedure will upload all of the ledger text files from the proper PC directory.

Files in the Tools Catalog.

File name

SMDREXT	This is an extract file that was used to extract the SMDR data from a print image of the official version for an original data load.
GSTABLE	This file was used to import pay figures from the General Service schedule.
XPTABLE	This file was used to import pay figures from the "XP" schedule.

Text files in the DTIC2 Catalog.

File name

Content

COST1FOOTNOTE	The footnote for the COST1 screen. This file contains an explanation of the formulas used in the personnel costs calculations.
DAVERS	This file contains the version number of the Pilot Interview application.
WSDOC	This file contains a description of how to use and implement the Pilot Worksheet application.
WSVERS	This file contains the version number of the Pilot Worksheet application.

Text files in the DTIC2TEXT Catalog.

Following is a list of SMDR footnote text files.

File Name	Title 1	Title2
SMDRTXT25	Quality Assurance	Quality of New Tech Rpts
SMDRTXT26	Quality Assurance	TR Demand User Complaints
SMDRTXT28	Quality Assurance	DROLS Response
SMDRTXT33	Technical Reports	New Record Collection
SMDRTXT40	Technical Reports	IAC New Records
SMDRTXT42	Technical Reports	Reports Distributed
SMDRTXT43	Technical Reports	Demand Orders Processed
SMDRTXT45	Technical Reports	Auto Doc Dist Subscripts
SMDRTXT51	Technical Reports	Bib Database Retrieval
SMDRTXT60	Work Unit Information	Database Retrieval
SMDRTXT64	Program Summary	Database Retrievals
SMDRTXT68	Independent R&D	In-House Bibs Furnished
SMDRTXT70	Independent R&D	Subscriptions/Retrievals
SMDRTXT73	DROLS	Interrogations
SMDRTXT77	DoD SBIR Program	Products Furnished Participants

APPENDIX B

The DIF2QDK procedure.

```

procedure dif2qdk(input_name, output_name)
declare string input_name output_name,field_name(30),record(30),line,void,-
        flag,str,value
declare real temp
declare integer x y z vectors tuples
declare function unquote enote

! this procedure will take a visicalc spread sheet (xxxxx.dif) and produce
! a pilot table. The DIF format is as follows:
!
! First is a header that tells the number of records (TUPLES) and the
! number of fields (VECTORS).
! Each cell in the spread sheet has a 2 line entry.
! The first line contains two numbers delimited by a comma.
! The first is a flag with the following meanings:
!     -1 = next line contains a special flag
!     0 = this is a numeric cell
!     1 = this is a character cell
! The second number is 0 if this is a special or character entry. If it is
! a numeric entry, however, the second number is the numeric entry in a
! form of scientific notation or in normal integer form
! The second line in each entry is one of the following depending on the
! flag value in the first line.
! if flag = -1 then second line = {BOT | EOD} where bot means end of record
!     and eod means end of data
! if flag = 0 then second line = V meaning that this is a numeric entry
! if flag = 1 then second line = a double quoted string value
!
! The rows in the spread sheet are delimited with a "-1,0" line and then
! a "BOT" line.

if not defined(input_name) then input_name = ask("Type the dif file name")
if not defined(output_name) then output_name = ask("Type the table name")

open read 1 @input_name.
for x = 1 to 4
    flag = read(1) ! flag = [TABLE|VECTORS|TUPLES|DATA] In any order
    line = read(1) ! 0,36          if flag = vectors 36 records in this file
    void = read(1) ! ""
    @flag. = dif2qdk:enote(line)
next x
void = read(1) ! -1,0
void = read(1) ! BOT

on error then close 1; print "TABLE EXISTS " ; return -1
make table @output_name.
make field recnum numeric
for x = 1 to vectors
    line = "FIELD"+str(x)
    make field @line. character
next x

```

```

for y = 1 to tuples
  build record y
  for x = 1 to vectors
    line = read(1)
    str = read(1)
    ! build the record in here
    if line = "1,0" then value = dif2qdk:unquote(str)
    else if line = "0,1.797693134862316E+308" then value = "NA"
    else value = dif2qdk:enote(line)
    build record value
  next x
  ! and in here make the record and read past the record terminator
  make record
  print y
  void = read(1) ! -1,0
  void = read(1) ! BOT          (EOD on the last record)
next y
close 1
pend

```

```

procedure unquote(str)
declare string str
declare integer loc
! unquote will remove all quote characters from a string
! this is the place where special characters in the input should be
! translated.

loc = instr(str,"'")
while loc <> 0
  str = left(str,loc-1) + mid(str,loc+1,0)
  loc = instr(str,"'")
wend

! and now translate the '*' char to something innocent '~'
str = translate(str,"*", "~")

return str
pend

```

```

procedure enote(str)

! this function will return a real value from a string in the scientific
! notation format that is used in the visicalc dif format

declare string str
declare integer x
str = mid(str,3,0)
x = instr(str,"E")
if x > 0 then -
  if (mid(str,x+1,1) = "+") then -
    return val(left(str,x-1)) * 10 ^ val(mid(str,x+1,0))
  else

```

```
    return val(left(str,x-1)) * 1 / (10 ^ val(mid(str,x+2,0)))  
else  
    return val(str)  
pend
```