

United States General Accounting Office

Report to the Chairman, Subcommittee
on Oversight, Committee on Ways and
Means, House of Representatives

TAX SYSTEM MODERNIZATION

ANALYSIS OF THE PROPOSED LEGISLATION

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United States
General Accounting Office
Washington, D.C. 20548

**Information Management and
Technology Division**

B-240837

December 12, 1990

The Honorable J.J. Pickle
Chairman, Subcommittee on Oversight
Committee on Ways and Means
House of Representatives

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Dear Mr. Chairman:

This report responds to your May 17, 1990, request for information on the Internal Revenue Service's (IRS) progress with the modernization of its tax processing system. Specifically, you asked us to describe the input processing initiative that is intended to speed the way in which tax information is fed into computer systems for processing. Although many of the projects included in the input processing initiative have just begun, you wanted an early indication of their status. You asked us to identify each project's anticipated costs, expected benefits, and progress toward implementation, and any issues requiring further attention by IRS. Appendix I discusses our objectives, scope, and methodology in greater detail.

Results in Brief

The input processing initiative will allow IRS to drastically reduce the manual processes associated with handling paper income tax returns, tax payments, and other tax information. The initiative has three major components, or modules, designed to automate the labor intensive aspects of entering tax return data and other tax information into IRS' computer system. Each module is made up of projects at various stages of development. The three modules are (1) the Electronic Filing System, where tax returns are transmitted over communications lines directly to one of three service centers; (2) the Document Processing System (DPS), which will convert tax returns, correspondence, and other tax information submitted on paper to electronic images for subsequent processing, storage, and retrieval; and (3) the Cash Management System, where IRS is exploring various options for processing tax payments.

Collectively, the input processing modules are expected to cost over \$390 million to develop. Although IRS expects to begin reducing the current manual processes in 1992, realistically, it will be close to the year 2000 before all of IRS' input processing initiatives are fully implemented and integrated so as to have a dramatic impact on the current operations.

The Electronic Filing System is now available nationwide. It cost about \$7 million to develop and is expected to handle about 13 million returns, about 7 percent of all returns received annually. Electronic filing, however, only automates the first step in filing a tax return; much of the rest of the tax processing system is still manual and requires paper copies of tax returns. Continued technical difficulties with printing copies of electronically filed tax returns could limit the system's usefulness. If not resolved, this problem will be amplified as the number of returns filed electronically increases.

Document Processing System research and design has begun. IRS expects to spend \$378.8 million to develop this capability and plans to issue the request for proposals for this system in April 1991. The system should be fully operational by 1998. IRS believes that nearly 97 percent of all paper returns will be converted to electronic images by this system and that the system will also use character recognition to automatically read data from tax returns. Technical limitations of character recognition pose a feasibility question for this aspect of the project. Currently, tax returns do not arrive on standard forms with easy-to-read, uniformly printed characters, for which this technology is best suited.

In cash management, IRS intends to use electronic funds transfer technologies for faster receipt of tax payments from employers and individual taxpayers. The agency has planned several multimillion dollar projects, targeted primarily at employers making federal tax deposits, to achieve this goal. However, IRS must still deal with the fact that there is currently little or no incentive for the individual taxpayer to pay taxes electronically as opposed to paying with a paper check.

Background

The Tax System Modernization Program is a comprehensive, \$6 billion effort managed by IRS' Information Systems Development organization, and intended to upgrade IRS' information systems so that IRS can provide a level of service on par with the best private-sector financial institutions. IRS expects the modernization program to (1) simplify and speed the input of tax information with the goal of drastically reducing the number and type of errors encountered in current manual processes, (2) provide on-line access to this information for its employees, and (3) establish telecommunications networks connecting IRS offices nationwide for rapid transfer of tax information. The input processing initiative is a vital part of IRS' modernization because it is expected to save time and money by reducing the need to process, store, retrieve, and handle paper documents.

To simplify the input of tax information, IRS intends to use technology to electronically capture tax returns, correspondence, and other information received from taxpayers and employers for subsequent processing. Currently, service centers receive most information on paper—about 1.7 billion pages each year, including over 200 million tax returns. Appendix II describes how a service center currently handles tax returns. In addition, each year IRS employees respond to numerous requests to retrieve returns kept in storage. Processing, storing, and retrieving these paper documents is becoming more difficult, expensive, and time-consuming each year. The input processing initiative should reduce labor-intensive paper processing, thereby increasing IRS' ability to control operating costs and to respond quickly to taxpayer inquiries.

The projects that comprise input processing were initiated as (1) research projects to explore new applications of automation for IRS, and (2) systems development projects to meet specific needs for improving input processing. As discussed in our recent report on the modernization, IRS is proceeding with several independent projects before demonstrating how they will complement each other in the modernization.¹ IRS' master plan, which will provide integration requirements for Tax System Modernization components, was issued in draft in September 1990, and will be completed by 1991.

Electronic Filing System

The Electronic Filing System allows tax preparers to transmit tax returns over communication lines to one of three service centers. With the Electronic Filing System, tax returns are transmitted directly to the service center's computer system where the information is automatically edited, processed, and stored. This system bypasses the manual processes for handling paper tax returns.

IRS began the Electronic Filing System in 1986 as a pilot system to test its technical feasibility and public acceptance. During the 1990 tax filing season electronic filing was available to taxpayers nationwide. Through May 1990, about 4.2 million electronic tax returns were filed. IRS processed these returns and issued refunds with little difficulty. By 1998 IRS expects to electronically receive and process about 13 million of a total of over 200 million annual returns.

¹Tax System Modernization: IRS' Challenge for the 21st Century (GAO/IMTEC-90-13, Feb. 8, 1990)

IRS spent about \$7 million developing this system, and projects that the life-cycle costs of the electronic filing project will be about \$198.2 million.

IRS believes the Electronic Filing System holds substantial promise for reducing the costs and time required to enter information from tax returns into its computer files. For IRS, electronic filing means less paper to handle and fewer errors on tax returns. In addition, the system can benefit taxpayers by processing refunds faster than traditional paper returns. According to IRS, taxpayers who file tax returns electronically can receive tax refunds about 3 weeks sooner than taxpayers who file paper returns. Currently, the option of electronic filing is limited to taxpayers receiving a refund, but beginning in 1991, IRS plans to accept electronically filed returns from taxpayers owing taxes, and to expand the capability to retrieve returns from 3 service centers to 10. However, technical problems persist with IRS' archive and retrieval software. As a result, IRS may not be able to retrieve and print these returns as fast as needed to efficiently (1) perform examinations to identify potential deficiencies in tax returns, and (2) investigate cases of underreporting to detect incorrect reporting of tax liability.

The graphics subsystem, which archives, retrieves, corrects, and prints the return, did not work properly during the 1990 filing season and presents technical management concerns for electronic filing. We reported that the graphics subsystem was a trouble spot in both the 1988 and 1989 filing seasons.²

Although IRS tried to correct problems with the graphics subsystem after each filing season, IRS' Quality Assurance Division reported many of the same or similar problems when it tested the subsystem prior to the 1990 filing season. The Division reported, for example, (1) the accumulation of error messages from the graphics operating system that caused the system to shut down, and (2) delays in retrieving and printing returns. In January and February 1990, IRS took steps to limit the effects of these problems. The agency was able to minimize the effect of error messages by restarting the system each day. Also, according to IRS officials, the agency avoided major print delays by scheduling print operations for more than one shift daily.

²Progress in Meeting the Challenge of Modernizing IRS' Tax Processing System (GAO/T-IMTEC-90-5, Mar. 22, 1990).

According to IRS, the graphics operating system was modified in April 1990 to correct the error message problem. In addition, IRS is currently preparing a statement of work to have a contractor correct the printing problems by summer 1991. Such technical problems could hamper the effectiveness of electronic filing as an alternative for submitting tax returns. If IRS does not solve these problems before it expands the Electronic Filing System to all 10 service centers, and before an increased work load places additional pressures on the system, the agency may face large-scale breakdowns in providing compliance functions with copies of electronically filed returns. Further details about the electronic filing process can be found in appendix III.

Paper Input Processed as Electronic Returns (PIPER)

Another alternative for taxpayers to receive expeditious refunds is called the PIPER system, which is an extension of the Electronic Filing System. Using commercially available software, tax returns are prepared on computers, formatted according to PIPER standards, printed on one- and two-page answer sheets, and mailed to a service center. The center uses scanning equipment to automatically read PIPER tax returns and pass the tax information to the Electronic Filing System for processing. IRS expects that taxpayers who use PIPER returns will receive their refunds faster than if they filed a traditional paper return, although not as fast as if their tax return had been transmitted electronically. IRS believes PIPER can be nearly as effective for receiving and processing tax returns as the Electronic Filing System, even though PIPER now suffers from high error rates and is not widely known among potential users.

During 1989 and 1990, PIPER was a research project of IRS' Research Division. IRS has not developed an estimate of PIPER's life-cycle costs, but as of April 1990, had spent about \$250,000 developing the system.

Although it was classified as a research project during the 1990 filing season, PIPER was available nationwide. IRS received only 1,600 PIPER returns during the filing season—about 1 percent of the level that project officials expected. IRS project officials believe PIPER returns were lower than expected because IRS did not actively promote this service. They speculated that PIPER was not actively promoted because of IRS management concerns that PIPER would draw business from preparers who would otherwise file electronic returns. Officials in the electronic filing project office agreed with this concern. We believe, and project officials agree, this concern was prompted by the fact that the electronic

filing project had not reached its predicted volumes. However in providing oral comments on a draft of this report, IRS' Assistant Chief Information Officer for Information Systems Development said that PIPER was not publicized because the system's feasibility was still being assessed. In 1991, IRS plans to give PIPER more publicity by moving it under the management of the Office of Input Processing in IRS' Office of Information Systems Development. IRS expects that this transfer will increase the public awareness and use of PIPER.

Even at low volumes of returns, PIPER has been unreliable. About one-third of the 1,600 PIPER returns IRS received in 1990 needed correction. This amount contrasts markedly with a 3-percent error rate for electronically filed returns, and a 16-percent error rate for other paper returns. According to officials in the Research Division, most errors stem from the software used to create the PIPER returns. This software is produced by independent vendors and does not perform the edits necessary to detect and correct errors. Although PIPER tax return preparers must be approved by IRS, project management does not certify or in any way approve the software that vendors market for PIPER. Vendors are, therefore, left to employ their own standards for error checking. According to IRS Research Division officials, IRS' continued development and testing of PIPER will focus on developing error checking standards for certifying this software.

PIPER presents IRS with two issues: (1) the need for a certification process for commercial software that is used to produce PIPER returns to ensure an acceptable error rate, and (2) the need for project management to promote and effectively deploy the PIPER system. IRS needs assurance that the software used to prepare PIPER tax returns contains effective edit checks to reduce errors on returns to acceptable levels. Without such control, IRS will continue to incur additional costs for correcting PIPER errors. Project management attention is essential to devising an appropriate promotion and deployment strategy for PIPER.

Document Processing System (DPS)

DPS is a technically aggressive system aimed at electronically capturing the information on paper documents such as tax returns and taxpayer correspondence, and eliminating the need to handle, store, and retrieve paper files. The concept involves making electronic images of tax returns and other information, and using the images instead of paper documents for any further processing and retrieval. With DPS, paper tax returns and taxpayer correspondence are first scanned or photographed to produce a digital image or picture, which is then processed and saved

on storage media. To process the returns, IRS plans to read specific data from the tax return image and save these data for tax calculations and analysis.

If DPS is successful, IRS expects that the majority of the paper returns will be handled by this process which should be faster, have lower labor costs, and have fewer errors than the current process. It should also reduce the number of paper documents that cannot be located each year—now estimated at about two million. However, questionable technical feasibility and the absence of key decisions could prevent IRS' successful completion of this project.

Current plans call for DPS to be fully implemented by 1998, at an estimated cost of \$379 million for system development. Total life-cycle costs including development and operations are expected to be about \$1.7 billion. As of June 1990, IRS estimated it would spend about \$5.5 million and 35 staff years for DPS research projects and prototypes. IRS plans to release a request for proposals for DPS in April 1991 and award a development contract in February 1992. However, the DPS project manager is concerned that the schedule for DPS is optimistic because awarding the contract could take more than one year. Also, the DPS work hinges on several research projects and prototypes that IRS is using to identify and refine the system requirements that will drive the request for proposals. As of October 1990, IRS officials told us that all research and prototype projects that directly affect the request for proposals have been completed. They said that although the projects continue to provide test results useful for DPS development, they have reviewed DPS plans and are very optimistic that the request for proposals will be released as scheduled. Appendix IV contains more detailed information about the costs and schedule of DPS, related research projects, and prototypes.

DPS presents IRS with three significant issues. First, the Tax System Modernization design team needs to make some key project management decisions that will affect DPS as well as the overall modernization program. For example, IRS needs to determine the specific data that it must capture from each tax return to satisfy the subsequent needs of the processing and compliance functions. Without this determination, IRS cannot develop the portion of DPS that will automatically read this information from the image of the return and save it in the computer for further processing. Another decision that needs to be made is how DPS will be integrated with other modernization components.

Officials in IRS' Returns Processing and Accounting Division and at the DPS Development Site expressed concern regarding DPS' development schedule, because requirements for integrating DPS with other Tax System Modernization components have not yet been finalized. According to IRS' Chief Information Officer, these integration requirements are in the draft master plan released in September 1990. Senior agency officials told us that as of October 1990, IRS had begun to make many of the key decisions that could affect DPS development. However, as we previously reported, given the absence of an approved Tax System Modernization master plan, IRS risks having to make potentially difficult and costly systems modifications to allow data to be easily exchanged with other Tax System Modernization systems.³ Our report on the Automated Underreporter System discusses a modernization project where 7 out of 10 key functions will need modification in order to integrate with other modernization projects.⁴ DPS is a significant component of the Tax System Modernization, and any delays in making key project management decisions could have a noticeable impact on the larger modernization effort.

The second issue relates to the feasibility of electronically reading data from returns that are printed on nonstandard forms. At a May 1990 IRS Forum on System Modernization, participants in an input processing group reported that the current forms' structures and the lack of standard forms and schedules complicated this automation effort. For example, IRS recently identified more than 30 different types of the Form 1040 that either were printed by different vendors or were produced by different commercial software packages, such as those used by tax preparers. These differences are further compounded by the added technical complexity of using different type fonts, inks, and paper textures in printing the forms. Such issues mean that IRS may not be able to automatically read the data from the forms, and may be forced to manually enter data from the image. IRS has formed a task force to study forms standardization and to determine printing requirements needed in the DPS request for proposals. Although this study plan was not final as of October 1990, IRS was optimistic that industry was developing approaches to reading data from nonstandard forms.

The third significant issue facing IRS is managing the implementation of the emerging character recognition technology. Successful extraction of

³GAO/IMTEC-90-13, Feb. 8, 1990.

⁴Tax System Modernization: Management Mistakes Caused Delays in Automated Underreporter System (GAO/IMTEC-90-51, July 10, 1990).

information using character recognition technology assumes that characters conform to a particular size and shape and that these characters are clear enough for the equipment to identify. Information that has been typewritten is more easily read than handwritten materials. For example, a contractor with experience in digital imaging technology conducted a test for IRS that read typewritten text and achieved about a 98-percent character recognition accuracy rate. Handwritten text was not tested because current technology is not nearly as successful with reading handwritten information. According to IRS' Chief Information Officer, about 50 percent of the returns IRS receives are handwritten. IRS may successfully take an image of most paper documents for storage and retrieval of tax information; however, it is less certain that tax data from nearly half of these returns can be electronically read for subsequent processing. Given this restriction, IRS may be forced to process handwritten returns by manually keying data from the image. To address this problem, IRS entered into an agreement with the National Institute of Standards and Technology to provide support in determining DPS image character recognition technology requirements. As of October 1990 the Institute had successfully demonstrated recognition of handwritten numeric characters. However, this technology has not been tested using handwritten alpha characters, nor was it tested using income tax returns.

Technological limitations have already affected the design of DPS. At a vendor's conference on DPS in May 1990, for example, IRS presented a vision of DPS that included full automation of the document handling process from the point at which mail is received at a service center. This design would have included automation of typically labor-intensive processes such as extracting documents from envelopes, unfolding and unstapling them, and sorting them by intended destination. As of September 1990, project officials had concluded that very little of this initial document handling process could be automated because the types of documents received by IRS and their uses will not be sufficiently standardized. Consequently, IRS now expects that the initial document handling process will continue to be labor intensive, although the agency is exploring ways to streamline it. According to IRS, labor savings associated with implementing DPS did not include automation of initial document handling because the agency recognized that technological limitations may exist.

Cash Management System

Currently IRS processes over 170 million tax payments amounting to about \$1 trillion. Despite the magnitude of these tax payments, IRS currently uses systems that are not fully automated for processing most of the paper-based payments it receives. As a result, IRS loses interest on receipts that cannot be quickly processed during peak periods of the filing season and deposited into financial institutions. IRS envisions using electronic funds transfer and automated check processing systems to replace current labor-intensive processes, thereby speeding deposits, earning more interest, reducing paper, and improving accounting controls. Because many of the projects under this system have been started recently, results are not yet apparent.

IRS is testing and analyzing systems for accepting electronic payments as well as systems that offer faster and more efficient processing of paper payments. Electronic payments will be handled by the Electronic Deposit Processing System, which is being designed to increase the use of electronic transfers of payment information between financial institutions and IRS. The Paper Deposit Processing System is intended to improve the processing of payments that are not transmitted electronically, and is intended to better address IRS' current needs for timely cash management. However, the Paper Deposit Processing System will not be available nationwide until 1992 or 1993 because the system will be pilot tested before nationwide implementation. These endeavors are discussed in more detail in appendix V, and are summarized in the following paragraphs.

Electronic Deposit Processing System

IRS expects to use electronic funds transfer technology to replace the paper deposit coupons that employers currently use to make tax payments under the Federal Tax Deposit system. During 1989, nearly 50 percent of the payments and 80 percent of the funds deposited flowed through the system as Federal Tax Deposits—a process in which employers deposit taxes through financial institutions to the Treasury. When the Federal Tax Deposit system is fully automated, instead of submitting a coupon with their tax payment, depositors would instruct financial institutions, for example, to make automatic withdrawals of tax payments from their accounts. In addition, instead of sending the paper coupons to IRS, financial institutions would electronically transmit payment information to IRS, where the information would be accepted and processed.

According to the Cash Management System Project Manager, IRS has not made any final decisions about the automated system for Federal Tax

Deposits. IRS contracted for a feasibility study and cost benefit analysis in November 1989. The study is due by January 1991. IRS plans to begin testing a prototype system at the Atlanta Service Center in September 1991. Life-cycle cost estimates are not yet available for this system.

IRS has another project underway in the Research Division to test the feasibility of receiving income tax payments electronically. Under this concept, taxpayers will have the option of making electronic payments to the IRS through their financial institutions. The financial institution will send an electronic funds transfer credit record for each payment through the automated clearinghouse network to the local Federal Reserve for direct crediting to the Treasury. After posting to the Treasury account, the Federal Reserve will electronically transmit the balanced credit record to an IRS service center. From here, computers will post the tax data to the taxpayer's account. Some of the benefits IRS expects from this approach are to (1) speed crediting of income tax payments to the Treasury, (2) eliminate the current problem of processing bad checks, and (3) save costs of handling paper checks. IRS expects to realize these benefits even though taxpayers receive no apparent financial benefit from paying taxes electronically as opposed to using a paper check.

IRS began limited testing of this capability in January 1990 at the service center in Andover, Massachusetts, and plans to study the results for lessons learned. As a research project, IRS has spent about \$200,000 to develop and test this project, but has not developed life-cycle cost estimates.

With electronic payments, IRS faces the issue of convincing taxpayers who send checks with their returns that they should send payments electronically instead. Taxpayers benefit from paying their taxes by check because of the time it takes IRS to process and clear the check. With electronic payments, taxpayers will lose this benefit because payments will be deducted immediately from their bank accounts. In addition, electronic payment of income taxes is a feature available to taxpayers as a commercially provided, fee-based service. While taxpayers who receive refunds may see a benefit in paying a fee in order to receive a faster refund, it is questionable whether taxpayers who owe taxes will see any benefit in paying a fee in order to pay taxes sooner. Consequently, IRS' cash management officials believe some sort of incentive, such as allowing taxpayers to use credit cards to pay taxes, may be needed to encourage electronic tax payments. IRS officials intend to explore the need for incentives as part of the research effort.

Paper Deposit Processing System

While the long-term plan for cash management assumes that taxes will be paid by electronic funds transfer, the near-term reality is that payments and financial information are received as paper transactions. The Paper Deposit Processing System is being designed to improve the processing of paper remittances that are not transmitted electronically. The system has two subsystems; one to automate remittance processing functions at district offices, and one to enhance the remittance processing system at service centers.

With one subsystem, IRS plans to automate the manual remittance processing functions for payments received at the 63 IRS district offices. Once this process is automated, district offices should be able to process and post tax receipts through a terminal, eliminating the need to forward certain payment data to service centers for processing. IRS expects to award a development contract for this system in December 1990, followed by a pilot test at the Fort Lauderdale, Florida, District Office. Nationwide implementation is scheduled for March 1992. IRS estimates initial development costs of about \$1 million.

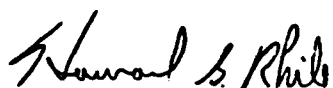
With the second subsystem, IRS plans to enhance the automated system that processes checks received at the 10 service centers. The current system cannot handle 15 percent of all remittances because it has limited electronic processing capacity. Therefore, the checks that cannot be handled by the system are processed manually. Through this enhancement project, IRS expects to increase capacity and virtually eliminate manual remittance processing. IRS issued a request for proposals for this check handling system in September 1989, and intends to award a 7-year contract around December 1990 for up to 11 systems with contractual provisions for technology upgrades. The initial system will be installed at the Ogden Service Center beginning in May 1992. Nationwide implementation is scheduled for October 1993. The system is expected to cost about \$130 million over its life cycle.

We discussed the contents of this report with senior IRS officials. These officials generally agreed with the contents of our report, and we have incorporated their comments where appropriate.

As arranged with your office, unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days after the date of this letter. We will then send copies to interested parties.

including the Commissioner of Internal Revenue, and will make copies available to others upon request. Should you have any questions about this report or require additional information, please contact me at (202) 275-3455. Major contributors to this report are listed in appendix VI.

Sincerely yours,



Howard G. Rhile, Jr.
Director, General Government
Information Systems

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Abbreviations

ADEPT	Automated Deposit of Electronic Payments for Taxes
CHEXS	Check Handling Enhancements and Expert System
COBOL	Common Business Oriented Language
DPS	Document Processing System
FTD	Federal Tax Deposit
GAO	General Accounting Office
IBM	International Business Machines
IMTEC	Information Management and Technology Division
IRS	Internal Revenue Service
PDPS	Paper Deposit Processing System
PIPER	Paper Input Processed as Electronic Returns

Objectives, Scope, and Methodology

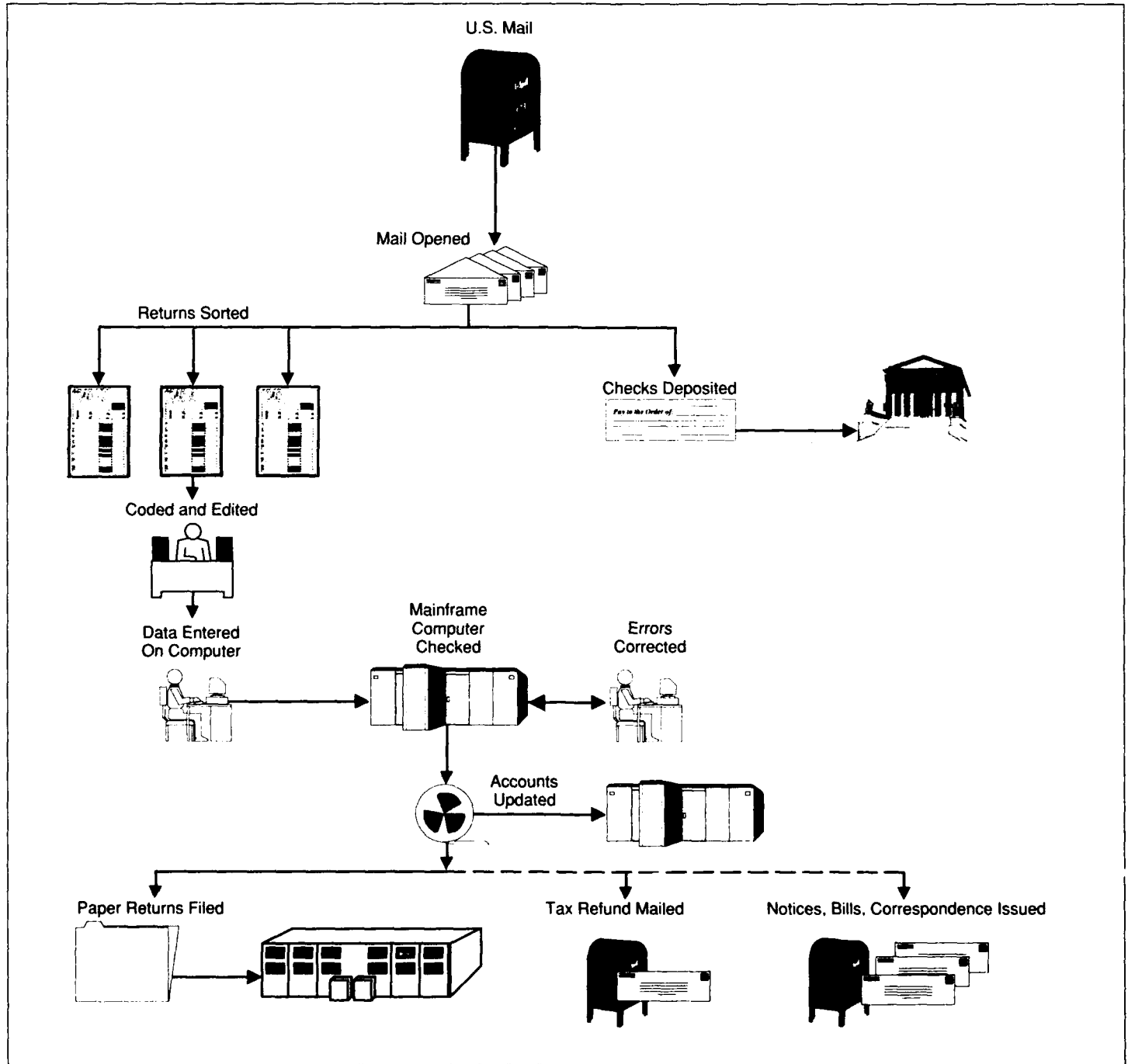
Our objectives were to identify and describe the various projects comprising IRS' input processing initiatives; to provide information on each project's cost, benefits, and status of implementation; and to identify issues IRS should address to successfully carry out the initiatives. We conducted audit work between October 1989 and October 1990 at IRS' National Office in Washington, D.C., and the IRS service centers in Andover, Massachusetts; Austin, Texas; and Cincinnati, Ohio. We interviewed officials at these locations and reviewed available documentation including project plans, test plans and results, project staffing agreements, requirements analysis packages, and concept documents. We also contacted organizations that had implemented technologies IRS is exploring, and attended forums where IRS officials discussed systems modernization initiatives with the business community. Our work was done in accordance with generally accepted government auditing standards.

Current Tax Return Process

IRS refers to its processing of tax returns in its service centers as pipeline processing. The system is primarily paper laden, labor intensive, and manually oriented. Designed in the 1950s and implemented during the 1960s, it has remained virtually unchanged since that time. As shown in Figure II.1, processing begins with mail opening, continues through computer entry and processing, and ends with tax returns being filed and tax refund checks being mailed.

Appendix II
Current Tax Return Process

Figure II.1: The Tax Processing System



Appendix II
Current Tax Return Process

The return information is processed and prepared for posting to the master file. As part of this process, erroneous returns are sent to the Error Resolution Unit for correction. After returns have completed pipeline processing, data from the returns are stored on computer tapes and are sent to the Martinsburg Computing Center to update taxpayer accounts on the master files and to generate tax refunds and other information.

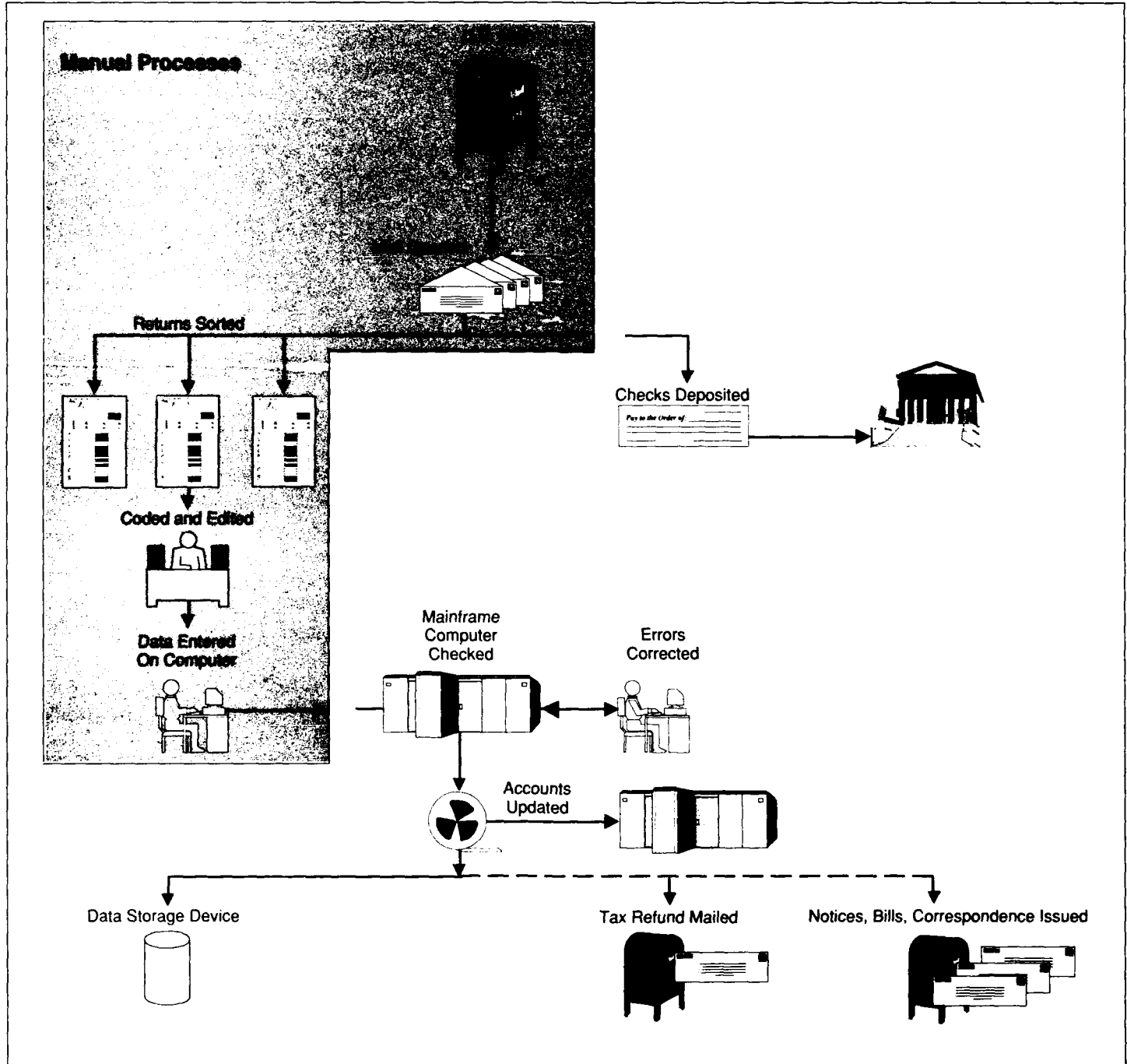
Electronic Filing System

Electronic filing of tax returns involves qualified tax preparers using special-purpose computer software to complete and electronically transmit tax return information to one of three IRS Service Centers located in Cincinnati, Ohio; Ogden, Utah; and Andover, Massachusetts. Begun as a pilot system in 1986, the Electronic Filing System is the most developed of the three major IRS input processing initiatives. In 1990, IRS made electronic filing available nationwide. Currently, electronic filing is limited to those tax returns that show a refund. The Electronic Filing System at each of the three service centers involves the electronic collection, processing, and storage and retrieval of the data. The system consists of three subsystems that perform the tax return filing process: the data communications subsystem, the returns processing subsystem, and the graphics subsystem.

The electronic filing process begins when tax return data are transmitted to one of three service centers and received by the IBM Series I data communications subsystem. The Series I subsystem passes tax return data to a mainframe computer, which processes both individual and business returns using COBOL programs. The programs that are run on the mainframe perform many functions that were previously done manually.

Figure III.1 illustrates those processes in the current tax processing system that are automated through electronic filing.

Figure III.1: Tax Processing Functions Replaced by Electronic Filing System



Once data are processed by the electronic filing programs, the output then goes into the current pipeline system—known as the Generalized Mainline Framework—into which manual and electronic data from all the input systems are fed. The Generalized Mainline Framework verifies calculations, balances transactions, and places select information on tape that is sent to the Martinsburg Computing Center to update the master file. Electronically filed returns are written on tape and sent to the graphics subsystem at the service center for archiving.

To archive electronically filed returns, the graphics subsystem stores them on optical disks at the three service centers for subsequent retrieval. Using this subsystem, IRS' staff corrects errors and then sends the corrected tax return information to the Martinsburg Computing Center. IRS staff also use the graphics subsystem to retrieve returns, print returns, and resolve preparer problems.

By 1991, all IRS service centers will have optical disks to store electronically filed returns. These sites will then handle any transactions that occur after the return is posted to Martinsburg's master file, such as retrieving special return requests, printing returns, resolving unpostables, and dealing with preparer problems.

Paper Input Processed as Electronic Returns (PIPER)

Paper Input Processed as Electronic Returns (PIPER) involves the tax preparer putting tax return data on a formatted answer sheet and sending it by mail to the IRS for input into the Electronic Filing System.

PIPER returns are scanned using optical character recognition equipment, converted to electronic filing format, and processed through the Electronic Filing System. PIPER is targeted at smaller tax preparers—those servicing 500 or fewer clients a year—who may not be able to afford the cost of the equipment needed to participate in the Electronic Filing System program. PIPER is a new IRS input processing initiative that was piloted by the IRS Research Division in 1989 at the Cincinnati and Andover Service Centers. PIPER was expanded nationwide in 1990, and 1,600 returns were processed in that year. Except for the initial batching and scanning process, PIPER is almost as efficient for data processing as the Electronic Filing System.

Table III.1 provides information on costs, implementation, and expected benefits of both projects.

**Appendix III
Electronic Filing System**

Table III.1: Input Processing Module: Electronic Filing System

Dollars in millions

System name	Development cost as of June 1990	Life-cycle cost	Nationwide implementation	Expected benefits
Electronic Filing System	\$7.0	\$198.2	January 1990	Faster refunds Reduced labor and storage costs Faster processing and retrieval of returns Reduced processing errors Reduced interest paid on refunds
Paper Input Processed as Electronic Returns (PIPER)	0.5	^a	January 1990	Same as electronic filing

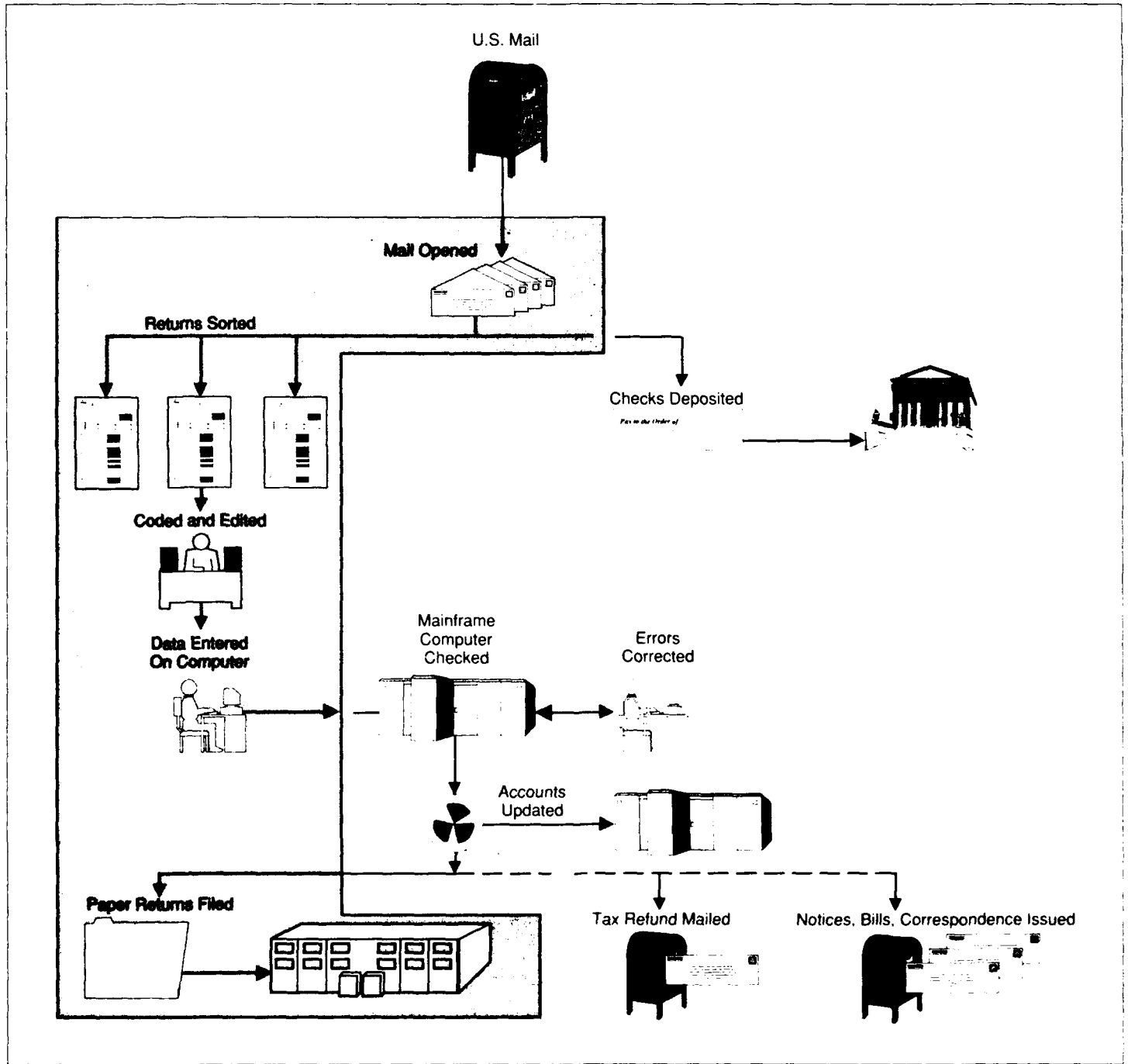
^aNot available.

Document Processing System and Related Subprojects

The Document Processing System (DPS) will convert paper tax returns to digital images prior to processing and will use the images instead of paper documents for any further processing. IRS considers DPS to be its long-term solution to the difficulty the agency has in processing, storing, and retrieving paper tax returns. Figure IV.1 shows the current processing functions that may be affected by DPS.

Appendix IV
 Document Processing System and
 Related Subprojects

Figure IV.1: Tax Processing Functions Affected by Document Processing System



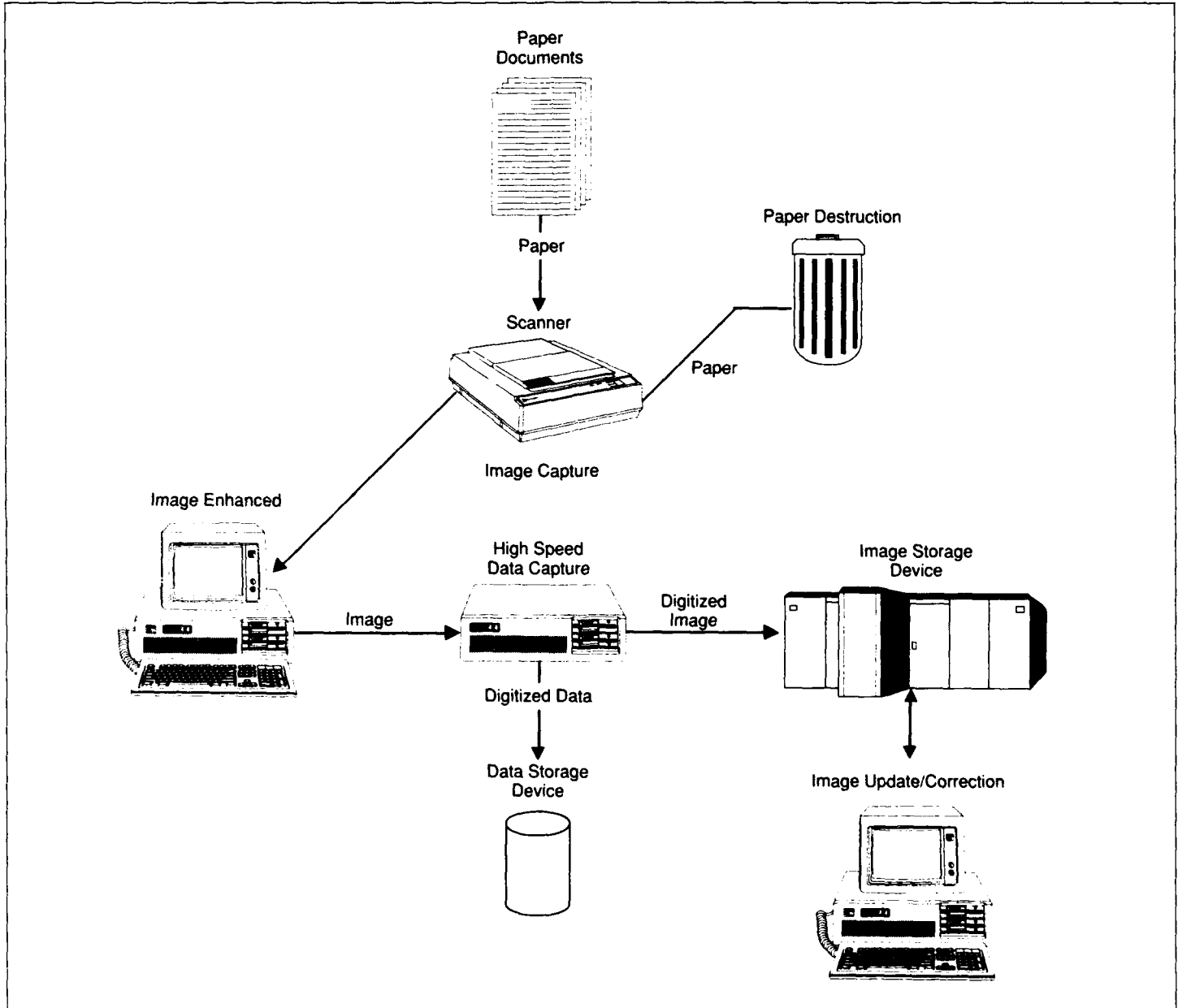
**Appendix IV
Document Processing System and
Related Subprojects**

DPS, as envisioned, includes several subprojects intended to automate the processing of major tax returns received by IRS, such as the Forms 1040, 1040A, and 1040EZ. DPS will ultimately be a totally integrated system installed at each service center, and will process about 97 percent of the paper tax returns and correspondence received at each site. As mail is received at a service center, envelopes will be automatically opened and employees will extract and sort the documents received, and prepare them for further processing. All documents to be imaged will be forwarded to a scanner, which will be equipped with an automatic document feeder, for imaging.

DPS will image all forms and attachments received with a tax return. These images will be passed to a computer, which will number the return, recognize the type of form, and electronically sort the documents. A quality assurance process will then verify the readability and accuracy of the images. Data from the returns will be extracted and compressed and then coded, validated, edited, reformatted, merged with other data from other input and correction systems, and passed to the next step. After the initial scanning operation, images of documents, instead of the paper returns and attachments, will be used as source and reference material by all subsequent users. A request for proposals is scheduled to be issued for DPS in April 1991 for the scanning, imaging, and storage portions of DPS. Figure IV.2 diagrams the flow of documents through DPS.

Appendix IV
Document Processing System and
Related Subprojects

Figure IV.2: Document Processing System



DPS Subprojects

Auto-Pipeline Prototype

The Auto-pipeline Prototype will test the feasibility of working with images to process IRS' returns and documents. Information from this prototype will be used to determine the type of hardware and software that will be required in DPS, and will be used as input to the DPS request for proposals scheduled for April 1991. The Auto-pipeline Prototype will also determine the effects on personnel of an image-based work environment. The test was delayed about 6 months because of problems with a data base management system. Tests are being conducted at the Austin, Texas, Service Center and are scheduled to run through December 1990.

Automated Document Handling Prototype

The Automated Document Handling Prototype will explore and test automating returns processing from the time returns are delivered to the service centers to the time they are actually ready to be scanned under the Document Processing System. This prototype will be looking at ways to automate the extraction, sorting, batching, and numbering functions currently performed manually when returns are received. As of September 1990, project officials had concluded that very little of this initial document handling process could be automated, because the types of documents received by IRS and their uses will not be sufficiently standardized. Therefore, the prototype is being directed towards further automating the letter opening process and evaluating ways to streamline other related document handling processes.

The prototype will not be developed prior to issuing DPS' request for proposals in April 1991. According to the project manager, the prototype will be ready in time to connect with systems that vendors propose for automating DPS. The prototype is scheduled to be installed at the Kansas City, Missouri, Service Center by September 1991.

High Speed Data Capture

The High Speed Data Capture capability was prototyped at the Austin Service Center and demonstrated the capability to extract typewritten data from images of tax returns with high speed and accuracy. The test was conducted by a contractor using optical character recognition to capture information for processing. The prototype, using form 1040 tax returns, demonstrated that forms could be processed at high speeds and also demonstrated an accuracy rate of 99.2 percent for numeric characters and 97.6 percent for alpha characters.

Input Processing Control System

The Input Processing Control System will ensure that all the input functions currently performed by IRS will be performed in the Document Processing System. Currently there are 19 functions that are performed on the service center pipeline processing system. For example, one of these functions is to account for all documents processed through the system. The Input Processing Control System will tie together all input processing systems including cash management, document processing, and electronic data interchange. As of October 1990, the input processing control requirements for the DPS request for proposals were complete according to IRS.

Mixed Media Workstation

The Mixed Media Workstation project is studying user needs for interfaces with DPS. It focuses on compliance activities such as examination and collection functions that will be using the images produced by DPS. It is looking at standard menus and formats for displaying returns on the screen for users regardless of their functional work area. These features could give employees the ability to perform more than one function. IRS will obtain data from users to determine the type of information needed by various IRS functions. IRS also has a User Work Station Interface project that expands on some of the issues covered by the Mixed Media Workstation initiative and examines the possibility of having one type of workstation that could perform all the functions required by IRS users. This feature would eliminate the current need for multiple workstations to perform various functions.

The Mixed Media project is being done under contract. As of April 1990, the contractor had made two presentations of its findings to IRS.

Facsimile Assisted Service for Taxpayers

This project addresses ways that facsimiles can be used with DPS to give more services to taxpayers, since facsimile transmission is readily available and widely used. This project is being done in two phases. The first phase consists of determining the types and volumes of tax documents requested by district offices. This information will be used to determine DPS capacity requirements, communications networks, and system terminal needs. This phase was completed in July 1990.

The second phase of this project includes developing a prototype using a facsimile machine to transmit tax returns to IRS. Project officials are currently considering measures to ensure security of facsimile transmitted tax data. This phase began in September 1990.

DPS-Related Initiatives

Document Image Data Base

The scope of this project includes providing long-term storage and retrieval of tax return images. The system developed will store, index, and retrieve all of IRS' imaged documents. In addition, the system will access images stored through the Electronic Filing System and the Electronic Deposit Processing System. Eventually, the system will store electronically filed returns, will provide images of tax returns to users throughout IRS, and will also index and store other data for retrieval. According to the project manager, the system IRS envisions will have information on whether the document was imaged or not, and where it is located if it was not imaged. Although specific requirements have not been set, IRS is considering an optical-storage medium. This project is currently in the concept-definition phase.

Image Character Recognition Support

On August 30, 1989, IRS established an interagency agreement with the National Institute of Standards and Technology to provide support for specific IRS requirements for the procurement of image character recognition technology and equipment for DPS. The Institute was requested to develop tools and statistics, and test data that will assist IRS in acquiring the appropriate image character recognition technology for automatically reading data from imaged documents.

Table IV.1 provides information on costs, implementation, and expected benefits for DPS, and research projects and prototypes being conducted in preparation for developing DPS.

**Appendix IV
Document Processing System and
Related Subprojects**

Table IV.1: Input Processing Module: Document Processing System

Dollars in millions

System name	Development cost as of June 1990	Life-cycle cost	Nationwide implementation	Expected benefits
Document Processing System	\$378.8	\$1,732.0	January 1998	Improved service to taxpayers Labor savings Reduced storage costs Faster retrieval of tax returns
Research projects and prototypes supporting DPS development				
Automated Document Handling	0.02	b	b	
Auto-Pipeline Prototype	0.79	b	b	
High-Speed Data Capture	2.3	b	b	
Input Processing Control System	a	b	b	
Mixed Media Workstation	0.90	b	b	
Facsimile Assisted Service for Taxpayers	0.01	b	b	
DPS-related initiatives				
Document Image Data Base	a	a	a	
Image Character Recognition Support	1.5	b		

^aNot available.

^bNot applicable.

Cash Management System and Related Subprojects

In 1989, the Internal Revenue Service accounted for about \$1 trillion through its cash management operations. Potentially, more than 80 percent of these dollars can be received electronically. IRS' preliminary design concept for modernizing its cash management systems integrates all cash management processes. The overall goal is to reduce the number of paper checks by using electronic funds transfer technologies, which will be implemented by the Electronic Deposit Processing System. This system's subprojects include

- ADEPT (Automated Deposit of Electronic Payments for Taxes), which tests the ability of the Electronic Deposit Processing System to receive and process various types of tax payments electronically, and
- Electronic Federal Tax Deposits, which tests the ability of the Electronic Deposit Processing System to receive and process federal tax deposits made by employers electronically.

Any residual paper remittances will be processed by the Paper Deposit Processing System (PDPS). PDPS subprojects include

- CHEXS (Check Handling Enhancements and Expert System), which replaces the current Remittance Processing System and will process 100 percent of all paper remittances and payment documents received at service centers, and
- District Remittance Processing System, which automates paper remittance processing functions at district offices.

Table V.1 provides information on costs, implementation, and expected benefits for the cash management projects.

**Appendix V
Cash Management System and
Related Subprojects**

Table V.1: Input Processing Module: Cash Management System

Dollars in millions

System name	Development cost as of June 1990	Life-cycle cost	Nationwide implementation	Expected benefits^a
Electronic Deposit Processing System (two subprojects)	b	b	b	Speeds processing Allows quicker access to funds Reduces operating costs Eliminates bad checks Produces fewer processing errors
(1) Automated Deposit of Electronic Payments for Taxes (ADEPT)	\$0.20	b	b	
(2) Electronic Federal Tax Deposit System	b	b	b	
Paper Deposit Processing System (two subprojects)	b	b	b	
(1) District Remittance Processing System	1.0	b	March 1992	
(2) Check Handling Enhancements and Expert System	b	\$130.0	October 1993	

^aBenefits for the entire Cash Management System.

^bNot available.

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