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Department of Energy/ Contractor Electronic Data Interchange Taskforce

Automated Transportation Management Strategic Plan

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EXECUTIVE SUMMARY

The purpose of the Automated Transportation Management Systems (ATMS) Program is to identify possible applications for the use of electronic data interchange (EDI) and other computer Traffic Management applications within the U.S. Department of Energy (DOE), Transportation Management Division (TMD).

The ATMS Strategic Plan and Program Description has been prepared as a source document for use in guidance and planning for the implementation of EDI and other computer-related technologies in the DOE-TMD organization.

The classical or textbook definition of EDI is "The computer-to-computer exchange of routine business transactions (e.g., purchase orders, bills of lading, invoices) in a machine-readable format, that is sent electronically (via phone lines) rather than in paper form." However, for the purpose of this document the classical definition has been expanded to include "any computer application that will make the transportation management job easier and more efficient."

Recently, other government agencies such as the U.S. Department of Defense (DOD) and the General Services Administration (GSA) have been studying the feasibility of automating their transportation management operations. This recent interest by the Federal government in automating transportation management operations is partially the result of the various government agencies recognizing the benefit in reducing the amount of paperwork involved in transportation operations. The Federal government recognized, also, that

ATMS applications including the use of EDI in the private sector, particularly among many Fortune 500 companies, has increased significantly during the last few years.

Another reason for the recent government interest in ATMS is that Congress has directed, pursuant to the requirements of Section 2, Public Law 99-62, dated November 7, 1986, the formation of the Interagency Transportation Task Force (TTF) to study the feasibility of automating the Federal government's transportation management system.

The first significant step in reviewing the automation capabilities of the DOE-TMD occurred when the DOE-TMD sponsored an EDI Task Force Workshop Meeting in Richland, Washington on May 4 and 5, 1988. Since this initial meeting, the DOE/Contractor EDI Task Force met recently in Las Vegas, Nevada, June 6 through 8, 1989, in conjunction with the Contractors Traffic Management Association (CTMA) annual meeting. The purpose of this meeting was to share information, discuss existing and potential transportation management applications, and educate CTMA traffic managers of the importance of ATMS to their organizations.

The direct administrative and strategic benefits of EDI to an organization include an increase in the speed of document transfer and improved information integrity by reducing manual data entry to ensure the timeliness of the data information, reduced data entry costs, and a more efficient use of human resources.

The DOE Inspector General (DOE-IG) recently issued a draft report detailing findings and recommendations relating to the audit of carrier invoices (see Appendix C). Among the recommendations of the DOE-IG were that DOE field organizations test and select software packages to automate transportation management functions such as the preparation of shipping documents, prepayment verification of carrier invoices, and the establishment of an automated carrier selection and rating/routing data base.

To more efficiently manage the transportation management function of DOE during the 1990's, it is going to require an increase in the automation capabilities of the DOE-TMD. A large nationwide organization such as DOE, with a shipment volume of 366,000 shipments annually and a transportation bill exceeding $35 million, requires the establishment of automated procedures and controls to ensure that low-cost carriers are consistently selected and that carrier invoices are properly verified before payment.

However, the first step in the process of developing a more integrated ATMS in an organization, such as DOE, is to prepare a written plan. The intent of this plan is to show where DOE-TMD is now in the area of automated transportation management applications, including the use of EDI. This plan will also define where DOE-TMD would like to go in the future and the level of automation required to meet this goal. This plan will provide a "road map" to guide DOE-TMD, its field offices, and the contractors under their purview, in the implementation of ATMS at the DOE site level. This document will be the ATMS Strategic Plan.

CONTENTS

CONTENTS (cont.)

LIST OF FIGURES

ACRONYMS

ATMS	Automated Traffic Management Systems
CAMPS	a procurement and routing system
CTMA	Contractors Traffic Managers Association
DOD	U.S. Department of Defense
DOE	U.S. Department of Energy
DOE-ALO	U.S. Department of Energy-Albuquerque Operations Office
DOE-CH	U.S. Department of Energy-Chicago Operations Office
DOE-IG	U.S. Department of Energy Inspector General
DOE-OR	U.S. Department of Energy-Oak Ridge Operations Office
DOE-RL	U.S. Department of Energy-Richland Operations Office
DOT	U.S. Department of Transportation
EDI	electronic data interchange
EFT	electronic funds transfer
FBS	Freight Bill System
FTS2000	Federal communications network
GSA	General Services Administration
HAZMAT	hazardous materials
IAEA	International Atomic Energy Agency
IRS	Internal Revenue Service
LTL	less than truckload
NASA	National Aeronautics and Space Administration
NRC	U.S. Nuclear Regulatory Commission
OMB	Office of Management and Budget
SMAC	Shipment Mobility Accountability Collection
TMD	Transportation Management Division
TRG	DOE, Transportation Review Group
TTF	Transportation Task Force
USDA	U.S. Department of Agriculture
VA	Veterans Administration

AUTOMATED TRAFFIC MANAGEMENT SYSTEMS STRATEGY AND PROGRAM DESCRIPTION

1.0 INTRODUCTION

The purpose of the Electronic Data Interchange (EDI) program is to identify possible applications for Automated Traffic Management Systems (ATMS) within the U.S. Department of Energy (DOE), Transportation Management Division (TMD) and its contractors. The intent of the EDI program strategic plan is to communicate the ATMS concept at a level that will encourage near-term implementation, facilitate technology transfer, and reduce duplication of effort and cost.

The use of paper documents for exchanging information is tedious, time consuming, subject to error, and expensive. In an automated business environment such as exists today, it is a costly and redundant effort to take data from one computer system and manually enter it into another computer system. It is better to perform this data exchange electronically.

The use of ATMS would allow the TMD organization and its contractors to be more productive in many ways. Many enhancements to existing automated systems are made feasible when an EDI system is utilized for exchanging information. For example, it would be possible to build a prepayment freight bill audit system that would audit carrier invoice charges to a predetermined tolerance level and approve the freight bill for payment. Only freight bill exceptions would be manually audited. This would significantly decrease the present amount of labor committed to the prepayment audit function. Many DOE sites are not presently performing prepayment audits of freight bills because they cannot allocate manpower to it. An automated method provided to these sites would make it less labor intensive and more cost effective in many instances.

The EDI transactions could also be used to locate the appropriate shipment record corresponding to a carrier invoice to verify that the shipment actually was received at the DOE site warehouse. If a match was found corresponding a particular freight bill with a purchase order and its corresponding receiving report, payment of the invoice for goods also could be approved electronically. The problem of duplicate billings both for freight carriers and commercial vendors could be reduced by the use of EDI.

An electronic funds transfer (EFT) capability could also be implemented to actually approve payment of the freight or commercial vendor invoices and physically transfer the money from the consignee account to the vendor, without using a single piece of paper.

Within the transportation management function, ATMS could also be utilized to provide the capability of computerizing freight rate and routing information. If carriers are required to provide freight rates in a zip code-based rate format, then these rates could be utilized by microcomputer-based programs for use in carrier selection and routing determination. "Should

Cost" freight charge estimates could then be prepared and used to identify "Out of Tolerance" freight charges when carrier or vendor invoices are submitted for payment.

A more automated transportation management environment would also increase the management reporting capability of the present DOE transportation data bases, such as the Shipment Mobility Accountability Collection (SMAC) system, which is located in Oak Ridge, Tennessee. During the implementation of EDI, carriers would begin transmitting freight bill information directly to the SMAC data base, which would simultaneously feed data to the site contractor Traffic organizations. The labor-intensive data entry task that is presently prohibiting some DOE site locations from entering any data into the present SMAC system could be eliminated through EDI.

Increased accessibility to DOE transportation data will add to the present management reporting capabilities of the SMAC data base. This will result in enhanced shipment analysis and planning capability for TMD. With more access to quantitative transportation data at its disposal, TMD would have the capability to perform traffic volume analysis per traffic lane, product, or by carrier for regular management reporting purposes or ad hoc inquiries into the system. These analyses and inquiries are frequently required to support the needs of TMD, the field offices, and their respective contractors.

This increased information capability could prove to be valuable in allowing TMD or its contractors to negotiate freight rate proposals from a stronger position. It will also increase the ability of the Transportation Management staff to perform special studies as requested, and allow better tracking of transportation costs for budget and accounting purposes.

The EDI applications in the transportation and logistics field are growing among many of the Fortune 500 companies. Traffic and Transportation Management functions have been adding EDI trading partners at a steady pace during the past five years. Many commercial companies have developed and implemented computer applications to send a purchase order to a vendor, receive a "shipping advice notice," trace a shipment in transit, receive the material, process the shipment for payment, warehouse, and even pay the freight charges and the supplier without producing or entering a single piece of paper (Figure 1).

This EDI capability is not just found in major companies such as Westinghouse Electric Corporation, E.I. duPont de Nemours and Company, General Motors, and Martin Marietta Energy Systems, Inc. Many midsize and even smaller companies are beginning to see the benefit of EDI applications.

Current industry trends towards increased automation in transportation management operations include the following:

- Increased investment in computer technology
- Increased use of microcomputers as a business tool
- The cost of computer hardware has decreased while labor costs have increased

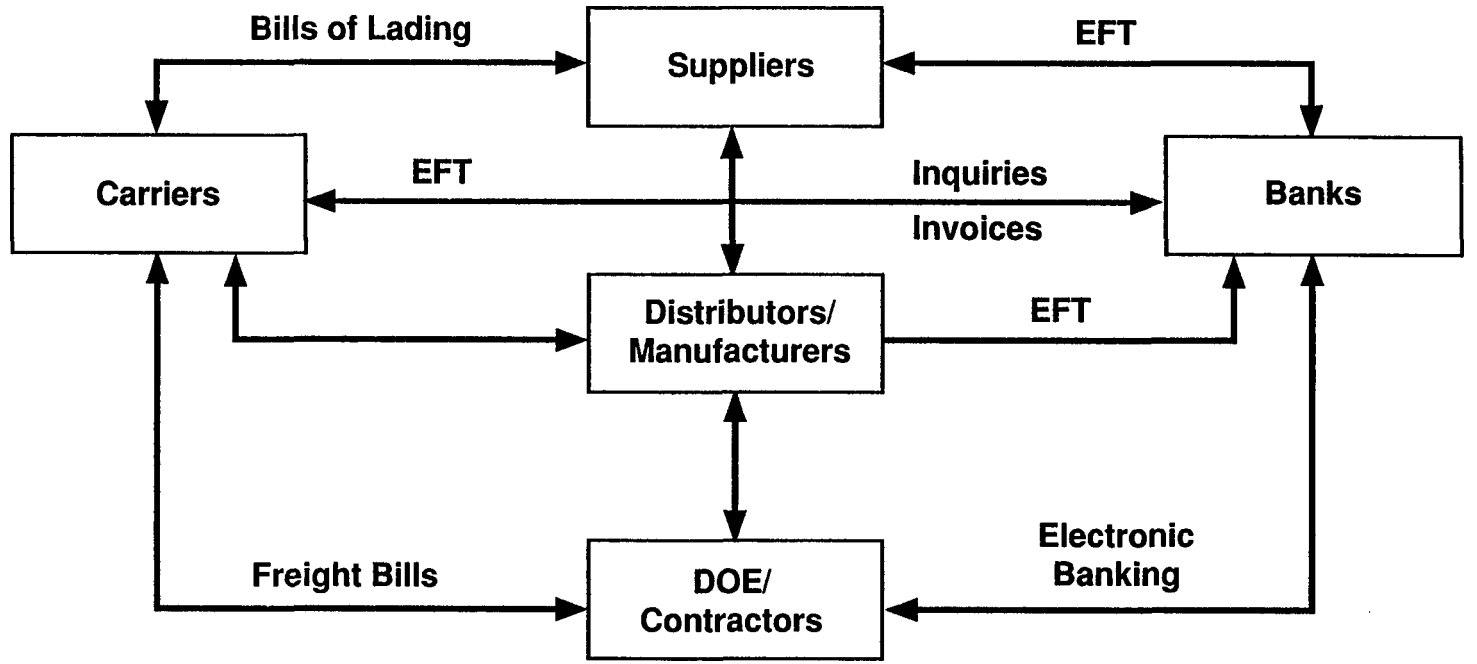

Figure 1. An Integrated Logistics Communication System.

- Specialized software has become more abundant and diverse
- New advances in communications technology
- More people are becoming computer literate and will not only accept but expect the latest available technology.

1.1 PRESENT ENVIRONMENT OF AUTOMATED TRAFFIC MANAGEMENT SYSTEMS IN THE FEDERAL GOVERNMENT

Other Federal agencies have successfully automated portions of their transportation management/logistics program.

The U.S. Department of Defense (DOD) and the U.S. Customs Service are examples of other government agencies that are presently moving in the direction of ATMS and EDI in the effort to achieve a "paperless" system.

The U.S. Customs Service has taken great strides in the last two years to automate the documentation required for importing and exporting shipments of goods to and from the United States. This agency expects to do away with nearly all import-related paper documents within the next 18 to 24 mo.

The Internal Revenue Service (IRS) is now allowing quarterly reports to be sent to the agency via EDI.

The Federal Supply Service, the General Services Administration (GSA) recently obtained a final ruling (Federal Register/Vol 54:No 75/Thursday April 20, 1989) relating to the implementation of EDI. The ruling amends the Federal Property Management regulations to permit Federal agencies to electronically transmit carrier billing and backup documentation for freight and passenger transport services as an alternative to issuing the standard forms. This act is intended to reduce paperwork and encourage the implementation of EDI government wide.

The Office of Management and Budget (OMB) has recently informed all government agencies that they will use EDI to conduct routine business in the near future. In a memo to all government agencies, OMB states that "Federal agencies are to develop plans for the orderly, cost-effective migration of all domestic electronic business transactions to accredited standards committee (EDI) standards." This must be done by 1992 for all domestic EDI and standard data communications, and by 1996 for international standards. Although this major move by OMB is only a memo and does not constitute official policy, the draft sends a strong message of the government's intent toward the implementation of EDI. It is therefore incumbent on DOE Transportation Management Division (DOE-TMD) to plan for the future implementation of EDI within its organization.

1.2 PRESENT ENVIRONMENT OF AUTOMATED TRAFFIC MANAGEMENT SYSTEMS IN THE U.S. DEPARTMENT OF ENERGY

Recently, the DOE Inspector General (DOE-IG) issued a draft report detailing findings and recommendations relating to the audit of carrier invoice verification (see Appendix C).

One of the recommendations of the DOE-IG report was that the DOE field organizations test and select software packages to automate their contractors' administration procedures and controls for the following functions:

- Carrier selection and rating/routing data base
- "Should cost" calculations
- Preparation of shipping documents
- Prepayment invoice verification data base
- Monitoring of contractor performance.

In order to more efficiently manage the transportation management function of DOE, it is going to require an increase in the automation capabilities of the DOE-TMD. A large nationwide organization such as DOE can no longer rely on individuals to manually find the lowest cost carriers and to verify shipping transactions costs. Sheer volume alone dictates that automated procedures and controls be established to ensure that low-cost carriers are consistently selected and that carrier invoices are properly verified before payment.

Because of the decentralized structure of the transportation operations in the field organizations and among their contractors, TMD may have to accomplish some of the recommendations noted by the DOE-IG report through alternate procedures instead of through a single uniform procedure. The organizational location of the transportation function and the degree of automation will be the determining factors.

The TMD has been actively pursuing several ATMS projects related to the recommendations of the DOE-IG in the areas of planning and budget requests. The implementation of some of these projects, however, will require an increase of both dollars and manpower at the U.S. Department of Energy-Headquarters (DOE-HQ), as well as in the field and contractor organizations to accomplish the goals set forth in this document.

The first step in the process of developing a more integrated ATMS in an organization such as DOE is to prepare a written plan. This plan should show where TMD is now in the area of automation, where it would like to be in the future, and a plan or road map on how TMD proposes to get to where it is it wants to be. This planning document is the ATMS Strategic Plan.

This ATMS strategic plan is envisioned to be a dynamic document, in that it will change as TMD's business requirements change. Therefore, this document will constantly need to be revised and updated to reflect current changes in the way TMD and the contractors under its purview does its business.

The objectives of the strategic plan are to do the following:

- Build constituency on the concept of ATMS
- Develop "high level" requirements for the ATMS

- Create an integrated business-driven plan for the implementation of ATMS within TMD in the 1990's
- Position TMD to take full advantage of new technology available in the field of transportation management
- Provide structure for long-range planning for the implementation of ATMS
- Provide guidelines for coordinating the DOE field office and site-wide contractor implementation of ATMS.

2.0 PURPOSE

The ATMS strategy and program description has been prepared as a source document for use in the guidance and planning for EDI and other computer-related technologies within the DOE-TMD transportation program. This strategy provides a structure for long-term computer resources investment planning.

This document has been generated under the sponsorship of DOE-HQ TMD in order to provide a "shared vision" of the use of EDI and the development of ATMS so that the field offices and the site contractors can develop their own respective tactical and funding plans (Figure 2).

3.0 BACKGROUND

The first significant step in the ATMS Program occurred when DOE-HQ TMD sponsored the Electronic Data Interchange Task Force Workshop in Richland, Washington in May 1988. The workshop objectives were to share information and discuss existing and potential transportation management computer applications and EDI.

The EDI Task Force participants defined EDI as a way to do business in which information is exchanged electronically. To DOE and its contractors involved in transportation management, EDI can be used to status less than truckload (LTL) shipment locations, automate the freight bill handling and auditing process, automate the freight claims handling process, provide data collection capability for existing information systems, electronically transmit freight bill payments, retrieve rate information for transportation charge comparisons, link up hazardous waste disposal cycle tracking systems, and provide shipment documentation in advance of shipment arrival.

The primary benefits associated with EDI include reducing paperwork costs, reducing errors, eliminating rekeying of data, improving communication, reducing inventory levels and carrying costs, and providing better service. The costs include software development or acquisition, telecommunications support, and startup conversion activities.

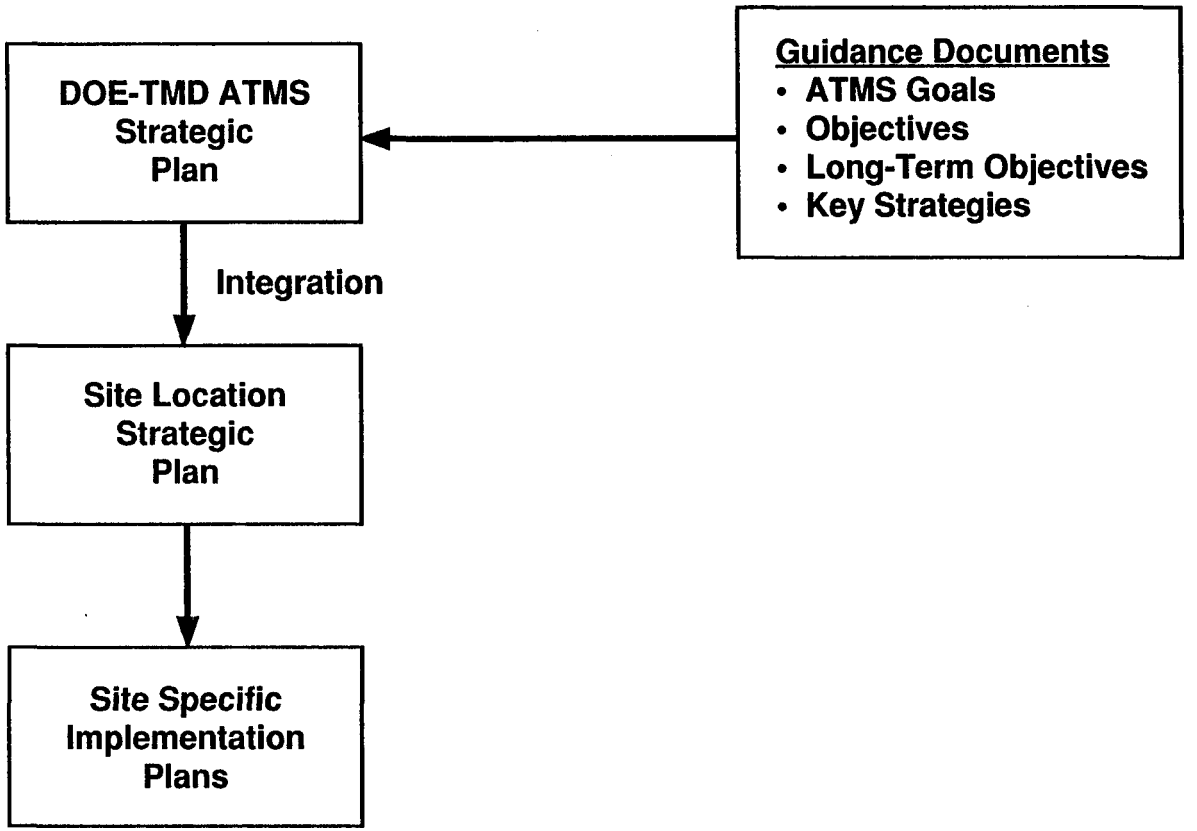

Figure 2. Automated Transportation Management Systems Strategic Plan.

Most of the larger motor, rail, and air freight carriers are already investing in EDI technology. Third-party network services companies are also now providing EDI services such as electronic mailbox, preprogrammed computer interfaces, and freight-bill audit and payment services.

Education is a critical component of the EDI Program. Several presentations on EDI have been given to DOE field office and contractor Traffic Managers through meetings of the DOE Transportation Review Group (TRG) and the Contractors' Traffic Managers Association (CTMA) in 1988 and 1989. The topic of EDI was also presented at the DOE Transportation and Packaging Workshop in Gaithersburg, Maryland in October 1988.

The Federal government interagency Transportation Task Force (TTF) issued the "Transportation Management Automation Feasibility Study" (1988) pursuant to the requirements of Section 2, Public Law 99-627 (11/7/86) which stated "... the TTF concluded that the (Federal government transportation management) program was relatively efficient and well-managed given the context in which it currently operates, but labors under constraints imposed by:

(i) insufficient management information,

(ii) a lack of rigorous program analysis (a condition largely attributable to (i)), and

(iii) a failure to fully harness currently available technology.

A prudent application of automation harbors the potential to largely remedy these deficiencies... concern that transportation automation has been effectively adopted by the private sector while the Federal government lags hopelessly behind represents an inaccurate assessment of the current situation... the gap in technology application is not as wide as many imagine."

The TTF found that private industry was generally more effective than the Federal government at adopting new transportation management techniques. Some of these techniques include integrating supply and transportation functions, simplifying and standardizing rate structures, establishing long-term relationships with fewer carriers, establishing carrier qualification programs, automating fundamental functions and procedures such as prepayment auditing, rating, and shipment tracking, and increasing the use of EDI. The TTF recommended several alternatives, which ranged from a narrow scope to a broad scope integrated automated transportation system for the GSA, the Veterans Administration (VA), the National Aeronautics and Space Administration (NASA), the State Department, and the U.S. Department of Agriculture (USDA).

The TTF further found that the benefits available from an automated transportation system depend on the way it is implemented and the degree to which it interoperates with carrier systems. The major functions recommended include automated prepayment rate verification, centralized rating/routing data base, centralized shipment history data base, and implementation of EDI.

The DOE-IG Tentative Findings Report on the Audit of Carrier Invoice Verification (5/31/89) found "... more costly shipments and excessive invoice payments occurred because DOE did not contractually require its shipping activities to use low cost carriers and had not yet fully developed and established automated transportation management programs for processing

shipping transactions and invoice payments. The DOE-IG estimated that consistently using low cost carriers and verifying carrier invoice charges prior to payment would save DOE an estimated $3.2 million annually."

The EDI Task Force met a second time in conjunction with the CTMA meeting in Las Vegas, Nevada in June 1989. The ATMS models presented at the meeting form the basis for automation of the traffic management functions at the Hanford Site. These ATMS data flow models display the organizational entities, automated structures, and information flows required to achieve the EDI program objectives.

The participants of the EDI Task Force agreed the models were generic enough to be of directional value in developing their own EDI implementation plans while facilitating ATMS portability throughout the DOE complex.

Each DOE contractor has its own computer resource strategies and pre-existing application structure (Procurement, Materials Management, Management Information Systems, and Accounts Payable Systems) within which ATMS must integrate. One generic ATMS system will not be compatible for all contractors unless the freight audit and payment functions are centralized.

The advantages of centralizing those functions, however, would be offset by the costs to develop and maintain such a large-scale automated system and supporting administrative operation.

For example, the TTF is recommending a centralized approach for the GSA, and is estimating $2 to $13 million in development costs and system life costs of $22 to $45 million (estimates depend on the scope of the alternative selected). Even at this funding level, TTF estimates the payback periods are in the first year of full operational capability due to the economies of scale gained by the sizes of the sponsoring departments. Should TMD decide to centralize its ATMS, the GSA system should be considered as a preferable alternative to a TMD-funded separate development effort.

The ATMS strategic plan offers a different approach, which makes use of the existing computer resource and transportation operations environment at each DOE site and the SMAC data system. In response to pressures from carriers and suppliers and the U.S. Government OMB, it appears that DOE and its contractors will eventually invest in EDI capability.

Many of the carriers and suppliers DOE uses have already invested in EDI and have been actively pursuing establishment of partnerships with DOE contractors.

Once the capability to produce and receive EDI transaction sets is in place, the contractors should link the EDI feeds to internal automated systems. The major payback to doing EDI comes from this link into contractor business systems. The EDI transactions must flow beyond being printed out for rekeying (the "rip and read" approach) and flow directly into the automated ATMS systems. The scope of the EDI program must include the conceptual ATMS architecture. This architecture describes the elements and integration required to achieve EDI time-and-cost benefits.

Because of the decentralized structure of transportation operations in the field offices and among their contractors, TMD is concerned with avoiding "reinventing the wheel" at each site. The ATMS strategy and program description provides guidance for TMD and contractor investment in automation. This is a planning document to be used as a "shared vision" and to prevent costly duplication of effort or a significant investment in proprietary EDI interfaces. As such, this document will change as the requirements of TMD and the field offices change.

4.0 PRIMARY GOALS OF THE U.S. DEPARTMENT OF ENERGY TRANSPORTATION MANAGEMENT DIVISION AUTOMATED TRANSPORTATION MANAGEMENT SYSTEMS PROGRAM

The primary goals for the implementation of the ATMS program are as follows:

1. To successfully implement EDI within the DOE-TMD, including successful document transfer with carriers and the subsequent update of appropriate internal automated interfaces

2. To enhance the present capabilities of the SMAC data base system

3. To reduce the amount of paperwork involved in transportation management operations

4. To more effectively use available computer applications to assist in the day-to-day transportation management operations at the DOE field office and contractor level

5. To communicate at DOE-HQ the ATMS concept at a level that will encourage near-term implementation of the project

6. To facilitate technology transfer and sharing of computer resources between the DOE sites

7. To ensure information timeliness and data consistency and improve the management reporting capability of the SMAC data base system

8. To educate and increase the awareness of ATMS including EDI within the DOE-TMD and among the site contractors.

5.0 MANAGEMENT STRUCTURES

The Atomic Energy Act of 1954, as amended; the Energy Reorganization Act of 1974; the DOE Organization Act of 1977; and the Hazardous Materials Transportation Act provide the basic statutory framework for DOE transportation and packaging activities. The Assistant Secretary for Defense Programs (DP) is assigned all programmatic, operational, and regulatory transportation functions except those specifically excluded by statute or DOE order.

Weapons, naval reactors, and Nuclear Waste Policy Act programs are excluded from the TMD area of responsibility.

The DOE-TMD at DOE-HQ is part of the Office of Defense Waste and Transportation Management reporting to the Deputy Assistant Secretary for Nuclear Materials within the national DP.

The DOE-TMD is responsible for managing a comprehensive transportation program for the safe, secure, and expeditious transportation of DOE-owned property and materials including radioactive materials, hazardous materials (HAZMAT), and byproducts from these materials. This mission includes the development and engineering of packaging certifiable by DOE and/or the U.S. Nuclear Regulatory Commission (NRC), the investigation of concepts and technologies for future packaging and transportation systems, and the development and enforcement of policies and procedures relating to the transportation of DOE property and materials.

The DOE-TMD coordinates DOE transportation interfaces with the U.S. Department of Transportation (DOT), the NRC, and other Federal agencies; the International Atomic Energy Agency (IAEA) and other international cooperative agencies; foreign governments; state, local, and tribal governments; and carrier organizations.

The DOE-TMD provides policy, funding, guidance, and program integration supervision. Each DOE field office is responsible for management of transportation operations and the maintenance of resources for an adequate technology base.

The TMD has delegated responsibility for major program areas to two of its field offices; Richland Operations Office (DOE-RL) and Albuquerque Operations Office (DOE-AL).

The lead field offices are charged with establishing and maintaining coordination with all cognizant DOE field offices and their contractors, encouraging technology transfer among the sites, and ensuring consistent TMD policy implementation. The lead field offices manage the programs to negotiated budgets and maintain a close working relationship with TMD senior management.

The DOE-RL Transportation Program responsibilities as a lead field office are carried out at several DOE sites. Chicago Operations Office (DOE-CH), Oak Ridge Operations (DOE-OR), several cognizant DOE contractors, and the DOE-HQ support services contractor (Social and Scientific Systems, Inc.) assist DOE-RL in coordinating and implementing TMD programs and policy. These programs are as follows:

- Transportation policy analysis and development, including the development of new policies regarding transportation operations
- Management of operations technology, systems, and methods, including the study of new technology and techniques for application within TMD operations

- Management and support of operational data bases, including the study of new technology and techniques for application within TMD operations

- Management of training programs for transportation personnel in order to ensure the highest levels of competency

- Management of packaging operations, including engineering and design support for DOE packages and general packaging analysis for fleet modifications, standards maintenance, utilization review, and regulatory compliance review

- Providing institutional support to TMD for public information requests about transportation operations, developing information products, and ensuring priority attention to issue resolution.

Contractor Traffic organizations generally provide the following DOE site support services for all DOE-funded contractors.

- Provide cost effective freight rate quotations, routing instructions, and transportation cost analyses in support of purchasing activities.

- Provide freight bill auditing services, handle freight claims, and maintain freight bill records. Nationally, freight bill charges during fiscal year (FY) 1988 were in excess of $35 million. Over 350,000 freight bills were processed.

- Provide onsite training in DOT transportation regulations and EPA hazardous waste regulations.

- Coordinate household goods moves.

- Coordinate and ship all offsite shipments of radioactive and other hazardous materials in a safe and secure manner. Coordinate the offsite movement of special nuclear materials. Coordinate all onsite and offsite hazardous waste shipments.

- Support receiving of all materials and equipment from offsite and inspect for damage, leakage, or loss of container integrity for all contractors.

- Trace shipments in transit. Set up the transportation and movement of large, oversized items. Handle import and export arrangements.

The EDI Program, which includes the ATMS planning and implementation effort, is managed by the lead field office in Richland, Washington. Support for this program has been provided by several organizations within Westinghouse Hanford Company. A team approach was used to develop the strategies that incorporated the input from many field offices and contractor locations.

6.0 ELECTRONIC DATA INTERCHANGE INVENTORY AND USAGE QUESTIONNAIRE FINDINGS

An EDI Inventory and Usage Questionnaire was submitted to each DOE Field Traffic Manager. The reason for the questionnaire was to determine the current baseline of ATMS including the use of EDI within the DOE organization. All field offices responded to the survey. At the discretion of each field office, the surveys were distributed to each site contractor; 28 completed questionnaires were received for review. Responses to the questionnaires are summarized as follows:

1. What aspects of your transportation management operations are presently automated?

Number of Responses		
17	(a)	The SMAC data input
11	(b)	Freight rate quotation
7	(c)	Freight bill preauditing
12	(d)	Warehouse operations such as materials control and inventory management
4	(e)	Bill of lading preparation (motor/rail)
7	(f)	Outbound air express shipment documentation and billing (i.e., Federal Express Powership II program or others)
7	(g)	Accounting operations, including activities such as freight bill payment and tracking
5	(h)	Management reporting and transportation planning and analysis
4	(i)	Shipment processing
5	(j)	Transportation cost analysis
4	(k)	Carrier evaluation and selection
4	(l)	Over/Short/and Damage claim status and reporting
9	(m)	Training (i.e., computerized hazardous materials training)
8	(n)	Shipment receipt and verification (tracing)
0	(o)	Tender filing with carriers
4	(p)	Onsite distribution
3	(q)	Electronic forms applications
3	(r)	Other--REGSCAN; material receipt verification; no answer

2. Please identify any automated carrier programs presently being utilized.

   Most carriers provided microcomputer diskettes. The carrier software is identified when provided.

   Arkansas Best Freightways
   Airborne--LIBRA II
   American Freight--Qwikquote
   ANR--Freight Rapid Rate
   Consolidated Freightways--OMNI Rate
   Consolidated Freightways
   Conway Central
   CSXT--CAR Tracing
   Federal Express--FEDEX, Powership 2

Milan--Rater
PIE--PC Rate
Roadway--EZ Rate
Thurston
Transcon--EDI
United Parcel Service
Viking--VIK Rate
Yellow--ZIP DISK
Yellow Freight System--Zip Rates

3. Are personal computers (PCs) currently being utilized in your day to day Transportation Management operations? How are they being used?

   The microcomputers have been put to productive use on a variety of tasks at various DOE field offices and contractor locations.

   Storing regulations--REGSCAN49
   Rate comparisons
   Electronic mail
   Auditing freight bills
   Routing shipments
   Accessing SMAC
   Preparing Bill of Lading
   TMS/Zipper Rate/Route
   Heavy Haul Rate comparisons
   Carrier Evaluation
   Premium Transportation analysis
   Claims tracking
   Household Moves
   Material receipt and onsite delivery analysis
   Daily activity tracking
   Address verification for inbound shipments
   Log in of priority shipments
   Outbound Tracing and Payment
   Inbound Tracking and Payment
   Training (Haz Mat)
   Functions as a terminal for Receiving--part of procurement system
   Manpower utilization and scheduling
   Dangerous goods documentation for shipments (IATA)
   Monthly management reports
   Motor carrier rate quotations tracking
   Tracking railcars

4. Is your organization presently involved in any direct Electronic Data Interchange (EDI) of bills of lading, freight bill information, or automatic payment with any carriers? If yes, please specify carriers.

   Very few responses were received to this question. Primary document interchange was with Airborne, Federal Express, ANR Freight, Roadway, Yellow Freight, and Consolidated Freight.

5. Which of the following groups does your transportation management organization interface with inside your company?

Number of Responses		
9	(a)	Purchasing
7	(b)	Accounts payable
5	(c)	Warehousing (material inventory and control)
6	(d)	Property control
8	(e)	Shipping and receiving
3	(f)	Safeguards and security
15	(g)	All of the above

6. In question 5 above, which groups within your company are you presently interfacing with electronically? Which do you plan to interface with electronically in the next two years?

   Most interfaces are currently through electronic mail facilities. Within the next two years, a large number of contractors appear to be improving the links between the groups listed in question 5 and Traffic. One additional group was mentioned as a future interface: Nuclear Material Control.

7. Please list and briefly describe any local site automated systems (current or planned) which you feel should interface with any proposed automated transportation management system.

   Very few responses were received to this question. Interfaces were designed with the local procurement, accounts payable, and receiving systems.

8. List computer and data communications hardware currently being utilized by traffic and transportation management personnel.

	Quantity		
Category	In-Use	Ordered	Planned
Microcomputers			
IBM-PC/Compatible	15	1	3
IBM-AT/Compatible	14	1	4
Compaq 386/Compatible	1	0	1
IBM PS-2	4	0	0
Apple Macintosh	0	0	0
DEC Rainbow	1	0	0
Minicomputers			
DEC VAX	3	0	0
HP 3000	0	0	0
IBM AS/400	0	0	0
IBM System 36/38	0	0	1
Other			
IBM Mainframe (?)	2		
HP 950	1		

9. Please list any commercial or proprietary software presently being utilized with transportation or materials management applications.

   Several popular data base management systems, communications, graphics, and word processing packages such as LOTUS 1,2,3*, WordPerfect**, Kermit, were mentioned in addition to carrier provided software. One site is integrating its traffic operations with the procurement and materials management software it had purchased from Cullinet (the "BUY" system).

10. To what extent is bar code and optical character recognition data entry technology being utilized in traffic management applications at your site location?

    Most air carrier packages use bar-coded labels to track shipments. Bar codes are used for materials and property identification, and several inventory applications. One site is exploring use of bar codes for onsite transportation delivery tracking and usage of supplier bar codes to generate receiving reports.

11. Would any of your present automated transportation management operations be transferable to other DOE site locations? (If yes, please specify high level transfer requirements and a point of contact within your organization.)

    Most responded "No." Two potential contacts were provided: Don Lamb (FTS 997-2887) regarding a procurement and routing system (CAMPS), and Dennis McCall (FTS 444-1651) regarding a HAZMAT training course.

12. Does your organization perform any pre-audit or post-payment auditing of freight bills or is a bank freight payment plan utilized?

    In most companies, a prepayment audit of household goods is performed by Traffic. For other commodities, five companies have their Accounts Payable groups pre-audit above a threshold amount ($100, $500, etc.). Most of the Traffic groups perform pre-audits but three stated no preaudit nor postaudit was done. No one responded regarding bank freight payment plans.

13. Automated rate structures are feasible when steps are taken towards the simplification of freight rates, such as zip code based rates or tenders with across the board discounts (i.e., percentage deductions from published tariff rates). What steps in the area of rate simplification has your organization accomplished or have planned?

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*Lotus 1,2,3 is a trademark of Lotus Development Corporation, Cambridge, Massachusets.

**WordPerfect is a trademark of Satellite Software International, Orem, Utah.

Most of the contractor plans are represented in the following quotes from the questionnaire responses:

"Use the diskette rate information provided by the DOE preferred carriers."

"In the process of creating our own tariff base rates, and developing our system to select carriers based on lowest rates in addition to other criteria."

"Reduced the number of carriers utilized to transport our materials inbound or outbound. Negotiated tender rates with across the board discounts."

"We use GE Corporate... Westinghouse Corporate... Discount Rates."

"Corporate rates negotiated as FAK to eliminate need for NMFC class structuring."

"We use TMS/Zipper."

"We plan to develop an expert system based on published tariff rates."

14. Please list primary carriers, both air and surface, presently utilized at your site location.

The following are the Primary carriers utilized by DOE:

Motor Freight	Air Freight	Rail
1. Yellow Freight System	1. Federal Express	1. CSX
2. Roadway Express	2. AirBorne Freight	2. Union Pacific
3. Consolidated Freightways	3. DHL Corporation	3. Conrail
4. ABF Freight System	4. Emery	
5. ANR Freight System	5. Purolator	

15. Which of the primary carriers serving your site location presently offer EDI capability? Please list.

A large number of the responses indicated it was not known which carriers are willing to provide EDI partnership capability; other contractors had been contacted by a number of carriers on the same issue.

The major carriers listed are:

Airborne
Federal Express
Yellow Freight
St. Johnsbury
PIE Truck Lines
Burlington Air Freight
Burlington Northern
Union Pacific
Consolidated Freightways

16. If you currently are exchanging information electronically with carriers, are you utilizing established Transportation Data Coordinating Committee (TDCC) formats or proprietary programs?

    None.

17. If question 16 above, what information is currently being exchanged electronically? (i.e., freight bills, invoices, etc.)

    None.

18. Which documents, that you regularly use, do you feel could be exchanged electronically with a carrier or other function external to your organization?

    Freight Bills
    Bills of Lading
    Shipping Orders
    Freight Bill Payments
    Invoices
    Air Bills
    Way Bills
    Tracers
    Vouchers
    Customs Declarations
    Dangerous Goods Declarations
    Purchase Orders

19. Are electronic forms presently being used or planned for at your site location?

    Yes [9] No [15] Not sure [3]

20. Do you routinely utilize the SMAC data base for management reporting purposes and ad hoc queries? If yes, please describe how you use SMAC.

    Half of the responses indicated SMAC was not used on a regular basis, including one comment that there was as yet no requirement to do so. Some of the other comments follow:

    "The SMAC data base is used to gather information such as shipment types and totals which is required in routine management reporting... We use SMAC to evaluate carriers, utilization of carriers, to determine savings from discount programs... Utilize SMAC for monthly cost savings report. Plan to use SMAC for evaluating carriers."

    "Freight distribution, cost savings, number of shipments, weight by carrier or mode."

    "DOE reports. Reports on number of radioactive shipments."

"SMAC is often used for ad hoc queries in performance of supporting DOE-RL in their delegated responsibility of lead field office. Also, the SMAC system is used to produce monthly reports to management for reporting shipping activity, carrier routings, costs and savings."

"Yes, utilized for conducting carrier negotiations to determine volume of shipments, cost and existing carrier service performance."

"SMAC reports are used for year end reporting and occasionally for preferred carrier utilization summaries."

21. What are the barriers to and the impacts of automation in your transportation organization? Are the barriers surmountable and the impacts acceptable?

Most contractors expressed frustration with funding and system staffing availability for transportation system development.

"More automation is desired and plans are currently being developed for expanded systems; however, time constraints and other computer service priorities sometimes present barriers."

"Barrier--lack of touch dial telephone service to interconnect with carriers auto tracing services."

"Biggest barrier--lack of interest on the part of management and budget limitations."

"Few carriers are presently capable of providing EDI services to some locations. Insufficient traffic volume of some locations, has inhibited the implementation of EDI's at some reporting locations."

"Limited programming staff."

"I believe a barrier would be to educate and gain acceptance of the idea of EDI within the transportation and logistics function. People are not always willing to change. We have already experienced problems with purchasing agents not wanting to give up the hard copy of the freight bill for their internal records."

"Money, equipment and training. Yes."

"PPPL incurred $67K in freight costs in FY88 for 3,322 shipments. The bulk of these costs (90%) were for small package shipments (under 70 lbs) shipped via UPS or overnight carrier. UPS does not discount its rates and our overnight carrier rates are negotiated by DOE or GSA. The remaining PPPL freight transactions and associated costs are too small to justify the cost of computerizing our transportation function."

21. (continued) - What are the barriers to and the impacts of automation in your transportation organization? Are the barriers surmountable and the impacts acceptable?

"None, with adequate control features and record retention, automation will be pursued wherever cost savings on productivity gains can be realized."

"Due to relatively small number of transactions a year, management approval could be difficult to obtain."

"The primary barrier is the time required (manpower) to adequately evaluate the benefits of automation and develop an automation implementation plan which addresses hardware requirements, software requirements, training, etc. The barriers are surmountable and the impacts are acceptable."

"Within our transportation functions there are no barriers. Our interfacing with other departments is a management decision."

"The barriers are obtaining the funding and resources required to implement an effective, encompassing EDI program. Among the impacts are a more efficient use of resources as well as reducing paper throughout the Transportation Management Department."

"The major barrier is probably the lack of currently available software to do things such as rate comparisons and bill of lading preparation. The barriers are surmountable through Energy Systems-wide participation such as is currently underway on electronic forms development. The impacts should be favorable as we realize greater ease and efficiency in repetitive routine tasks such as routing and document preparations."

22. What implications on security procedures would EDI and the use of modems for data exchange have on your organization?

Most contractors agreed the microcomputers used for EDI would be required to be dedicated to "non-sensitive" use only, and access would be limited to a few authorized individuals.

This question should be addressed by DOE Business Systems and Computer Security groups. A DOE policy should be formulated and direction provided to DOE contractors in regard to the use of EDI and modems.

Some traffic groups are located in an enclosed area and have already experienced problems when trying to develop communications links outside the enclosed area.

As long as the EDI process does not permit direct access to company data resources, there are no current security or privacy concerns.

7.0 POTENTIAL ELECTRONIC DATA INTERCHANGE PARTNERS AMONG CURRENT CARRIERS

The DOE and its contractors presently have several carriers from each transportation mode (air, motor, rail, water), which could be utilized as possible "future" partners in any EDI application.

Most large transcontinental motor and rail carriers have been trading information electronically with several partners, sometimes as many as several hundred partners, for the last five years. Typically, the type of information most frequently being exchanged electronically (in order of popularity) between companies and carrier industry are tracing information, freight bills, bills of lading, and transportation rates and tariffs (Cahners 1989).

Through discussions with carriers, attendance at National EDI seminars, and researching information on EDI from industry trade journals and carrier literature, it was found that the majority of the large transcontinental carriers that DOE and its contractors are doing business with have the capability to transfer information electronically with DOE. According to the most recent annual report on the SMAC system, the five primary motor carriers listed in order of tonnage hauled all had some degree of EDI capability. The top three motor carriers listed, Yellow Freight System, Roadway, and Consolidated Freightways, have extensive EDI experience. Yellow Freight System presently has over 2,000 major customers presently transmitting information by EDI.

All five of the primary airfreight carriers utilized by DOE and its contractors (Federal Express, Airborne, DHL Corporation, Emery, and Purolator) have some degree of EDI capability. As one might expect, Federal Express and the Airborne Airfreight Corporation were leaders in this field. However, DHL, Emery, and Purolator all have outbound air express systems that utilize a microcomputer for the preparation of the shipping papers. Burlington Northern Airfreight even has a computer program that will assist the shipper in the preparation of the shippers declaration for dangerous goods.

The four major rail carriers used by DOE and its contractors, as identified in the FY 1989 SMAC Annual Report (CSX, Union Pacific, Conrail, and Burlington Northern), all have EDI capability. These four carriers also have a large list of customers that they regularly interchange shipping information with electronically. It should be noted that the railroads were one of the first industries to see the advantages of EDI by electronically exchanging car status information between one another.

Most carriers initially contacted regarding the possibility of exchanging information electronically have showed interest in adding DOE and its contractors to the growing list of customers with which they presently exchange information electronically.

8.0 AUTOMATED TRAFFIC MANAGEMENT SYSTEMS CONCEPTUAL ARCHITECTURE

The implementation of EDI utility software would provide a communication platform application that can be used to electronically exchange transactions between outside companies and DOE.

The specific EDI ANSI X.12 transaction sets of interest to the Traffic functions within the contractors supporting DOE field offices are the freight details and charges, carrier quotations, and shipment status and tracing information. There are additional EDI transaction sets that could be of benefit to other contractor organizations; once the EDI utility is in place it is a matter of communications access to provide the link with other vendors.

The EDI links would be established between DOE contractors and selected, high-volume carriers. The communication links would be two-way; Traffic would submit inquiries for quotations, status, and tracing information; and the carriers would send responses to the inquiries in addition to freight bill data. The carriers may also provide zip code-based rate files via EDI. Electronic funds transfer services could also be triggered by the freight bill process by setting up an EDI link between the accounts payable departments and the bank networks.

The EDI will never fully replace the paper-based system of today, but it still promises significant productivity improvements and benefits. Freight bill information could be received electronically from the carrier, processed by Traffic, transferred directly into the contractor's accounts payable system for payment, and uploaded into the SMAC data base without several data entry and reentry processing steps. This process could eventually eliminate the current practice of manually preauditing delivery receipts for subsequent match to the carrier invoice.

There is today active commercial marketing of third-party services for electronic mailboxes and preprogrammed computer interfaces for EDI translation functions. One work effort of the EDI program will be to evaluate the cost effectiveness and other benefits of doing business with a network services provider. Initially, Traffic may directly interface with individual carriers via modems and custom EDI interfaces. The EDI automation opportunities include the following:

1. Using EDI to extend the data collection processes for SMAC as has been suggested several times in recent years

2. Expanded information exchange by way of electronic bulletin boards or access to information repositories. Electronic bulletin boards are available today within DOE

3. The use of various proprietary outbound air express package rating, routing, and billing systems when it is advantageous to DOE to do so

4. The use of carrier-provided dial-up shipment monitoring systems for carrier evaluation

5. The use of a computerized freight bill auditing and payment system at the contractor level, which could also provide business system interfaces electronically with other transportation management; materials management, purchasing, and accounts payable systems; technical system interfaces with work scheduling systems; and direct carrier document (or payment) exchange.

The ATMS models presented in this section display the organizational entities, automated structures, and information flows required to achieve EDI Program objectives.

Currently, the freight bill audit and payment process is manual. In today's environment, carrier and shipment information is entered into the procurement system during preparation of the purchase order, reentered in Receiving when the shipment is received, reentered in Accounts Payable to prepare for carrier payment, processed in Treasury to produce the check, and reentered finally to update the SMAC interface. The existing freight bill process for inbound and outbound shipments is pictured in Figures 3 and 4.

The Freight Bill Invoice process is a good candidate for automation. The EDI pilot project freight bill application is called the Freight Bill System (FBS).

The FBS application will match receiving shipment verification records to EDI carrier invoice transaction sets to produce automated freight bills, will edit the freight bills for valid codes and extensions, and will audit the freight bills against a carrier-supplied zip code-based rate file before payment. Any errors outside of tolerance limits, exceptions, and unmatches will be reported for administrative handling by Traffic staff. The freight bills ready for payment will be uploaded to the accounts payable system which will produce checks for the carriers. The FBS will produce summary and detail freight bill reports to be used by Traffic and Accounts Payable staff in the payment process. Eventually, the accounts payable system could produce EFT transactions through EDI for automated payment.

The local interface with SMAC will be reduced if the plan to have carriers begin directly feeding shipment information to SMAC is implemented. The FBS can be designed to feed SMAC-only exceptions and corrections, which would reduce the need for clerical data entry and local interface systems.

The migration from the existing workflow to a fully automated system will be accomplished over two phases (Figures 5 through 8). "Freight Bill Process--Inbound--Phase 1" and "Freight Bill Process--Outbound--Phase 1" describe the effect of adding EDI capability through a central point. The SMAC would be updated automatically, which would eliminate most SMAC data entry by individual sites. The individual contractors would simultaneously receive the EDI transactions either into existing systems or could utilize the "rip and read" method (printing the transactions for manual handling). Traffic functions remain functionally similar to the present workflow.

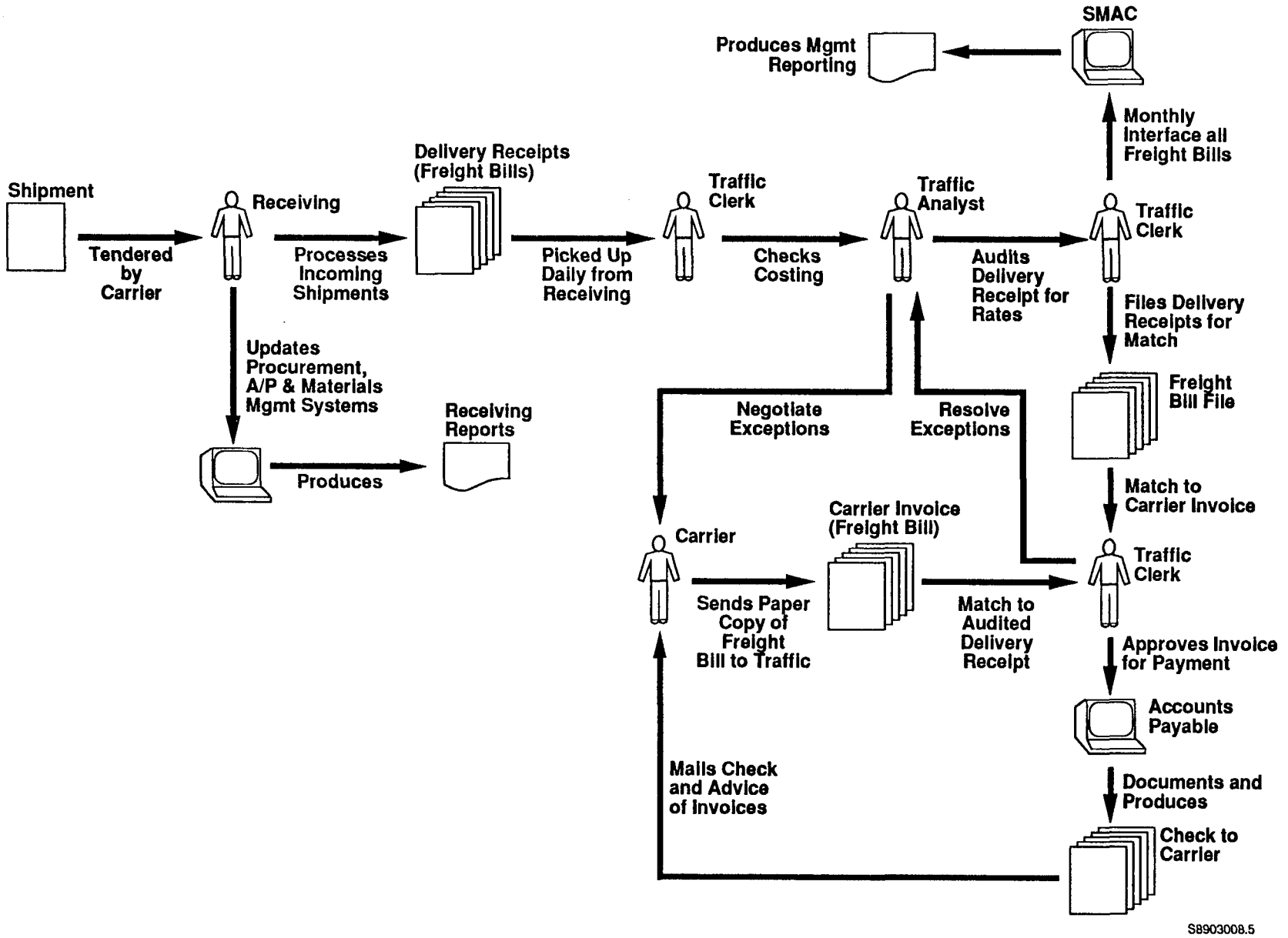

Figure 3. Existing Freight Bill Process--Inbound.

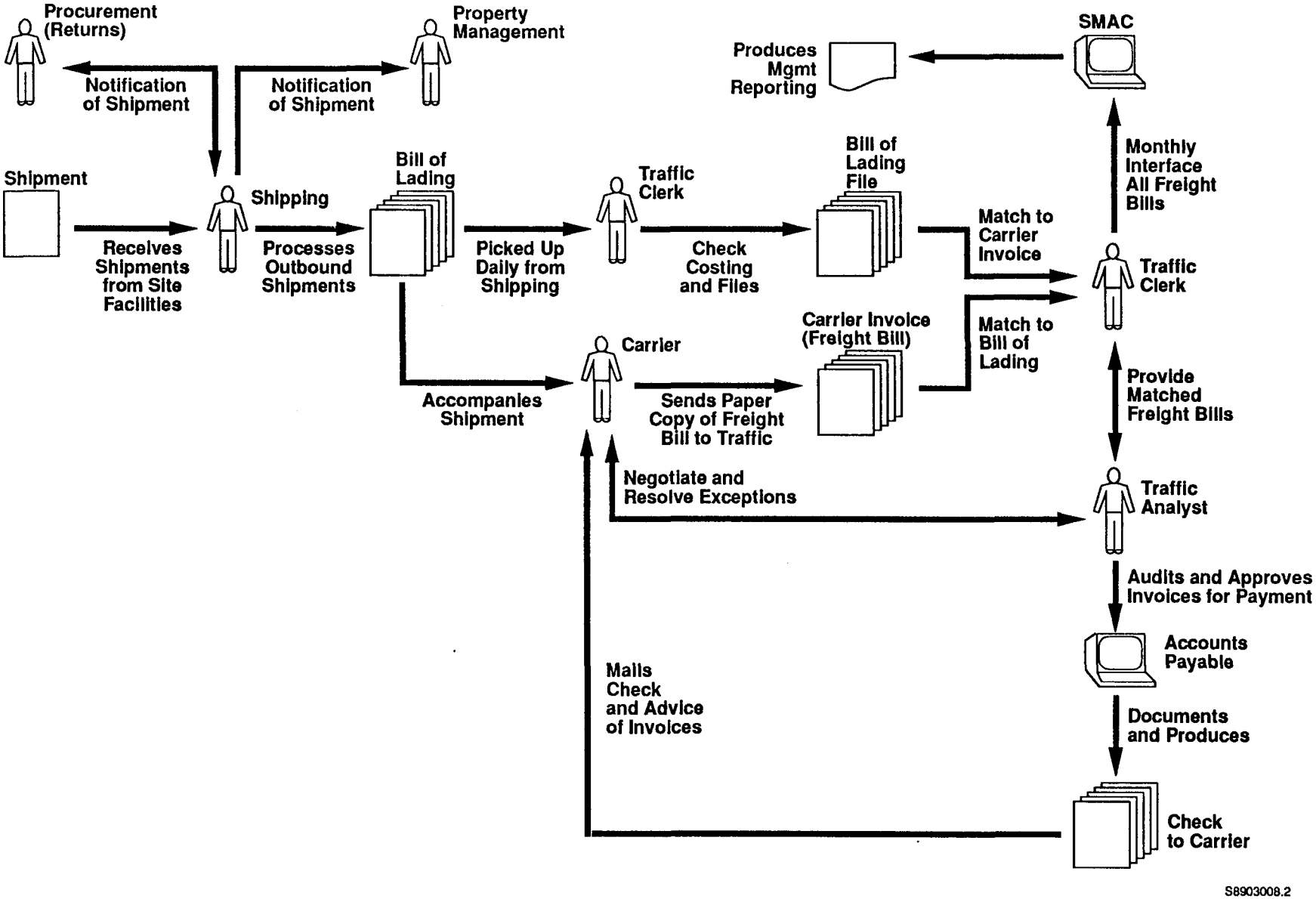

Figure 4. Existing Freight Bill Process--Outbound.

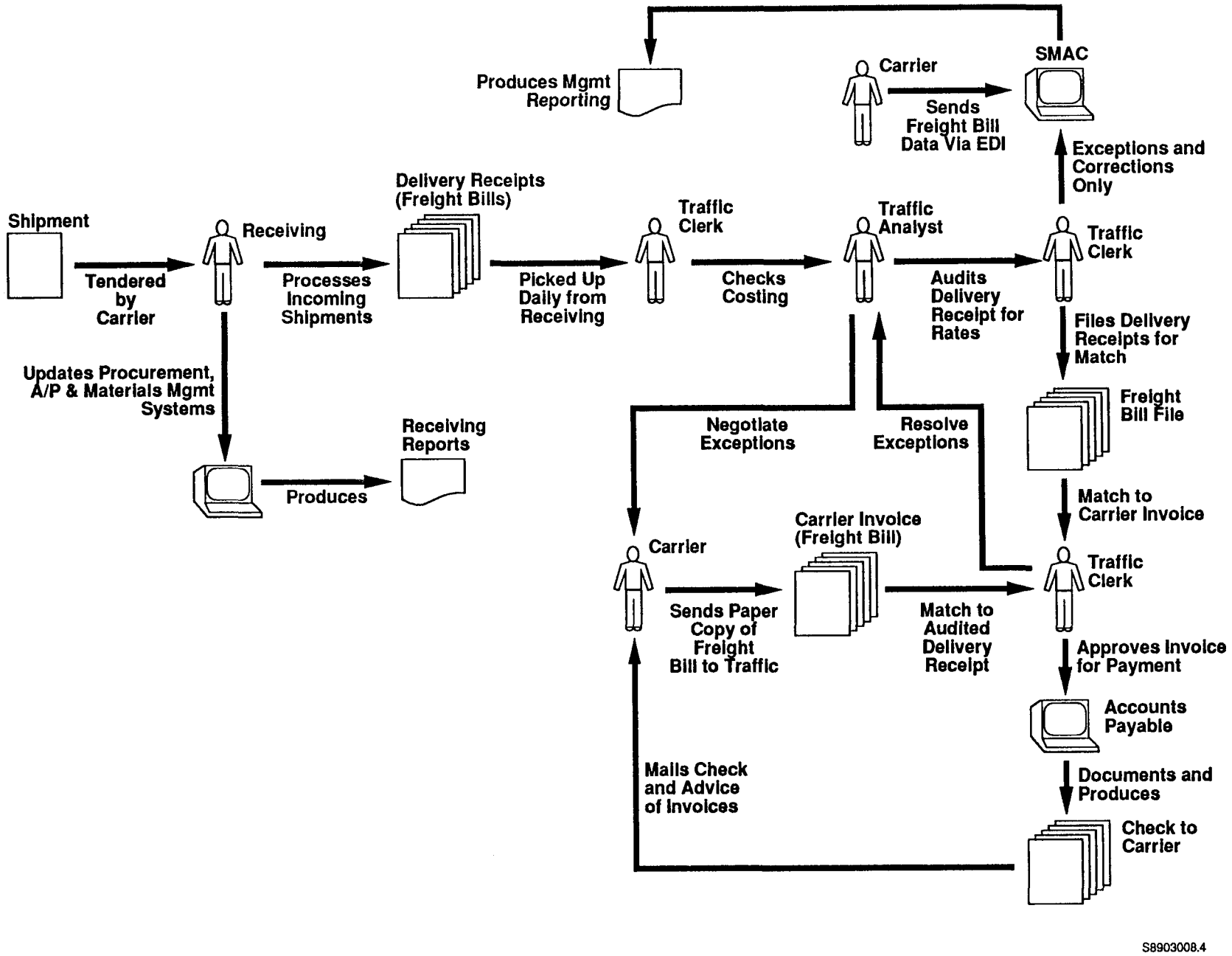

Figure 5. Freight Bill Process--Inbound--Phase 1. (sheet 1 of 2)

- **Functionally similar to present flow**
- **Eliminates most SMAC data entry by individual sites**
  - **Only exceptions and corrections entered into SMAC by DOE Sites**
- **Carrier sends freight bills**
  - **To SMAC via EDI**
  - **To individual contractors via mail**

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Figure 5. Freight Bill Process--Inbound--Phase 1. (sheet 2 of 2)

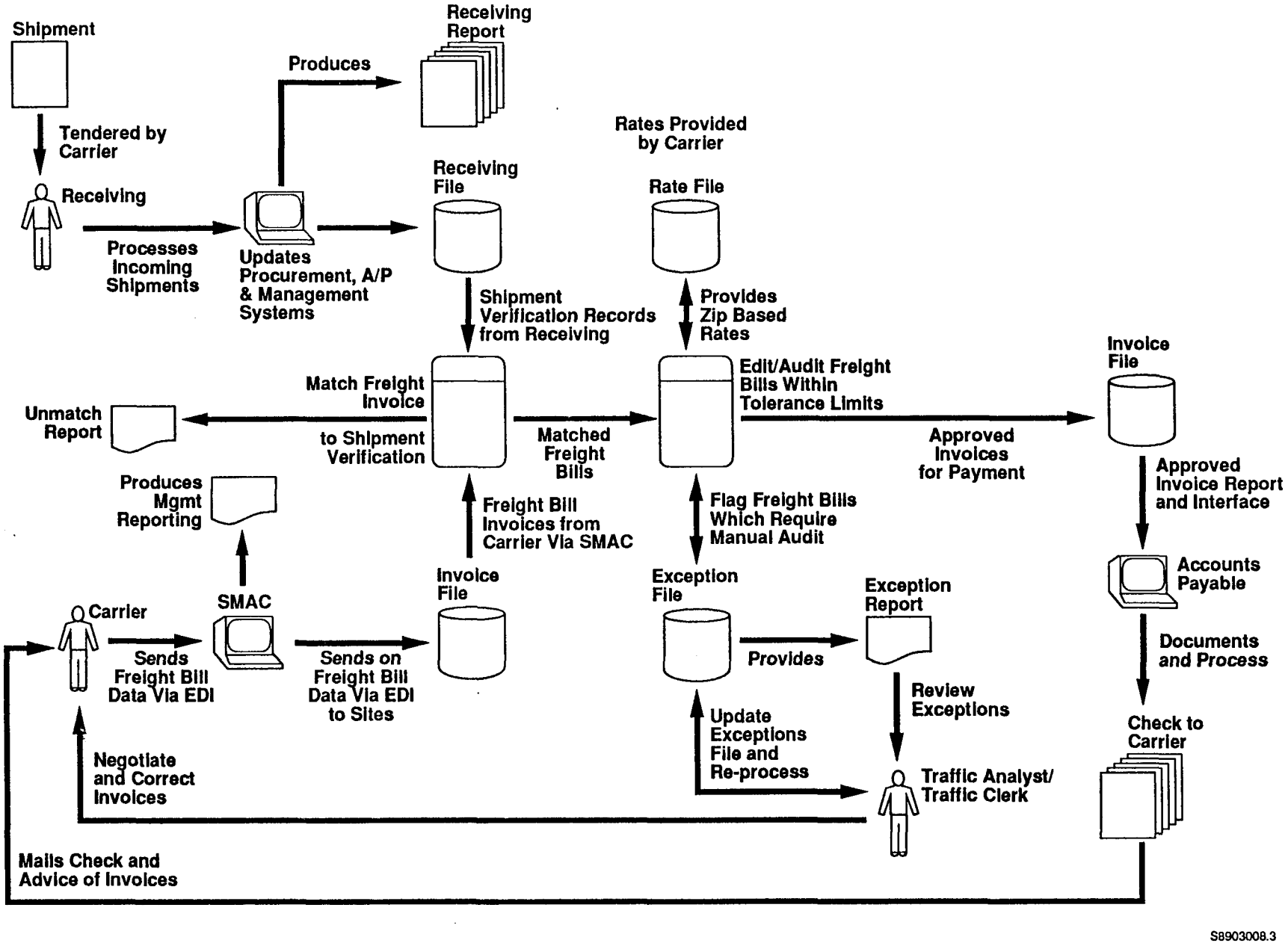


Figure 6. Freight Bill Process--Inbound--Phase 2. (sheet 1 of 2)

- Automates traffic functions
  - Matches bill of ladings to freight bills
  - Audits and edits freight bills
  - Prepares bill of ladings

- Computer assisted review
  - Unmatch tracking capability
  - "Out of Tolerance" rates rejected
  - Extension errors

- Eliminates all data entry of bill of ladings and freight bills
  - Carrier sends freight bill transactions to SMAC via EDI
  - SMAC sends bill of lading data to SMAC (collect shipments) via EDI

- Freight bill transactions can be printed as a carrier summary report for manual processing, if necessary

38909064.1

Figure 6. Freight Bill Process--Inbound--Phase 2. (sheet 2 of 2)

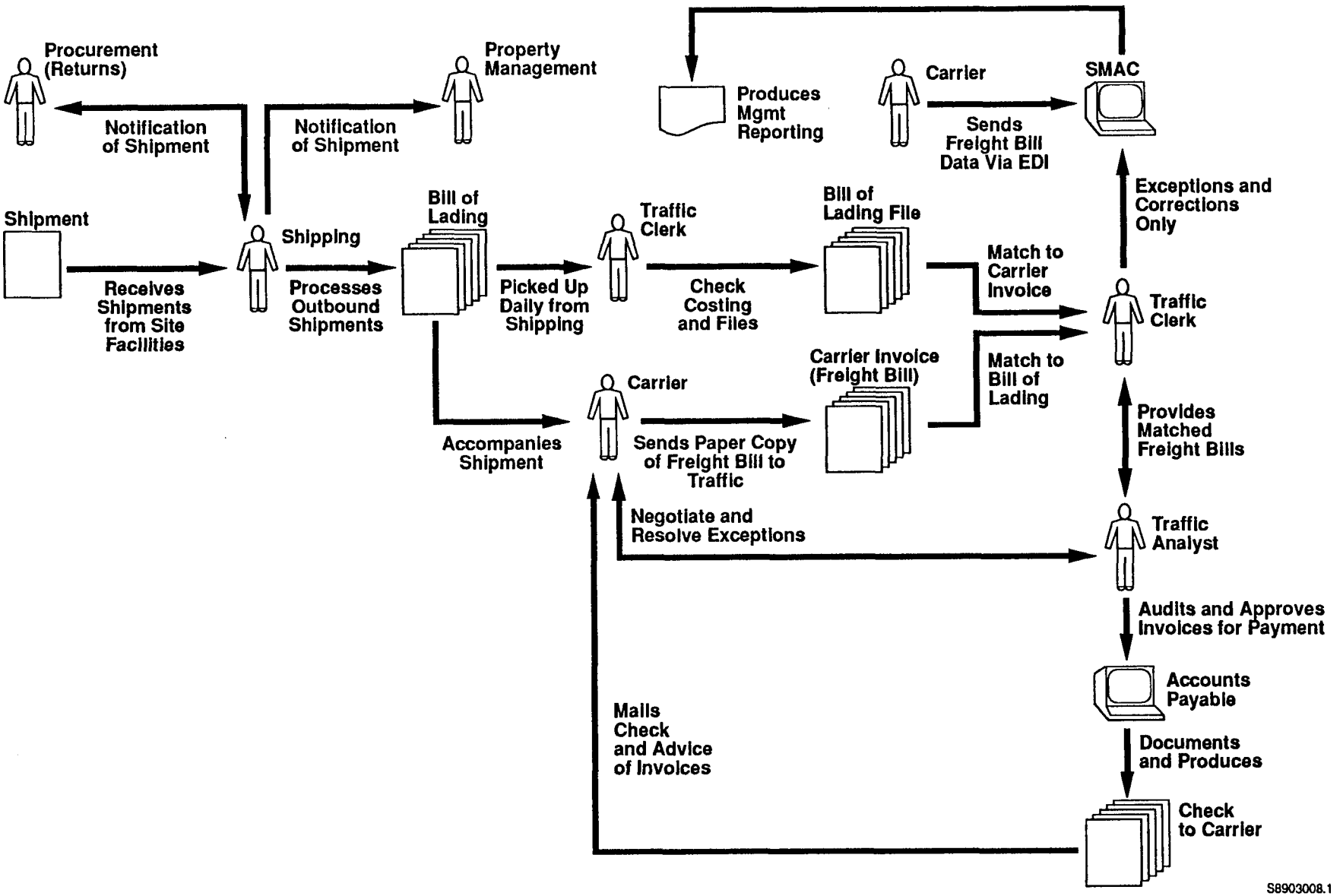


Figure 7. Freight Bill Process--Outbound--Phase 1. (sheet 1 of 2)

- **Functionally similar to present flow**

- **Eliminates most SMAC data entry by individual sites**
  - **Only exceptions and corrections entered into SMAC by DOE Sites**

- **Carrier sends freight bills**
  - **To SMAC via EDI**
  - **To individual contractors via mail**

38909064.2

Figure 7. Freight Bill Process--Outbound--Phase 1. (sheet 2 of 2)

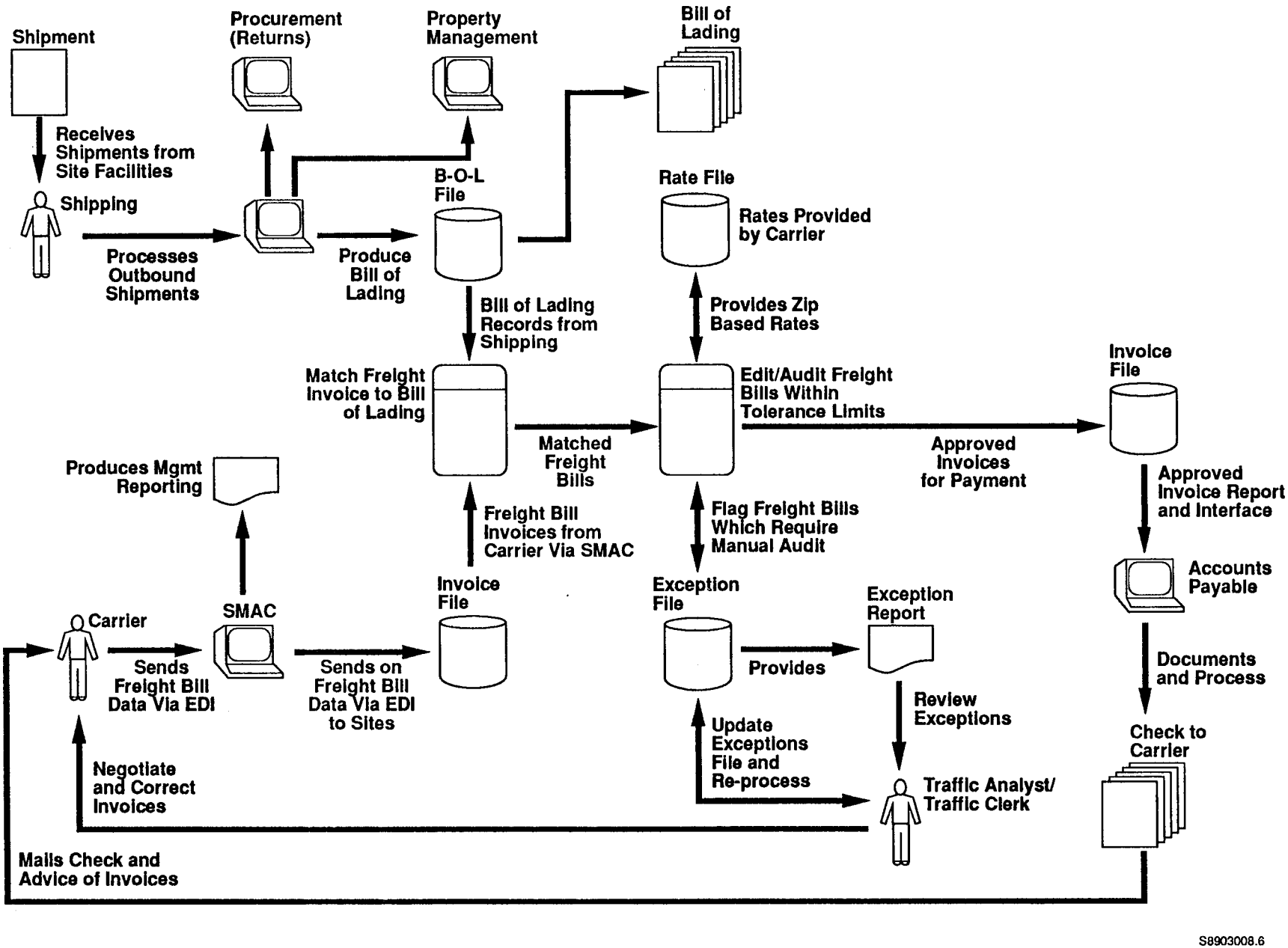


Figure 8. Freight Bill Process--Outbound--Phase 2. (sheet 1 of 2)

- **Automates traffic functions**
  - **Matches receipts to freight bills**
  - **Audits and edits freight bills**

- **Computer assisted review**
  - **Unmatch tracking ability**
  - **"Out of Tolerance" rates**

- **Eliminates all data entry of freight bills**
  - **Carrier sends freight bill transactions to SMAC via EDI**
  - **SMAC sends freight bill transactions to sites via EDI**

- **Freight bill transactions can be printed as a carrier summary report for manual processing, if necessary**

38909064.3

Figure 8. Freight Bill Process--Outbound--Phase 2. (sheet 2 of 2)

"Freight Bill Process--Inbound--Phase 2" and "Freight Bill Process--Outbound--Phase 2" describe the effect of automating the traffic functions. The system would automatically match receipts and bill of lading to freight bills, providing edits and audits of the freight bills including "unmatch tracking," freight rate tolerance checks, and extension error rejection. The flow will eliminate most data entry.

9.0 STRATEGIES AND PROGRAM ACTIVITIES

Strategy 1 EDI partnerships between DOE sites and carriers must be fostered.

The EDI Task Force has been established to facilitate information exchange internally. The EDI Task Force will meet annually to share information and tools. In addition, introductions to organizations who are active in EDI are provided by membership with organizations such as the TDCC and attendance at the annual TDCC conference. In the past year, site EDI coordinators at several DOE locations have been identified and have participated in this planning. The carriers must be encouraged to provide services such as EDI through the DOE carrier selection process.

Strategy 2 The ANSI X.12 (and EDIFACT, if appropriate) standards must be incorporated into ATMS design.

Many industries have accepted the ANSI X.12 transaction sets as the EDI standard over proprietary transaction sets. The ANSI X.12 transaction sets must be reviewed to determine applicability of TMD requirements.

Strategy 3 There is a need to educate and build constituency to the EDI and ATMS concepts.

Successful implementation of ATMS will require a team approach. Many organizational elements within the contractor environment will be required to support a successful EDI partnership. The ATMS pilots will provide not only a wealth of experience, but will also showcase the productivity improvements computer applications can provide.

Strategy 4 Transportation data is an asset to DOE, field offices, and contractors and should be managed as a resource.

The SMACs present capability to provide a repository of current reliable data should be enhanced. The value of transportation information must be recognized in order to obtain the interest of contractor management.

Strategy 5 Each DOE site should develop their own ATMS implementation plan using the general strategies set forth in this strategic plan.

Each site must independently develop its own specific ATMS computer application architecture. It will be necessary for the ATMS used at each site location to integrate seamlessly into that structure.

Strategy 6 Each successive ATMS must be built on the foundations of those that exist within the DOE system.

Applications and technologies should be shared. For example, EDI and FBS could be implemented at the Hanford Site as a pilot for TMD before significant funding is committed at other sites. Other site locations could also participate in pilot projects as a showcase of other computer applications applicable to the ATMS such as freight rating, bar coding, and electronic forms.

Strategy 7 Information must flow through the different business functions without a great deal of difficulty.

Information must be capable of flowing between the business unit functions such as traffic, purchasing, receiving/stores, and accounts payable without having to be downloaded and reentered into a different data base.

Strategy 8 Implementation of ATMS at the DOE Field Office and site contractor level will require internal funding at each site location.

Funding for the implementation of ATMS and EDI at the site level will require each field office and DOE contractor to develop their own internal source of funding. Headquarters DOE-TMD will not fund the site specific ATMS implementation efforts, but will share costs for the tie in to the SMAC system.

Strategy 9 The DOE organization, as well as its contractors, will have to adapt their current ways of doing business in order to take better advantage of ATMS.

It is imperative for the success of the ATMS program that DOE and the contractors under its purview be willing to change their current ways of doing business, in order to be able to make better use of new automation opportunities within the transportation management field. The ATMS program must not be regarded by DOE or its contractor organizational structure as "just another computer project." In order for the program to succeed it will involve a change in the overall business strategy of the organizations involved.

10.0 ELECTRONIC DATA INTERCHANGE PROGRAM WORK EFFORT MATRIX

EDI PROGRAM STRATEGIES									
EDI PROGRAM ACTIVITIES	1	2	3	4	5	6	7	8	9
Task Force Meetings	X		X			X			
ATMS Presentations and Representation	X		X		X	X			
Forms Standardization		X		X		X			X
Practices and Procedures Recommendation		X				X	X		X
Carrier Interface	X	X					X		
ANSI X12 Review		X							X
ATMS Pilot Projects			X		X	X	X	X	X
ATMS Pilot Benefits Analysis			X		X		X		X
Application Portability			X			X	X	X	
SMAC Interface				X		X	X		X

Strategy 1 EDI partnerships between DOE sites and carriers must be fostered.

Strategy 2 The ANSI X.12 (and EDIFACT, if appropriate) standards must be incorporated into ATMS design.

Strategy 3 There is a need to educate and build constituency to the EDI and ATMS concepts.

Strategy 4 Transportation data is an asset to DOE, field offices, and contractors and should be managed as a resource.

Strategy 5 Each DOE site should develop its own ATMS implementation plan using the general strategies set forth in this strategic plan.

Strategy 6 Each successive ATMS must be build on the foundations of those that exit within the DOE system.

Strategy 7 Information must flow through the different business functions without a great deal of difficulty.

Strategy 8 Implementation of ATMS at the DOE Field Office and site contractor level will require internal funding at each site location.

Strategy 9 The DOE organization as well as its contractors will have to adapt their current ways of doing business, in order to take better advantage of ATMS.

11.0 ELECTRONIC DATA INTERCHANGE PILOT PROJECT PROPOSAL

This section details a proposal for the implementation of an EDI pilot project for TMD. The purpose of the pilot project is to field test the technology and procedures used to electronically interchange transportation information on a limited basis.

11.1 ELECTRONIC DATA INTERCHANGE INVENTORY AND QUESTIONNAIRE

The first step in the EDI pilot project process was to evaluate the EDI capability of the DOE field offices and their respective contractors. This was done through the use of the EDI Inventory and Questionnaire form, which was sent out to the field offices in January 1989. The purpose of this survey is to develop a current baseline of information on the present status of ATMS including EDI within the DOE organization. The EDI Inventory provides the starting point from which benefits can be measured.

Any investment in EDI should be maximized through technology transfer among DOE field offices and contractors. The EDI inventory can help to accomplish the transfer of software, procedures, and experience through information gathering and reporting.

11.2 MOTOR CARRIER ELECTRONIC DATA INTERCHANGE SURVEY

Concurrent to evaluating the EDI capability of DOE and its contractors, a survey of the motor carriers with whom the DOE and its contractors are presently doing business was performed. Carriers should be viewed as partners in an EDI relationship. It is important that DOE should know the level of support for EDI these carriers can provide in order to ascertain the feasibility of establishing EDI partnerships.

11.3 TRANSACTION SET MAPPING

During the implementation of EDI, freight bill information is transmitted between carriers and customers via EDI transaction sets. The EDI pilot project should make use of ANSI X.12 transaction set formats in order to achieve standardization with the motor and air carrier industries.

In order to interlink SMAC with the carriers, and eventually with DOE field offices and their contractors, the data requirements for SMAC input must be "mapped" to the appropriate ANSI X.12 EDI transaction sets. This mapping activity will yield issues to be worked out such as data format inconsistencies, data conversion rules, and data usage requirements.

This conversion information will be useful in determining the impact a change such as EDI will have on the current way of doing business. This impact is expected to affect SMAC as well as individual field offices.

11.4 MODELS

An analysis of the current paper flow would be performed at a candidate site location and through the SMAC system. This paper flow analysis would ascertain if current needs for paper documents can adequately be met through an EDI solution and would also provide the basis for an EDI system architecture. The EDI system architecture is a model of how all the elements necessary to achieve a working EDI process fit together.

The EDI models represent a phased implementation of EDI. Each successive architecture presented describes the relationships between the DOE, SMAC system, DOE field offices, and the carriers and how the relationships change through increased functional use of EDI. In consideration of changes to funding priorities, it is expected the speed of EDI implementation will vary from site to site. The models could be used by each site to keep the ATMS strategic plan in focus during this implementation process. These models will be modified based on the results of the EDI pilot project.

11.5 SETTING PILOT SCOPE

The completion of the internal and motor carrier surveys, as well as the EDI models and SMAC transaction set mapping activities, will provide the information necessary for TMD to make decisions regarding the pilot. Following are a sampling of scope issues.

- Transaction Flow--SMAC could act as a service bureau collecting, processing, and retransmitting information for DOE facilities. Other options would be to use the site selected for the EDI pilot project to collect the data directly from a participating carrier and retransmit the required data to the SMAC system electronically, or to use third-party network services providers for data translating and communications services.

- Number of carriers--One large carrier serving a majority of DOE site locations could probably be used in the EDI pilot project. Another option would be the use of a number of carriers serving <u>one</u> selected DOE site location.

- Portability--Strategic considerations for technology transfer such as whether to make the EDI pilot project a microcomputer, minicomputer, or mainframe-based system will also need to be addressed.

- The EDI utility software--Software will have to be procured from a commercial vendor, or some internal programming will be required to develop the translation/generation functions that make EDI possible. In addition, SMAC software enhancements may be necessary to accept EDI transactions.

- Communications--The possible use of the new Federal Telecommunications Network (FTS2000) for the transmission of the data from the carrier to the SMAC data base, and from SMAC to the DOE site location participating in the pilot project needs to be considered. Alternately, it may be advantageous to TMD to secure the services of a third-party network services provider.

11.6 CARRIER SELECTION

The next step in the EDI pilot plan would be to select a motor carrier to participate in the program. It is recommended a motor carrier be selected for the pilot project, as opposed to an air freight carrier, in order to initially reduce the data volumes. The volume of air freight/express invoices are much greater than those of motor freight carriers.

The SMAC system would be used to select a carrier with an appropriate level of participation DOE-wide. From the carrier list generated through SMAC, a motor carrier would be selected that would handle some predetermined threshold shipment volume.

It is recommended that a national motor carrier be selected over a regional carrier. If a carrier selected for the pilot project does not serve a majority of the DOE field office locations, it might be more difficult to sell the idea of EDI to the field offices and DOE contractors. Selection of a national carrier already serving a majority of DOE sites will not only avoid the "won't work here" syndrome, but also better support from the carrier can be expected. The national carriers have more incentive to support EDI.

11.7 SITE SELECTION

The next step in the implementation process would be to pick one DOE site facility to perform an on-line test of EDI with a selected motor carrier.

After a site has been formally identified as a possible location for a pilot test, the approval and support of both the respective DOE field office traffic manager as well as the contractor traffic manager would be needed before proceeding. From the possible site locations identified as candidates, a selection will be made by TMD to select one site location to participate in the EDI pilot project. It should be quoted that the EDI pilot project would be only <u>one</u> of several possible pilot projects. Each ATMS pilot project would be centered on a particular ATMS application such as EDI, bar coding, electronic forms, or computer rating routing capabilities.

11.8 PILOT DEVELOPMENT AND ASSESSMENT PLAN

The next step would be to develop a schedule for the implementation and assessment of the EDI pilot project. This implementation schedule would show in chronological order the process to be followed in the changeover from the manual to an automated transportation management system.

The implementation of the EDI pilot project would need to be approached in well-defined phases of development.

The initial phase of the EDI pilot project will be centered around the electronic transmittal of the freight invoice and will later include a pre-audit function before the payment of the freight invoice to the participating carrier. Most DOE facilities are primarily inbound operations, and TMD can expect to accrue the most benefit in this area.

The implementation of an EDI pilot project would be done concurrently with the presently used manual system. The two systems would be used simultaneously for a given period of time until the EDI pilot project completes its shakedown stage, and enters the conversion stage to the complete electronic transmittal of freight bill data.

After a predetermined period of successful EDI transactions with the carrier selected in the pilot project, the next step would be to expand the program to include the electronic submittal of all freight bill information from the carrier directly to the SMAC.

11.9 PHASED PROGRESSION FROM THE PILOT PROGRAM

It is expected that the EDI pilot project will proceed from its initial implementation phase to more advanced stages of development. During the first phase of development it is envisioned that only freight bill information would be exchanged between the participating motor carrier and the SMAC system. The SMAC data base would be updated from the information the carrier electronically transmits to SMAC. The DOE field office and site contractors would only have to enter exceptions on a manual basis into the SMAC data base system. By entering freight bill data only on the exception basis, the labor-intensive data entry task would be drastically reduced during Phase I of the EDI pilot program.

During Phase II of the EDI pilot program, it is proposed that the program be enhanced to include a preaudit of all applicable freight bill invoices. At the current time, not all DOE field office locations and their contractors perform a preaudit of the carrier freight bills. This lack of a pre-audit of the freight bills before payment increases the potential for the DOE to pay more than the legal published rate for many shipments. This could potentially cost the DOE thousands of dollars in additional freight costs.

During Phase II, the participating motor carrier would be required to submit its freight rates during the freight negotiation process in a way that would be capable of being computerized. For example, the carrier may elect to submit the rates in a zip code-based format. Many national motor carriers already have zip code-based rates that are put on microcomputer diskettes for their customers. Once these freight rates are loaded into the EDI pilot program data base, the computer could be programmed to perform this pre-audit function within a predetermined tolerance level. The participating carrier would send its freight bill information electronically to the SMAC system, which would in turn automatically update the SMAC data base and retransmit the freight bill information to the EDI pilot project DOE site for an electronic audit and subsequent payment by the site location.

11.10 RESULTS ASSESSMENT

During each phase of the implementation of the EDI pilot project, the EDI task force will publish the results of the EDI pilot program. These published results would serve as a guideline for full-scale implementation of EDI at other DOE site locations and as a forum to discuss the problems and lessons learned from the implementation of the EDI pilot project.

The final step in the program would be to sell the program's benefits to other DOE site locations, and to expand the EDI program from the pilot phase to the full-scale implementation at other DOE site locations. This move to full-scale implementation at the other site locations would depend on funding from the management of the various DOE sites and their respective contractors, as well as continued support and funding from TMD.

12.0 REFERENCES

Cahners, 1989, *Traffic Management Magazine*, V 28, 8, Cahners Publications.

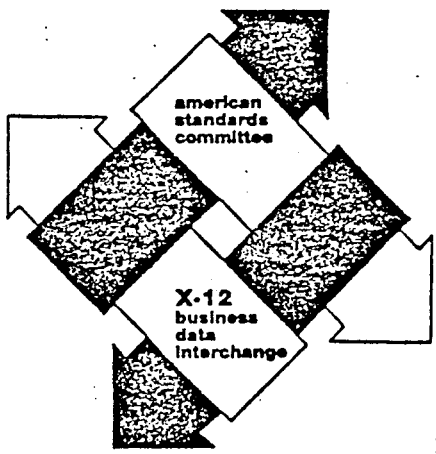
Transportation Task Force, 1988, *Transportation Management Automation Feasibility Study*, Volume 1 report prepared for U.S. Congress.

APPENDIX A

AN INTRODUCTION TO ELECTRONIC BUSINESS DATA INTERCHANGE

ANSC X12

An Introduction To Electronic Business Data Interchange



Introduction to Electronic Business Data Interchange

Introduction

The American National Standards Institute is the recognized coordinator and clearinghouse for information on national and international standards. Its federated membership includes some 180 organizations representing virtually every technical discipline and all facets of trade and commerce, including organized labor and consumer interests. The members have joined together with some 1,000 individual companies and with representatives of federal, state, and local governments to work on programs dedicated to meeting this country's need for voluntary business communications standards. ANSI also serves as the U.S. representative to the International Standards Organization (ISO).

In 1979 ANSI chartered a new committee, known as X12, to develop uniform standards for inter-industry electronic interchange of business transactions. The objective of Committee X12 is to develop standards to facilitate electronic interchange relating to order placement and processing, shipment and receiving information, invoicing, payment and cash application data.

Committee X12, using the pioneering work of the Transportation Data Coordinating Committee and the National Association of Credit Management's Credit Research Foundation, has completed the purchase order, invoice and payment advice transaction standards. Work continues in developing standards for additional transactions.

This document, prepared by members of Subcommittee X12B on Implementation and Maintenance of Business Data Interchange Standards (BDI), describes the scope and importance of the data interchange standards.

It also covers what is included in the standards (e.g., business applications), and what conventions (e.g., communications) must be agreed upon prior to beginning electronic business data interchange, as well as what changes are required within the user's organization (e.g., procedural changes in sales, marketing and accounting).

The Need For Universal Standards

Businesses traditionally conduct external transactions through paper exchanges (i.e., purchase orders, invoices, etc.). In recent years, the growth in these paper exchanges has been explosive. Although computers greatly facilitate the use of paper documents, many commercial organizations have been forced to seek more expedient techniques for processing this massive amount of data.

Various industry groups and individual businesses use electronic alternatives to the handling of paper. Motives for this movement include the need for improved timeliness to reduce inventory investment, reductions in paper processing costs, and better cash availability.

Since most electronic exchanges are supported by a single company or industry, organizations desiring to conduct multi-industry transactions face the problem of supporting a multitude of incompatible transactional electronic interchange standards.

The universal adoption of The Business Data Interchange (BDI) Standards described in this Guideline will enable all such organizations to use a single standard format for interchanging data.

The Standards In Brief

The ANSI X12 Business Data Interchange Standards consist of:

1. transaction set standards;
2. a data dictionary; and
3. transmission control standards.

Transaction set standards define the procedural format and data content requirements for specified business transactions, such as purchase orders.

The data dictionary defines the precise content for data elements used in building transaction sets.

The transmission control standards define the formats for the information required to interchange data. These controls are already in use by some industry groups. Additional information is available from the following documents:

General Information

	Document No.
Data Dictionary	ANSI X12.3 (1983)
Interchange Control	dp ANS X12.5
Application Control	ANSI X12.6 (1983)
Functional Acknowledgement	dp ANS X12.20
Interchange Acknowledgement	dp ANS X12.21
Segment Directory	dp ANS X12.22

Specific Transactions

Purchase Order (850)	ANSI X12.1 (1983)
Invoice (810)	ANSI X12.2 (1983)
Remittance/Payment Advice (820)	ANSI X12.4 (1983)
Purchase Order Acknowledgment (855)	dp ANS X12.9
Request for Quote (840)	dp ANS X12.7
Reply to Request for Quote (845)	dp ANS X12.8
Planning Schedule (830)	dp ANS X 12.14
Shipping Notice (856)	dp ANS X12.10
Receiving Advice (861)	dp ANS X12.12
Price/Sales Catalog (862)	dp ANS X12.13
Planning Schedule	dp ANS X12.14
Purchase Order Change Request	dp ANS X12.15
Purchase Order Change Acknowledgement	dp ANS X12.16

A complete package of all standards is available in draft-proposed (dp) form, for $85.00, from the Secretariat:

TDCC
1101 Seventeenth Street, N.W.
Washington, D.C. 20036
(202) 293-5514

More current information may be obtained from the Secretariat. This document was produced by Subcommittee X12B. Comments and suggestions are always welcome and may be addressed to the Subcommittee, in care of TDCC, Secretariat. Bulk quantities are available from the Secretariat at $50.00 per hundred.

Understanding Standards for Business Data Interchange

A "transaction set" is simply the term used in Business Data Interchange to describe the electronic transmission of a single document (Purchase Order, Invoice, etc.) between one company's computer and another company's computer.

The data included in a transaction set will convey the same information as a conventional printed document.

Within each transaction set are three general areas that relate directly to the format of the printed document. These are:

The Header Area

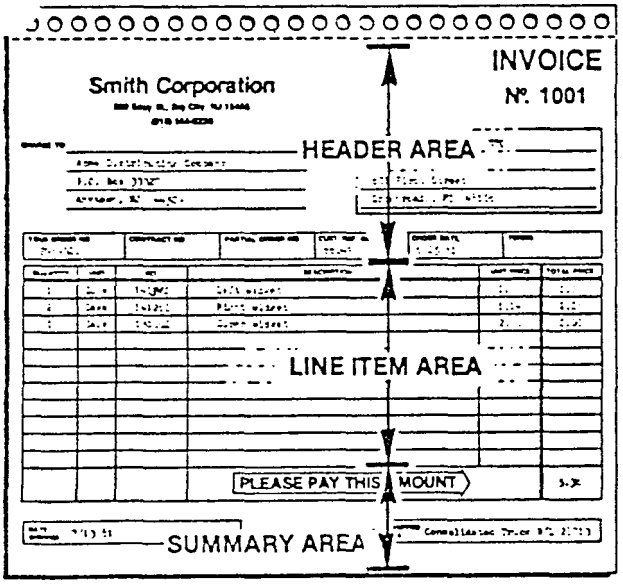
The Transaction Set Header Area contains preliminary information that pertains to the entire document, such as the date, company name, address, P.O. number, terms, etc.

The Transaction Set Line Item Area

The Line Item Area encompasses the actual business transaction and includes information, such as quantities, descriptions and prices.

The Transaction Set Summary Area

The Summary Area contains control information and other data that relate to the total transaction.



The conventional invoice shown above illustrates the three basic areas of a transaction set. The data included in the line item area of this invoice is understandable since each column is labeled.

In electronic business data interchange, each line is called a *segment* and each item within the segment becomes an *element*.

To facilitate an electronic transmission, the information is converted to the BDI format for this document (Invoice) and is replaced with the appropriate BDI symbols compiled in the Committee X12 Data Dictionary.

Thus, the line item information from this invoice:

Quantity	Unit of Measure	Unit Price	Catalog Number	Description	Price

becomes a segment comprised of five elements, grouped in a specific sequence as follows:

IT1 *	Quantity Invoiced	* Unit of Measure	* Unit Price	* Product ID Qualifier	* Product ID	N/L

Each of the elements is separated by an asterisk and followed by an N/L indicator to separate the segments.

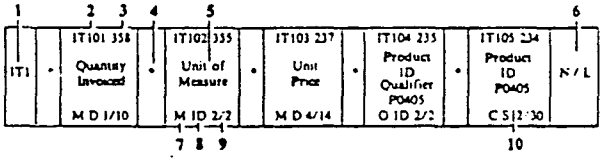
The first line of an actual electronic transmission of the invoice would include additional symbols and appear as:

IT1 * 1 * CA * 1.08 * CT * 141151 N/L

In the Data Dictionary, "CA" is the unit of measure code for case and "CT" the product ID qualifier for buyer's catalog number.

Segment Diagram Key

The following diagram illustrates how a data segment is diagrammed and provides references to codes and terms used in the BDI Standard. Note that the actual interchange of information does not include all the reference characters shown in the diagram. Only the Data Segment Identifier characters, the values for each Data Element, the Data Element Separator, and the Data Segment Terminator characters are actually transmitted.



(1) **Data Segment Identifier** — The two or three characters assigned to identify the segment.

(2) **Data Element Reference Designator** — The data segment identifier plus a two-digit sequence number.

(3) **Data Dictionary Reference Number** — The index reference number to the Data Dictionary standard where the content of all data elements is defined.

(4) **Data Element Separator** — The character selected by sender which precedes every data element, whether the data element is used or not.

(5) **Data Element Title** — Name of the data element.

(6) **Data Segment Terminator** —The character selected by sender to end each data segment.

(7) **Data Element Requirement Designator** — indicates when this element must be included in an electronic document.

- M = Mandatory — The data element must be used in the segment.
- C = Conditional — The data element may be required in the segment based on whether another element is used.
- O = Optional — The data element may or may not be used in the segment at the option of the user.

(8) **Data Element Type** — specifies the characters that may be used

- N = Numeric
- D = Decimal — Numeric with decimal point (R).
- ID = Identifier — A specific code taken from a table defined in the Data Dictionary Standard, such as a unit of measure.
- S = String — A series of characters, such as a company name (Alphanumeric—AN)

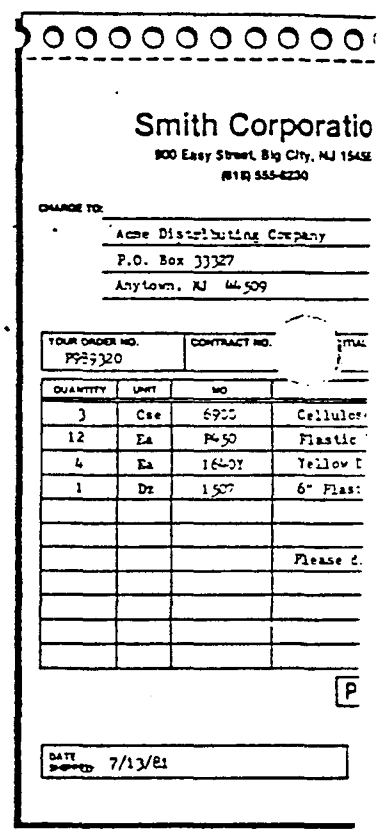
(9) **Data Element Length** — The minimum length and maximum length of the data element in characters.

(10) **Data Element Relational** —Defines relationship between two or more data elements in a group.

ANSI X12 Format	Paper Format
ICS**ANSI0010101012345678900001010123456789000028309222359000000001N/L	INTERCHANGE CONTROL HEADER (See dp ANSI X12.5)
GS*IN*012345678*087654321*0714*2210*000001*X*00101N/L	FUNCTIONAL GROUP HEADER (See ANSI X12.6—Applications Control)
ST*810*0001 N/L	TRANSACTION SET HEADER
BIG*810713*1001*810625*P989320 N/L	DATE 7/13/81 INVOICE NO. — 1001 ORDER DATE 6/25/81 CUST ORDER NO — P989320
LS*100 N/L	LOOP HEADER
N1*BT*ACME DISTRIBUTING COMPANY N/L N3*P.O. BOX 33327 N/L N4*ANYTOWN*NJ*44509 N/L	CHARGE TO Acme Distributing Company P.O. Box 33327 Anytown, NJ 44509
N1*ST*THE CORNER STORE N/L N3*601 FIRST STREET N/L N4*CROSSROADS*MI*48106 N/L	SHIP TO The Corner Store 601 First Street Crossroads, MI 48106
N1*SE*SMITH*CORPORATION N/L N3*900 EASY STREET N/L N4*BIG CITY*NJ*15455 N/L	REMIT TO Smith Corporation 900 Easy Street Big City, NJ 15455
LE*100 N/L	LOOP TRAILER
IT9*01*03*2**10 N/L	TERMS OF SALE... 2% 10 days
PER*DU*C.D. JONES*TE618/555-8230 N/L	CORRESPONDENCE TO C.D. Jones 618/555-8230
LS*200 N/L	LOOP HEADER
IT1*3*CA*127500*VC*6900 N/L IT1*12*EA*4750*VC*P450 N/L IT1*4*EA*9400*VC*1640Y N/L IT1*1*DZ*34000*VC*1507 N/L	QUANTITY UNIT NO. DESCRIPTION PRICE 3 Cse 6900 Cellulose Sponges 12.75 12 Ea P450 Plastic Pails .475 4 Ea 1640Y Yellow Dish Drainer .94 1 Dz 1507 6" Plastic Flower Pots 3.40
LE*200 N/L	LOOP TRAILER
CAD*N****CONSOLIDATED N/L	Via Consolidated Truck
TDS*5111 N/L	INVOICE TOTAL PLEASE PAY THIS AMOUNT $51.11
SE*24 N/L	TRANSACTION SET TRAILER
GE*1*000001N/L	FUNCTIONAL GROUP TRAILER (See ANSI X12.6—Application Control)
ICE*000001*000000001N/L	INTERCHANGE CONTROL TRAILER (See ANSI X12.5—Interchange Control)

Sample Invoice

Showing relationship of Paper Fo



ormat to X12 Format.

INVOICE

No. 1001

INVOICE DATE 7/13/81	SALES PERSON NTO
SHIP TO The Corner Store	
601 First Street	
Crossroads, MI 48106	

		ORDER DATE	TERMS
	04F	6/25/81	2% 10 days

DESCRIPTION	UNIT PRICE	TOTAL PRICE
treet	12.75	38.25
	.475	5.70
Trainer	.94	3.76
ower Pets	3.40	3.40
correspondence to:		
C.D. Jones		
(615) 555-8230		
ASE PAY THIS AMOUNT		$51.11

SHIPPED VIA Consolidated Truck B/L 29713

RIGINAL

Moving The Information

Senders and receivers of business transactions must establish the required link to move the information. The primary goals are to identify the media, the means for the computer to access the media, and the steps needed to initiate interchanges.

The media generally in use for BDI are:

1. Physical — The formatted business data may be recorded on a paper/magnetic tape or diskette/disk media and transported to the receiving partner via U.S. Mail or courier service.
2. Telecommunications — The formatted business data may be transported via public or private telecommunications media.

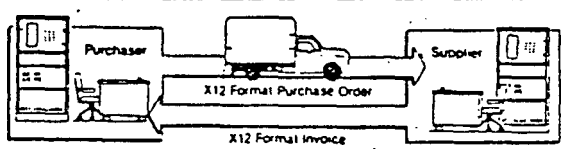
Determining Mode of Transfer

Assuming a Sender and Receiver wish to establish a telecommunications connection, it is their responsibility to consider, negotiate and set the location of the "mailbox", the protocol and the transmission parameters. If a third-party location is selected to domicile the "mailbox", that third party could take care of the details of media incompatibility, code incompatibility or timing incompatibility between partners.

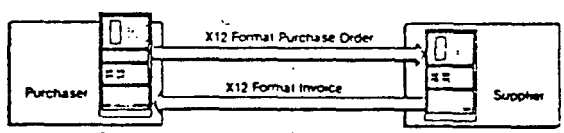
The criteria for selecting the method should consider the following elements:

- Distance of Transport
- Required Delivery Time Frame
- Volume of Transactions
- Number of Destinations
- Frequency of Transport
- Compatibility of Media
- Costs
- Security
- Reliability

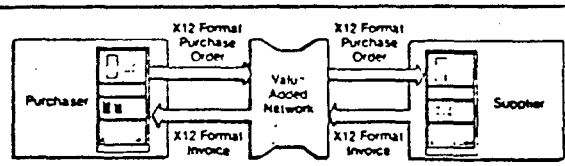
Consider the following approaches for computer-to-computer transfer:



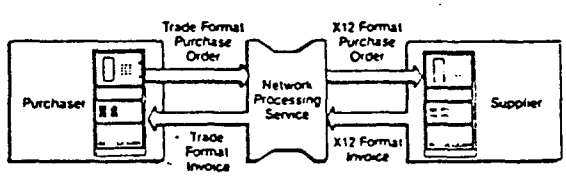
1. U.S. Mail or courier service delivering magnetic tape or diskette — Primary considerations of this method might be:
   - Cost of transport
   - Security of connection
   - Speed of delivery



2. Point-to-Point Connect between partners, both of whom accommodate the same communication protocol and ANSI X12 format — Some considerations are:
   - Cost of connection justified by volume of data
   - Speed of delivery
   - Volume of Data



3. Value-added network, providing "Mailbox Service" for both partners, accommodating ANSI X12 formats. Specific considerations are:
   - Easy adaptation of each partner's own line speed, protocol, multi-destination, times of day.



4. Third Party Service providing "mailbox" and X12 standard translation. Specific considerations are:
   - Partners do not have to worry about translating standard formats, nor do they negotiate line speeds, protocols, multi-destinations, times of day.

Introduction to
Electronic Business Data Interchange

Transmitting Multiple Electronic Transaction Sets

In practice, several electronic transaction sets (e.g., invoices) may be sent together. In order to separate these documents, each is preceded by a transaction set header (code ST*) and followed by a transaction set trailer (code SE*).

Two invoices would appear as:

ST* (Header)
— Segments of Invoice —
SE* (Trailer)
ST* (Header)
— Segments of Invoice —
SE* (Trailer)

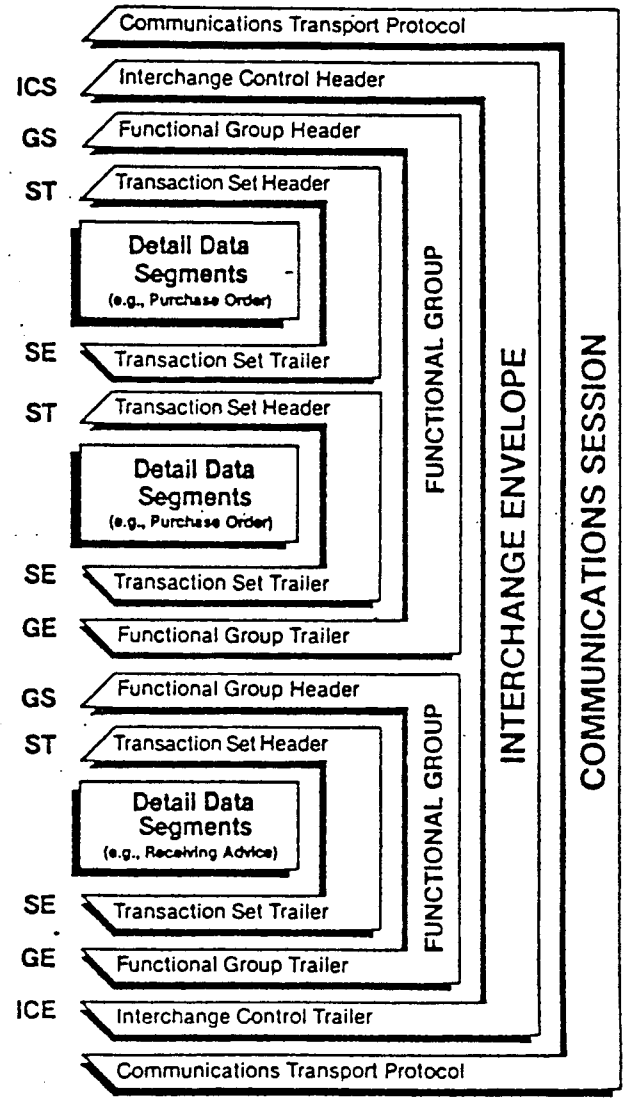
Combining different types of documents also provides for sending more than one type of transaction in the same package. In this instance, each group of the same type is placed between separators (Functional Group Header and Trailer) to differentiate the type (e.g., invoices from purchase orders).

Several groups to a single recipient may be enclosed between an Interchange Control Header and Trailer.

A complete package then would be represented by:

ICS* Interchange Header
GS* Functional Group Header
ST* Transactional Set Header
— Segments As Required —
SE* Transaction Set Trailer
— Other Transaction Sets —
GE* Functional Group Trailer
— Other Functional Groups —
ICE* Interchange Trailer

The following schematic illustrates a typical format for electronically transmitting a series of diverse business documents.



Data Dictionary From X12.3 (1983)

Ref No.	Type	Min Length	Max Length	Name
403	N	6	6	Acknowledgment Date
402	ID	2	2	Acknowledgment Purpose
510	ID	2	2	Agency Qualifier Code
340	ID	1	1	Allowance or Charge Indicator
331	ID	2	2	Allowance or Charge Method of Handling
341	S	1	16	Allowance or Charge Number
332	DO	1	7	Allowance or Charge Percent
378	ID	2	2	Allowance or Charge Percent Qualifier
339	DO	1	10	Allowance or Charge Quantity
360	D2	2	9	Allowance or Charge Total Amount
359	D4	4	14	Allowance or Charge Unit Amount
508	D2	2	11	Amount of Payment Adjustment
504	D2	2	11	Amount Paid
390	D2	2	11	Amount Subject To Discount
124	ID	2	12	Application Receiver's Code
142	ID	2	12	Application Sender's Code
515	ID	1	1	Back Order Code
327	N	1	2	Change Order Sequence Number
381	ID	2	2	Change Reason Code
19	S	2	19	City Name
22	ID	2	10	Commodity Code
23	ID	1	1	Commodity Code Qualifier
364	S	2	21	Communication Number
365	ID	2	2	Communication Number Qualifier
367	S	1	30	Contract Number
26	ID	2	2	Country Code
28	N	1	9	Data Interchange Control Number
29	N	6	6	Data Interchange Date
30	N	4	4	Data Interchange Time
373	N	6	6	Date
374	ID	3	3	Date or Time Qualifier
389	D2	2	10	Deferred Amount Due
369	S	1	80	Description
391	D2	2	11	Discounted Amount Due
404	ID	3	3	Discrepancy Type
516	ID	1	1	Do-Not-Exceed Action Code
517	ID	2	9	Do-Not-Exceed Amount
40	ID	2	2	Equipment Description Code
206	ID	1	4	Equipment Initial
207	N	2	7	Equipment Number
3	S	1	80	Free-Form Message
379	DO	1	10	Free Goods Quantity
479	ID	2	2	Functional Identifier
366	ID	2	2	Function Code
385	DO	1	9	Gross Volume Per Pack
384	DO	1	9	Gross Weight Per Pack
209	S	2	2	Hazardous Material Code
65	DO	1	9	Height
67	S	2	12	Identification Code
66	ID	2	2	Identification Code Qualifier
245	N	6	6	Invoice Date
76	S	3	16	Invoice Number
372	S	2	80	Item Description
348	ID	2	2	Item Description Qualifier
349	ID	1	1	Item Description Type
79	S	2	35	Lading Description
80	N	1	5	Lading Quantity
82	DO	1	9	Length
310	S	1	25	Location Code
309	ID	2	2	Location Qualifier
447	ID	1	4	Loop Identifier
87	S	1	45	Marks and Numbers
88	ID	2	2	Marks and Numbers Qualifier
91	ID	1	1	Mode Code
93	S	2	35	Name
363	ID	3	3	Note Reference
96	N	1	6	Number of Included Segments
97	N	1	6	Number of Included Transaction Sets
398	N	1	4	Number of Line Items
383	DO	1	10	Order Quantity Difference
98	ID	2	2	Organization Identifier
102	ID	1	1	Ownership Code
356	N	1	6	Pack
103	ID	5	5	Packaging Code
266	S	2	2	Pack Size Measure
501	D2	3	12	Payment Amount
502	ID	3	3	Payment Method Code
503	S	1	80	Payment Method Description
342	D3	3	5	Percent of Invoice Payable
116	ID	5	9	Postal Code
236	ID	3	3	Price Qualifier Code
234	S	2	30	Product/Service I.D.
235	ID	2	2	Produce/Service I.D. Qualifier
520	S	1	2	Product/Service Substitution Code
323	N	6	6	Purchase Order Date
350	S	1	6	Purchase Order Line Number
324	S	2	30	Purchase Order Number
400	ID	2	2	Purchase Order Type
380	DO	1	10	Quantity
399	DO	1	40	Quantity Hash Total
358	DO	1	10	Quantity Invoiced
330	DO	1	10	Quantity Ordered
127	S	2	30	Reference Number
128	ID	2	2	Reference Number Qualifier
328	S	1	6	Release Number
401	S	1	45	Request For Quote Reference Number
326	S	1	45	Request Reference Number
519	N	6	6	Required Invoice Date
482	ID	1	2	Responsible Agency Code
387	S	2	80	Routing (Or Orig. Carr. Name)
133	ID	1	1	Routing Sequence Code
140	ID	4	4	SCAC Code
514	ID	2	2	Schedule Code
518	S	2	30	Sender's Account Number
513	S	1	80	Services Description
512	S	1	45	Services Marks and Numbers
368	ID	2	2	Shipment/Order Status
375	ID	2	2	Shipment Terms Code
357	DO	1	8	Size
152	ID	2	3	Special Handling Code
511	S	2	10	Special Services Code
156	ID	2	2	State, Province Code
166	S	2	35	Street Address
325	S	1	20	Tax Identification Number
333	ID	2	2	Terms Basis Date Code
388	N	6	6	Terms Deferred Due Date
318	D2	3	9	Terms Discount Amount
351	N	1	3	Terms Discount Days Due
370	N	6	6	Terms Discount Due Date
386	N	1	3	Terms Net Days
343	N	6	6	Terms Net Due Date
338	DO	1	7	Terms Percent
336	ID	2	2	Terms Type Code
337	N	4	4	Time
377	ID	2	2	Title Passage Location Qualifier
505	D2	2	11	Total Amount
392	D2	2	11	Total Discount Amount
361	D2	2	11	Total Invoice Amount
335	S	3	3	Trade Terms Code
334	ID	2	2	Trade Terms Qualifier
329	S	4	9	Transaction Set Control Number
143	ID	3	3	Transaction Set Identifier
353	ID	2	2	Transaction Set Purpose
376	ID	2	2	Transportation Responsibility Location Qualifier
355	ID	2	2	Unit of Measure
237	D4	4	14	Unit Price
382	DO	1	10	Units Shipped
480	ID	1	12	Version
183	DO	1	9	Volume
81	DO	1	9	Weight
187	ID	1	1	Weight Qualifier
189	DO	1	9	Width

Implementation Considerations

Since the format and content of the data in one company's computer is different from that in another, a common language is required for the interchange of data between the two computers.

The conversion from paper documents to an electronic interchange will impose issues and considerations in two major areas:

1. Internal considerations — those issues and considerations to be resolved within the organization planning to implement the standards — e.g.:

- Determine the application to be utilized (Purchase Order, Remittance Payment, etc.)
- Educate user personnel as to why the company is implementing the standards and what impact it may have on current procedures.
- Explain benefits of using a standard format for business data interchange.
- Explain why ANSI X12 standards were chosen.
- Initiate an implementation schedule.
- Make certain the required data is available on existing systems
- Review all documents to be interchanged and identify each data element with the ANSI X12 formats to ensure that all pertinent information will be included.
- Establish a liaison with all functional areas within your company that may be impacted.
- Identify hardware requirements.
- Determine the method of achieving translation interface:

  Internally developed software

  Software purchase or lease

  Utilize third-party service bureau

- Security precautions taken by BDI applications within a company's computer center should be at least as good as those for the most secure existing application with which BDI is to be used. When the translation to BDI format takes place, every option may be added to completely secure contents of the message. The security functions may also be included as a part of the company's existing data transport services.

2. External considerations — those issues to be resolved with the business partner prior to exchanging data electronically, using the standard:

   identify potential business interchange partners

   define terms of exchange and establish agreement between partners

   verify that sufficient information is available for interchange partners to correctly interpret the data.

   Ensure that partner has adequate translation interface.

- Send sample X12 data to interchange partners for their evaluation. (This does not need to be done on the same media that interchanges will occur in actual operation.)

Other Considerations

Contingency plans should be established to address the following situations:

Backup Procedures

Establish fall-back position (e.g., mail delivery, etc.) in the event of system failure.

Error Recovery

Establish a maximum number of attempts of retransmission following a text transmission error, thus minimizing communication costs for bad connections.

Security

Passwords

Network Response Time

Establish reasonable-time frame for response (functional acknowledgment) to message receipt.

Error Reporting/Contact Support

Names and telephone numbers of transmission partners and hardware and software vendors should be accessible. Some vendors provide diagnostic error routines to isolate failure prior to contact. If available, these routines should be attempted prior to contact to minimize service charges.

Start-Up Checklist

After partners agree on the operating environment, a schedu of implementation dates and check points should be specifiea.

The following is a checklist of items and activities that should be considered during initial planning stages:

- ☐ Network Availability
- ☐ Network Communications — Line Type and Speed
- ☐ Line Protocol, Transmission Mode
- ☐ Transmission Initiation
- ☐ Install hardware and translation software that will allow interface of ANSI X12 formatted data with present internal operating system.
- ☐ Test interface software under the current environment using internal data.
- ☐ Develop required internal edits and controls
- ☐ Establish a "go live" date while running parallel for "x" amount of time
- ☐ Document "trouble-shooting" procedures
- ☐ Date to drop parallel system
- ☐ Fine tune existing system and upgrade to new versions of standards, hardware, etc.
- ☐ Add other applications and standards users

APPENDIX B

EXCERPTS FROM "EDI UPDATE," "WHATS DOE DOING WITH EDI," J. H. PORTSMOUTH AND "EDI OVERVIEW," S. K. GENONI

ATMS Program Implementation Tasks

The following is a listing of some of the more important tasks involved in the implementation of a successful ATMS program within the DOE organization. These activities are listed in the approximate order in which they would be performed.

1. Define business needs, and determine where ATMS could be utilized in the organization.

2. Set up a DOE/contractor ATMS task force group and hold regular workshop meetings on various aspects of the ATMS program including, but not limited to the implementation of EDI.

3. Continue to educate DOE field offices and the contractors under their purview on the benefits and need of the ATMS program.

4. Inventory the ATMS capabilities of the DOE facilities.

5. Develop the ATMS strategic plan as a guidance document for the implementation of ATMS at the field office and contractor level.

6. Survey the EDI capabilities of the carriers (i.e., motor, air, rail).

7. Identify specific ATMS applications that could be utilized by the DOE and its contractors.

8. Inform management at the DOE-HQ-TMD, field office, and contractor levels of the importance and benefits of ATMS program.

9. Reduce the number of carriers DOE is presently using.

10. Develop DOE-wide freight rates.

11. Encourage the development of site-specific tactical implementation plans.

12. Perform a systems analysis of the transportation data flow (i.e., EDI data flow and task models) activities at a particular "test site."

13. Determine what information is going to be exchanged with and between the carriers and DOE.

14. Compare DOE data need requirements with the current industry EDI standards.

15. Extend the generic transportation data flow models developed to other site locations activities.

16. Determine the resource requirements for the implementation of ATMS DOE-wide.

17. Select trading partner(s) for the EDI application of the ATMS program.

18. Select ATMS "Pilot Projects."

19. Get funding approved through the respective site contractors for the implementation of the "ATMS Pilot Projects."

20. Examine the benefits of utilizing an outside third party in the implementation of ATMS programs such as EDI.

21. Software acquisition and development.

22. Implement the "ATMS Pilot Projects" at the locations selected.

23. Encourage the standardization and simplification of carrier tariffs (i.e., zip code-based tariffs) supplied to DOE and its contractors.

24. Pursue the standardization of internal forms utilized by DOE and its contractors (i.e., bills of lading, offsite Radioactive Shipping Records).

25. Accept current industry EDI standards for use in the DOE Organization (i.e., ANSI X.12, TDCC).

26. Get DOE representation of EDI standards committees.

27. Interface ATMS with the current SMAC data base system.

28. Disseminate ATMS "Pilot Projects" findings.

29. Measure benefits of the ATMS/EDI system.

30. Expand ATMS system.

OBSTACLES TO IMPLEMENTING EDI WITHIN THE DOE ORGANIZATION

(1) LACK OF KNOWLEDGE OF EDI CONCEPT AND ITS BENEFITS

(2) LACK OF MANAGEMENT SUPPORT

(3) IMPLEMENTATION COSTS

(4) INSUFFICIENT HUMAN RESOURCES

(5) TIME CONSTRAINTS

(6) DECENTRALIZED NATURE OF THE DOE ORGANIZATION

(7) NEITHER EDI OR ATMS ARE VIEWED AS "HIGH PRIORITY" ITEMS BY MANAGEMENT INFORMATION SYSTEMS (MIS)

(8) INABILITY OF THE SITE CONTRACTORS TO SECURE FUNDING

ELECTRONIC DATA INTERCHANGE

DEFINITION

THE COMPUTER-TO-COMPUTER EXCHANGE OF ROUTINE BUSINESS TRANSACTIONS SUCH AS QUOTATIONS, PURCHASE ORDERS, ORDER CONFIRMATIONS, INVOICES, AND FREIGHT BILLS.

CUSTOMERS AND SUPPLIERS COMMUNICATE THROUGH A MACHINE-READABLE STANDARD FORMAT THAT IS ELECTRONICALLY TRANSMITTED RATHER THAN THROUGH PAPER FORMS.

OBJECTIVE

TO SHARE INFORMATION PROFITABLY AMONG TRADING PARTNERS.

TO REDUCE OR ELIMINATE DATA ENTRY KEYING AND REKEYING.

TO REDUCE THE COSTS OF PAPER PRINTING, HANDLING AND STORAGE.

KEY QUESTIONS

WHAT IS EDI? - OR - WHAT CAN WE DO WITH EDI?

WHICH BUSINESS FUNCTIONS BENEFIT MOST BY USING AN EDI APPROACH?

WHAT BENEFITS CAN WE EXPECT?

HOW WILL OUR WAY OF DOING BUSINESS CHANGE THROUGH UTILIZATION OF EDI?

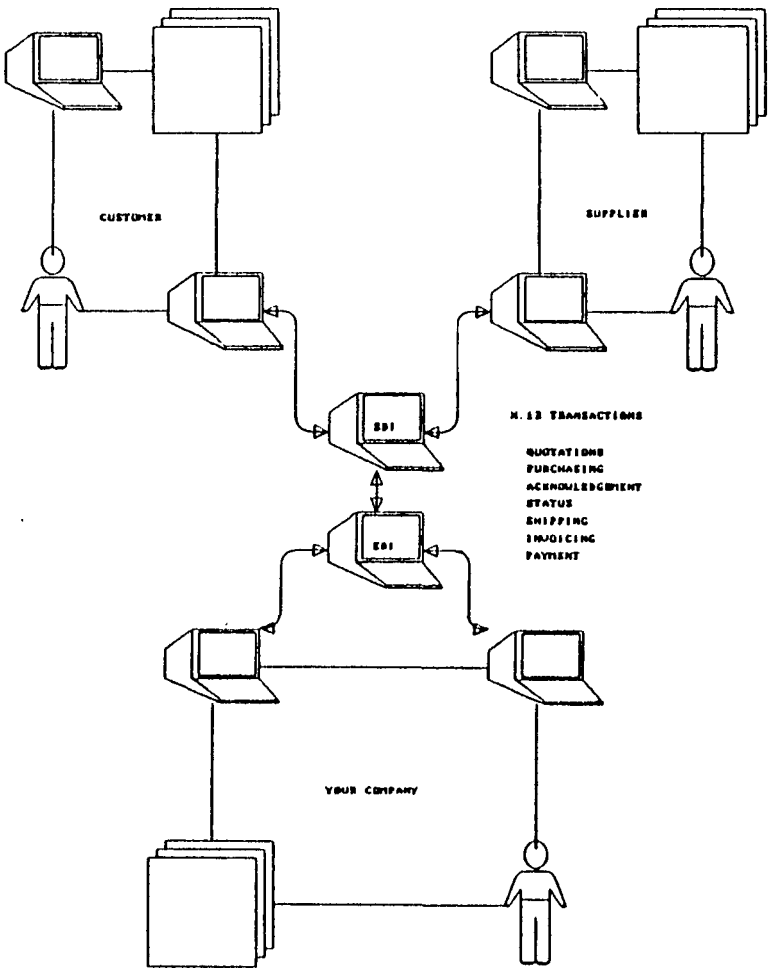
SHOULD WE INVEST IN EDI NOW - OR WAIT?

HOW DO WE GO ABOUT IMPLEMENTING EDI?

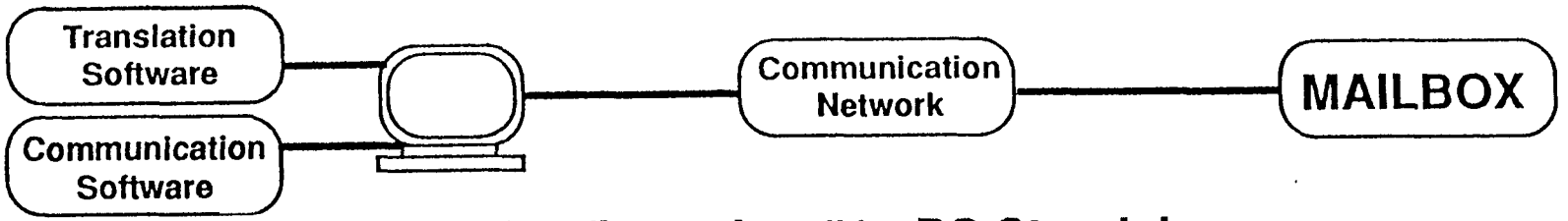
THE EDI OBSTACLES

Communications:	• Time Zones and Windows • Communication Protocols • Hardware Types
Data:	• User Data vs. Standards • Cross Industry Standards • Standards Maintenance
Environment:	• Trading Partner Implementation • Translation - Host, Front-End, Network • Applications Interface

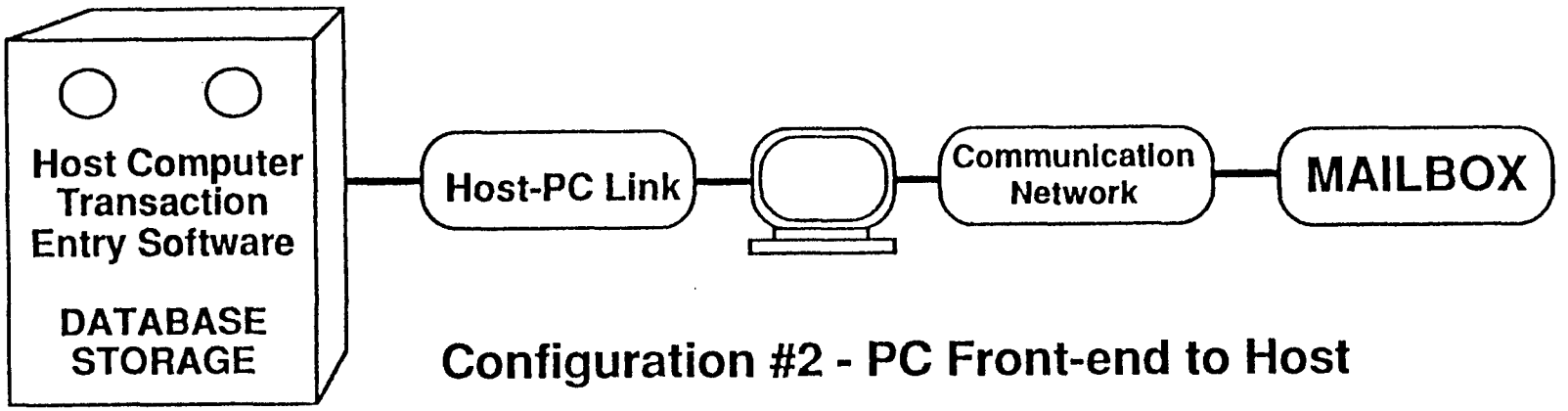
INFORMATION MANAGEMENT BETWEEN TRADING PARTNERS USING EDI



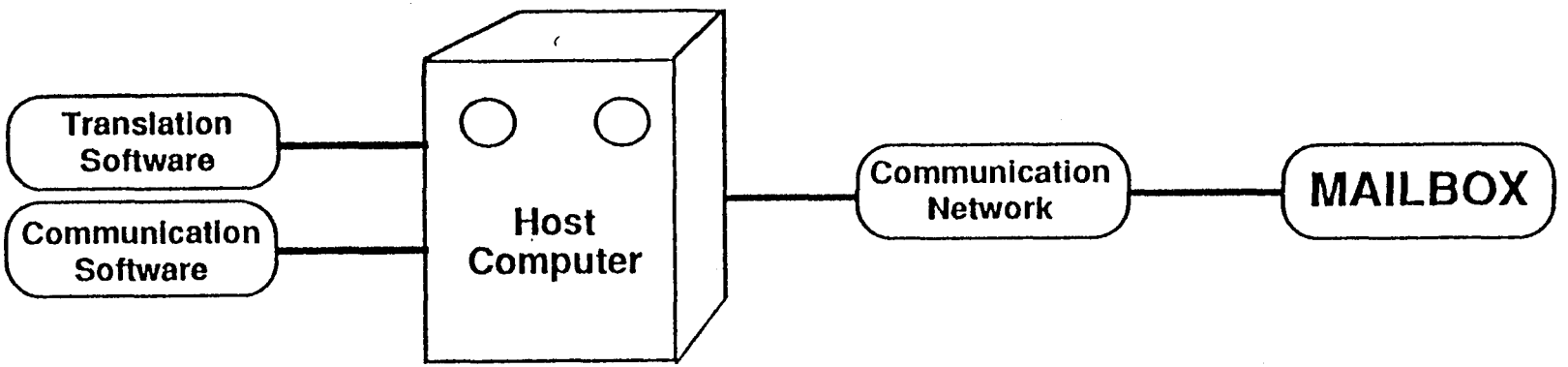
EDI System Configurations



Configuration #1 - PC Standalone



Configuration #2 - PC Front-end to Host



Configuration #3 - Host-based System

S8905085.1

EDI PROCESSING ACTIVITIES - INCOMING DOCUMENTS

YOUR CUSTOMER (CARRIER/SUPPLIER)

- GENERATES DOCUMENTS IN ANSI X.12 FORMAT - "TRANSACTION SET".
- TRANSMITS TO THIRD PARTY NETWORK SERVICES PROVIDER.

THIRD PARTY

- OPENS MAILBOX AND SENDS ACKNOWLEDGMENTS.
- RETAINS OR RETRANSMITS DOCUMENTS TO YOUR COMPANY.

DOE/CONTRACTOR

- ESTABLISH COMMUNICATIONS WITH THIRD PARTY AND RECEIVES DATA.
- INTERPRETS FROM ANSI X.12 STANDARD FORMAT INTO YOUR COMPANY'S APPLICATION FORMAT AND ESTABLISHES AN AUDIT TRIAL.
- USES DATA IN SPECIFIC APPLICATIONS OR PRINTS DOCUMENTS.

EDI PROCESSING ACTIVITIES - OUTGOING DOCUMENTS

DOE/CONTRACTOR

- CREATES DOCUMENTS MANUALLY OR AUTOMATICALLY.
- GENERATES TRANSACTION SETS PER ANSI X.12 STANDARD FROM APPLICATION GENERATED OR KEY ENTERED DOCUMENTS.
- ESTABLISHES COMMUNICATIONS AND TRANSMITS DATA TO THIRD PARTY NETWORK SERVICES PROVIDER.

THIRD PARTY

- OPENS MAILBOX AND SENDS ACKNOWLEDGMENTS.
- RETAINS OR RETRANSMITS DOCUMENT.

YOUR SUPPLIER (CARRIER/VENDOR)

- ESTABLISH COMMUNICATIONS WITH THIRD PARTY AND RECEIVES DATA.
- INTERPRETS FROM ANSI X.12 STANDARD FORMAT INTO HIS COMPANY'S APPLICATION FORMAT AND ESTABLISHES AN AUDIT TRAIL.
- USES DATA IN SPECIFIC APPLICATIONS OR PRINTS DOCUMENTS.

BUSINESS FUNCTIONS WHICH BENEFIT USING EDI

SALES - ORDER ENTRY
- QUOTATIONS
- ACKNOWLEDGEMENTS

MATERIALS PROCUREMENT AND HANDLING
- PURCHASE ORDER PLACEMENT
- RECEIPT/BACKORDER ACKNOWLEDGEMENT
- INVENTORY CONTROL (BAR CODING)
- WAREHOUSING LOCATION REPORTING

TRAFFIC - SHIPPING - RECEIVING - DISTRIBUTION
- FREIGHT BILL AUDITING
- BILLS OF LADING PREPARATION
- STATUS OF SHIPMENTS
- SHIPMENT ACKNOWLEDGEMENT

PAYMENT - COLLECTION
- INVOICES
- PAYMENTS

BENEFITS OF EDI

IMPROVES PRODUCTIVITY

SPEEDS OVERALL PRODUCT CYCLE TIME.

REDUCES ROUTINE PAPERWORK HANDLING COSTS.

INCREASES TIMELINESS OF INFORMATION.

INCREASES TIMELINESS OF MATERIALS - LESS WAIT TIME.

SMOOTHS WORK FLOW - EVENS OUT PEAKS AND VALLEYS.

IMPROVES CUSTOMER SERVICE

PROCESS ORDERS FASTER - NO MANUAL INTERVENTION.

MORE ACCURATE ORDERS - NO REDUNDANT DATA ENTRY.

RAISES SERVICE LEVELS - BETTER INVENTORY MANAGEMENT.

BENEFITS OF EDI

REDUCES DATA ENTRY COSTS

ELIMINATES MANUAL RE-ENTRY OF DATA - INCREASES ACCURACY.

BETTER INVENTORY MANAGEMENT

MORE ACCURATE SALES ORDER FORECASTING.

REDUCED PURCHASE ORDER LEAD TIMES.

REDUCES REQUIRED SAFETY STOCKS - SUPPORTS JIT METHODS.

IMPROVES SUPPLIER RELATIONSHIPS.

IMPROVE CASH FLOW/WORKING CAPITAL

MORE TIMELY INVOICE PROCESSING.

ACCELERATES THE SALES CYCLE.

REDUCES REQUIRED INVENTORY.

FOOD FOR THOUGHT

70% OF A GIVEN COMPUTER'S INPUT IS ANOTHER COMPUTER'S OUTPUT. 25% OF A GIVEN TRANSACTION'S COST IS ASSOCIATED WITH DATA ENTRY AND DATA REENTRY.

FROM GE INFORMATION SYSTEMS COMPANY SALES LITERATURE

THE AVERAGE COST TO PROCESS A PURCHASE ORDER IS $49.00. USING EDI, THE AVERAGE COST TO PROCESS A PURCHASE ORDER IS REDUCED TO $4.70.

FROM "EDI TRENDS", COMPUTERWORLD, AUGUST 29, 1988, QUOTED BY VICTOR WHEATON, INPUT, INC.

FOOD FOR THOUGHT

MANY FORTUNE 1000 COMPANIES HAVE MADE EDI A CORPORATE OBJECTIVE. ROUGHLY HALF OF THE FORTUNE 1000 CURRENTLY USE EDI OR PLAN TO USE EDI WITHIN THE NEXT YEAR (1989) AND 81% OF THOSE COMPANIES REQUEST OR REQUIRE THEIR SUPPLIERS TO USE EDI. AS A RESULT, EDI IS EXPECTED TO GROW RAPIDLY OVER THE NEXT 3 YEARS.

FROM "CAN YOU AFFORD TO IGNORE EDI?", PATRICIA KEEFE, COMPUTERWORLD, JANUARY 6, 1988, FORRESTER RESEARCH, INC.

"DOING BUSINESS WITHOUT EDI WILL SOON BE LIKE DOING BUSINESS WITHOUT A TELEPHONE."

EDWARD LUCENTE, IBM INFORMATION SYSTEMS GROUP, KEYNOTE SPEAKER AT TRANSPORTATION DATA COORDINATING COMMITTEE (TDCC) ELECTRONIC DATA INTERCHANGE ASSOCIATION (EDIA) 1987 EDI CONFERENCE.

FOOD FOR THOUGHT

"THE KEYS TO AN EDI PLAN ARE THAT IT MUST BE DRIVEN BY BUSINESS REQUIREMENTS, RATHER THAN TECHNICAL SCHEMES, AND THAT IT MUST BE UNIVERSALLY UNDERSTOOD AND ADOPTED BY ALL PARTICIPATING PARTIES."

FROM "CREATING STRATEGIC INFORMATION PARTNERSHIPS THROUGH EDI", TEMPLE, BARKER & SLOANE, INC.

"THIS IS A BUSINESS ISSUE, NOT A TECHNICAL ISSUE....YOU ARE AT A SEVERE COMPETITIVE DISADVANTAGE IF YOU ARE NOT ALREADY DOING EDI... MORE THAN 5000 DOMESTIC COMPANIES ARE CURRENT EDI USERS. "

JACK SHAW, EDI STRATEGIES, KEYNOTE SPEAKER AT THE DATA INTERCHANGE STANDARDS ASSOCIATION 1988 ANNUAL MEETING.

The Real Challenge in EDI:

Planning and implementing a successful EDI system

Stages in Planning and Implementing a Successful EDI System

- Business Planning
  - Technical Planning
    - Trading Partner Selection
      - Internal Systems Integration
        - Software Acquisition/Development
          - EDI System Pilot
            - EDI System Expansion

WHERE IS EDI HEADING?

STANDARD FORMATS VERSUS PROPRIETARY FORMATS.

REDUCTION IN THE NUMBER OF STANDARDS.

INCREASING USE OF THIRD PARTY NETWORK SERVICES.
- MANY OPTIONS AVAILABLE TO FIT NEEDS.
- BANKS ARE BEGINNING TO OFFER THIRD PARTY NETWORK SERVICES.

INCREASED USE OF MICROCOMPUTERS.
- PERFORMING TRANSLATION TO/FROM STANDARD TRANSACTION SETS.
- INTERFACING WITH HOST COMPUTER NETWORKS.
- PROVIDING STANDALONE SYSTEMS.

SOME SOFTWARE VENDORS NOW INCLUDE EDI WITH THEIR SOFTWARE PACKAGES.

APPENDIX C

"TENTATIVE FINDINGS AND RECOMMENDATIONS: AUDIT OF CARRIER INVOICE VERIFICATION", R. MCKIM

United States Government **Department of Energy**

memorandum

DATE May 31, 1989

REPLY TO ATTN OF IG-34

SUBJECT Tentative Findings and Recommendations: Audit of Carrier Invoice Verification

TO Deputy Assistant Secretary for Nuclear Materials
Deputy Assistant Secretary for Procurement and Assistance Management

Attached is a copy of our finding and recommendations on the subject audit for your comment in accordance with DOE Order 2320.2.

We plan to issue an official draft report on June 28, 1989, therefore we will need your comments by June 21, 1989. In your response we request that you focus on the accuracy of the facts as presented and the reasonableness of the conclusions. Please include a statement of concurrence or nonconcurrence with each recommendation and indicate any corrective actions taken or contemplated.

Since the finding is subject to change and, therefore, does not represent the final position of the Office of Inspector General, you are requested to provide special handling for the findings to avoid premature disclosure outside the Department.

Your assistance and cooperation will be greatly appreciated.

Rod Eckim
Audit Director
Capital Regional Office
Office of Inspector General

Attachment

cc: Director, Office of Executive Operations
Director, Transportation Management, Office of Defense Waste and Transportation Management

TENTATIVE FINDING(S)

MAY 3 1 1989

AUDIT OF CARRIER INVOICE VERIFICATION

Introduction and Purpose

We are auditing the Department of Energy's (DOE) transportation management for material shipped by commercial carriers. Our purpose is to determine if carrier selection and invoice verification by major DOE shippers resulted in economical use of commercial carriers commensurate with the level of service required. During Fiscal Year (FY) 1988 DOE made about 250,000 commercial air and motor shipments at a cost of about $25 million.

1. Carrier Selection and Invoice Verification

Finding

Federal regulations and DOE policy provide for commercial freight shipments to be routed using those carriers that can provide the required service at the lowest cost. They also require that carrier invoices be verified prior to payment. DOE (CONTRACTOR/) shippers, however, were not consistently using the lowest cost carriers or verifying invoices before payment. Based on our review of sample shipping transactions, costs on 38 percent of the shipments could have been reduced if lower cost shipping modes or carriers had been selected. Further, 19 percent of the invoices contained overcharges that were not detected. More costly shipments and excessive invoice payments occurred because DOE did not contractually require its shipping activities to use low-cost carriers and had not yet fully developed and established automated transportation management programs for

TENTATIVE FINDING(S)

processing shipping transactions and invoice payments. Consistently using low-cost carriers and verifying carrier invoice charges prior to payment would save DOE an estimated $3.2 million annually.

Details of Finding

Background

DOE's operating contractors have been charged with day-to-day responsibility for using the lowest cost carriers commensurate with the level of service required. They are also responsible for verification of carrier invoices before payment. DOE Headquarters has the overall transportation management responsibility of setting policy, including that dealing with the use of low-cost carriers and properly verifying invoices. DOE field offices have responsibility for the actual contracting for transportation services with operating contractors and for designating a transportation officer to furnish support and guidance for carrier selection. Both the Headquarters and field offices have responsibility for negotiating with carriers for reduced rates, providing the names of carriers offering reduced rates to the operating contractors, and monitoring performance.

Scope and Methodology of Review

We reviewed commercial carrier shipping transactions processed by 18 DOE activities under the jurisdiction of four of DOE's Operations Offices -- Albuquerque, Oak Ridge, Richland and Savannah River. Together the activities reviewed incurred

TENTATIVE FINDING(S)

commercial air and motor shipment costs of $15.7 million in FY 1988, which accounts for about 60 percent of the Departmental total.

We selected the transactions reviewed from a central transportation database maintained for DOE shipping activities. A random sample was taken of air and motor shipments processed during the period October 1, 1987 through July 19, 1988, and 397 transactions were selected for audit. Each sample transaction was reviewed to determine whether the mode and carrier selected provided the required level of service at the lowest delivered cost, and that the carrier invoice was verified and corrected as necessary prior to payment.

Requirements for Efficient Transportation Management

Routing Shipments

Several regulations either require or support the use of cost effective shipping practices. The Department's Property Management Regulation (41 CFR 109) requires that shipments be routed using carriers that can provide the required service at the lowest cost. This requirement is carried on through to operating contracts by the Federal Acquisition Regulation (FAR Section 47.104-3) and DOE's Acquisition Regulation (DEAR Section 947.104-3). These regulations state that contracting officers shall include a statement in contracts that requires the contractor to use carriers which offer acceptable service at reduced rates. Common carriers can offer Government Agencies reductions from published rate tariffs under the provisions of 49 USC 10721. The FAR Section also requires contracting officers to

TENTATIVE FINDING(S)

ensure that contractors receive the name and location of the transportation officer designated to furnish support and guidance on carrier selection. DOE Order 1540.1, Materials Transportation and Traffic Management, sets forth procedures for negotiating with carriers to obtain cost favorable rates.

Verifying Carrier Invoices

DOE's Accounting Practices and Procedures Handbook (Ch. VIII, Sect. 5) states that for carrier invoices, operating contractors will verify additions, extensions and rates; determine that charges are for DOE shipments on their contract; and correct any invoice errors before payment.

Monitoring Contractor Performance

The Department's Acquisition Regulation (Section 942) states it is Departmental policy to monitor operating contractor performance to assure compliance with contract terms and conditions.

Automating Transportation Management Systems

The Interagency Transportation Task Force, in a 1988 report required by Public Law 99-627, evaluated various government and industry techniques for processing shipping transactions and concluded that the most effective and efficient method of routing shipments and verifying carrier invoices was through the use of automated systems.

TENTATIVE FINDING(S)

Carrier Selection and Invoice Verification

DOE (contractor) shippers under the jurisdiction of the four Operations offices covered in the audit were not consistently selecting low-cost air and motor carriers and verifying invoices before payment.

Carrier Selection

In 246 of the 397 sample transactions (62 percent) DOE shippers selected the lowest cost carrier for the required service. Although 79 of those shipments used higher cost air service, the need for this service was substantiated in the supporting documentation by higher service requirements such as urgency or security.

In 151 of the transactions (38 percent), however, the lowest cost carrier or mode of shipment was not chosen. In 110 cases the supporting documentation indicated that a lower cost carrier would have met the shipper's need. For example, a shipment sent "overnight air" between California and New Mexico had a required delivery date 6 weeks later. Even among those cases where air service was called for, there were 30 instances in the sample where the lowest cost air carrier was not used. In another 41 cases, there was either no supporting documentation (27 cases) or the documentation did not show a need for the higher cost carrier (14 cases). The average extra cost incurred from use of the higher cost carriers was $174. Although all of the sites visited had policies to discourage the unnecessary use of higher cost carriers, the sample results showed that these policies were not consistently followed.

TENTATIVE FINDING(S)

Invoice Verification

Nineteen percent of the 397 sampled transactions, processed by DOE activities under the four Operations Offices, contained overcharges due to erroneous rates, extra insurance charges, or non-compliance with shipping instructions. This increased the average costs of the related payments by $77. Improper charges fell into the following three categories.

-- Carrier overcharges resulted in overpayments due to incorrect rates on 11 percent of the sample invoices. For example, an invoice that should have been billed at $85 per hundredweight was billed at a rate of $210 per hundredweight, resulting in a $265 overcharge on this shipment.

-- Vendor noncompliance with shipping instructions increased the freight costs in 4 percent of the sample transactions. In one instance, a vendor shipped the material by air when the purchase order instructions specified less costly motor service; this increased shipping costs from $48 to $316.

-- Insurance charges, not authorized by regulations, were not detected in 4 percent of the sample transactions. Two shipments from the same vendor had unnecessary insurance charges that increased the freight costs by 50 percent. In all, our sample showed 16 cases where unauthorized insurance charges were paid.

Reasons for Higher Cost Shipping Transactions

Contract Terms to Use Low-Cost Carriers

Low-cost carriers were not used because DOE did not include in its contracts the requirement that contractors use carriers offering acceptable service at reduced rates, and had not designated transportation offices to furnish related support and guidance. These clauses were not in any of the DOE operating contracts we reviewed. Contracting officers at the field offices were unaware of this requirement, contained in FAR Section 47.104-3 and DEAR Section 947.104-3.

Transportation Management Programs

DOE also had not yet fully developed and implemented transportation management programs for DOE-wide carrier selection, detailed rating and routing guidance, or automated traffic management systems for processing shipping transactions and verifying invoices. (BUT WE ARE WAY OUT FRONT OF ANY OTHER GOVT AGENCY).

DOE-wide Carrier Selection

We found that current and accurate DOE-wide information identifying low-cost carriers was not readily available. DOE field offices had negotiated reduced rates with carriers and identified preferred carriers. However, on a DOE-wide basis, these preferred carriers and reduced rates had not been used by DOE's operating contractors. We also noted that contractors selected carriers based upon local conditions and agreements reached by their parent corporations. While these arrangements led to the use of low-cost carriers in 62 percent of the sample, they did not in 38 percent.

Rating and Routing Guidance

Although all of the activities we reviewed had routing guides, they were not used to assure the selection of low-cost carriers. Also, none of routing guides were used to establish accounting controls over the shipping transactions by calculating what a transaction "should cost" when it was initiated, and then comparing it to actual invoice cost, and determining the reason for significant deviations. In almost all cases, the cost of the shipment was not known, or was not recorded in the accounting system until receipt of the carrier invoice. By then it was too late to affect carrier selection, or obtain appropriate supporting documentation to approve the use of other than low cost transportation. This also contributed to the likelihood of invoice verification errors, as each invoice had to be manually processed and paid expeditiously to satisfy prompt-payment requirements.

Automated Traffic Management Systems

Large nationwide organizations like DOE should not rely on individuals to manually find low-cost carriers and to verify shipping transactions. Sheer volume alone --about 250,000 shipments annually -- dictates that automated procedures and controls be established to assure that low-cost carriers are consistently selected and that carrier invoices are properly verified prior to payment.

TENTATIVE FINDING(S)

Our audit showed that the lack of sufficient automation was a significant cause for high-cost carrier selection and incorrect invoice payments. The level of automation at each location reviewed varied widely. Although one location had an automated routing guide that assigned carriers for purchase order deliveries and most had automated portions of the invoice verification process, none had completely automated their carrier selection or invoice verification systems.

By establishing automated procedures and using "should cost" controls, low cost carriers would be consistently selected, and invoices could be easily screened for errors. These procedures would also aid in the preparation of shipping documentation, input to the DOE transportation database and monitoring performance.

Potential Savings

The estimated annual cost of higher cost carrier selection and incorrect invoice payments is $3.2 million. This is based on the results of the audit of 397 sample shipping transactions processed during Fiscal Year 1988. For each sample item, we reviewed the supporting documentation as well as local and Departmental rating/routing guidance to determine whether a low cost carrier was used for the required level of service. Unless the supporting documentation substantiated the need to use a higher cost carrier, we computed the difference between the amount paid and what the lower cost carrier would have cost. In cases where the sample transaction disclosed that the carrier

invoice was inaccurate, we also computed the amount of the overcharge. In assessing these differences, we used FY 1988 statistics for air and motor shipments recorded in the DOE transportation database.

We estimate that, based on the sample results, the increased costs of not consistently using low cost carriers would be $2.4 million annually and overcharges would be $834,000. The estimated annual overcharges consisted of (1) incorrect carrier invoices - $384,000, (2) vendor noncompliance with the M&O contractor shipping instructions - $297,000; and (3) extra insurance coverage - $153,000.

Management Initiatives

The Transportation Management Division has three transportation management improvement programs planned for FYs 1989, 1990 and 1991. They are called "Freight Rate and Cost Support," "Shipment Mobility/Accountability Collection" and "Electronic Data Interchange." Our recommendations are compatible with management's initiatives and should help to provide emphasis in bringing about timely improvements.

Recommendations

1. We recommend that the Assistant Secretary for Management and Administration make sure field organizations implement FAR Section 47.104-3 and DEAR Section 947.104-3 provisions to:

a. Require their operating contractors to use low-cost carriers, and

b. Designate a transportation officer to furnish support and guidance for carrier selection.

2. We recommend that the Assistant Secretary for Defense Programs:

a. Expedite and complete the DOE-wide carrier selection process.

b. Provide detailed rating and routing guidance to DOE's field organizations for implementation by their operating contractors.

c. Test and select software packages for field organizations to automate their contractors' administrative procedures and controls for the following functions:

- Carrier Selection Rating/Routing Database
- "Should Cost" Calculations
- Preparation of Shipping Documentation
- Pre-payment Invoice Verification
- Input to Department's Transportation Database
- Monitoring of Contractor Performance.

APPENDIX D

"MOTOR FREIGHT CARRIERS OFFERING ELECTRONIC DATA INTERCHANGE (EDI) SERVICES", MANAGEMENT SYSTEMS COUNCIL, AMERICAN TRUCKING ASSOCIATIONS

Management Systems Council

American Trucking Associations
2200 Mill Road, Alexandria, Virginia 22314
(703) 838-1721

MOTOR FREIGHT CARRIERS OFFERING ELECTRONIC DATA INTERCHANGE (EDI) SERVICES

APRIL 17, 1989

The following list of motor freight carriers which offer electronic data interchange (EDI) services is based upon a series of surveys taken by the American Trucking Associations' Management Systems Council (ATA/MSC). The first report issued in February 1988 included 68 carriers, with the most recent including 151. Carriers were asked to identify the Transportation Data Coordinating Committee (TDCC/EDIA) or American National Standards Institute Accredited Standards Committee X12 (ANSI ASC X12) message formats (transaction sets) which they currently support. This list is compiled from unverified information and is offered to all interested parties as an information service. It should not be relied on as a list of all motor carriers who currently utilize EDI. No endorsements by the ATA/MSC are implied of intended. It is planned to update this list annually.

The list is divided into two parts. Part I identifies the specific EDI transaction set and the carriers that support them. Part II provides the carrier's address, telephone number, and contact person.

TRANSACTION SETS INCLUDED

TDCC/EDIA 204 - Shipment Information (Motor)
TDCC/EDIA 205 - Container/Equipment Transfer (Motor)
TDCC/EDIA 206 - Shipment Pick-up Order
TDCC/EDIA 207 - Shipment Information for Export Declaration
TDCC/EDIA 208 - Shipment Information for Import (Motor)
TDCC/EDIA 210 - Freight Details and Invoice (Motor)
TDCC/EDIA 211 - Freight Details and Invoice Summary (Motor)
TDCC/EDIA 213 - Inquiry (Motor)
TDCC/EDIA 214 - Shipment Status Message (Motor)
TDCC/EDIA 216 - Repetitive Pattern Maintenance (Motor)
TDCC/EDIA 602 - Transportation Services Tender
ASC X12 820 - Payment Order/Remittance Advice
ASC X12 856 - Ship Notice/Manifest
TDCC/EDIA 924 - Loss or Damage Claim - Automotive
TDCC/EDIA 926 - Claim Status Report and Tracer Reply
TDCC/EDIA 980 - Functional Group Totals
TDCC/EDIA 990 - Generalized Feedback
TDCC/EDIA 994 - Administrative Message
ASC X12 997 - Functional Acknowledgment

PART I

MOTOR CARRIERS OFFERING EDI SERVICES BY TRANSACTION SET

TRANSACTION SET 204 - SHIPMENT INFORMATION (MOTOR)

Company Name	Contact	Telephone
ABF Freight Systems, Inc.	John Goslin	501-785-8600
ANR Freight Systems, Inc.	Douglas Lien	303-273-7642
Arkansas Freightways	James R. Dodd	501-741-9000
Averitt Express	Judy Godsey	615-526-3306
Bekins Van Lines	Ben Cassell	312-547-2046
Builders Transport, Inc.	Amy Connelly	803-432-1400
Burlington Motor Carriers	John Kent	317-378-0261
Carolina Freight Carriers Corp.	John B. Vick	704-435-6811
Carrier Express, Inc.	Linda Mason	800-843-4400
Central Storage & Transfer Co.	Jeffrey W. Stoner	800-233-5821
Century Motor Freight, Inc.	John J. Roemer	612-786-9650
Chemical Leaman Tank Lines	Chris McLaughlin	215-363-4386
Consolidated Freightways, Inc.	Debbie Benson	503-226-4692
Cooper Motor Lines, Inc.	Jack Roddy	800-845-4276
DSI Transports, Inc.	Thomas E. Pope	713-478-1000
Dunne, Steve, Cartage Company	Al Liskey	312-343-1200
Eck Miller Transportation Corp.	Joseph Ruth	812-649-5001
Enterprise Transportation Co.	Ed Woods	713-880-6688
Gensimore Trucking Inc.	Barry Gensimore	814-355-5461
George Transfer, Inc.	Sherri Miller-Smith	301-329-4000
Groendyke Transport, Inc.	Dan Buckley	405-234-4663
Hi-Way Dispatch, Inc.	Frank A. Bove	317-664-7374
Hyman Freightways, Inc.	Rich Colburn	612-645-0381
Intermodal Transportation Svcs Inc.	David A. Dietrich	513-621-1200
Interstate Distributor Company	Darrel Dunham	206-537-9455
J.B. Hunt Transport, Inc.	Jesse Hopkins	501-659-7108
J.E. Transport	Mark Maloney	519-653-0321
Jones Transfer Company	Thomas M. Hummer	313-241-4120
Leaseway Technology Corporation	Gary Cross	216-765-5601
LoBiondo Bros. Motor Express, Inc.	Robert Griffiths	609-451-2410
M.S. Carriers, Inc.	Kevin Schopf	901-332-2500
Marten Transport LTD	Voin Long	715-926-4216
McClendon Trucking	Hugh F. McClendon	800-633-7710
MCI Transporters	John Kent	317-378-0261
Monroe Trucking Co.	John Kent	317-387-0261
Motor Cargo	Patrick M. Reese	801-292-1111
NW Transport Services, Inc.	Edwin D. Gulley	303-289-3511
Overnite Transportation Co.	Edward N. Bromley	804-231-8364
P.I.E. Nationwide (Trans-Tel Systems)	Jerry Collins	904-731-0580
Red Arrow Freight Lines, Inc.	John B. Vick	704-435-6811
Rediehs Express, Inc.	Linda Mason	800-843-4400
Riss International	Kendall Coulson	816-471-3400
Roadway Express, Inc.	Brian Wellock	216-258-6580

TRANSACTION SET 204 - SHIPMENT INFORMATION (MOTOR) continued

Company Name	Contact	Telephone
Schneider National, Inc.	Peter D. Strand	414-498-7802
Stoops Express, Inc.	John Kent	317-378-0261
Tanksley, Sam, Trucking, Inc.	Duane Statler	314-334-7161
Transcon Lines	Carol L. Kromer	213-726-8555
Viking Freight System, Inc.	Ed Hulton	408-997-6776
Watkins Motor Lines, Inc.	Roy Law	813-687-4545
Wingate/Taylor-Maid Transportation	John Kent	317-378-0261
Yellow Freight System, Inc.	Kent Jamison	913-345-3742

TRANSACTION SET 205 - CONTAINER/EQUIPMENT TRANSFER (MOTOR)

Company Name	Contact	Telephone
Central Storage & Transfer Co.	Jeffrey W. Stoner	800-233-5821
Motor Cargo	Patrick M. Reese	801-292-1111
NW Transport Services, Inc.	Edwin D. Gulley	303-289-3511

TRANSACTION SET 206 - SHIPMENT PICK-UP ORDER (MOTOR)

Company Name	Contact	Telephone
Century Motor Freight, Inc.	John J. Roemer	612-786-9650
DSI Transports, Inc.	Thomas E. Pope	713-478-1000
Gensimore Trucking Inc.	Barry Gensimore	814-355-5461
Hyman Freightways, Inc.	Rich Colburn	612-645-0381
Intermodal Transportation Svcs Inc.	David A. Dietrich	513-621-1200
M.S. Carriers, Inc.	Kevin Schopf	901-332-2500
Marten Transport LTD	Voin Long	715-926-4216

TRANSACTION SET 207 - SHIPMENT INFORMATION FOR EXPORT DECLARATION

Company Name	Contact	Telephone
Central Storage & Transfer Co.	Jeffrey W. Stoner	800-233-5821
Motor Cargo	Patrick M. Reese	801-292-1111
NW Transport Services, Inc.	Edwin D. Gulley	303-289-3511

TRANSACTION SET 208 - SHIPMENT INFORMATION FOR IMPORT (MOTOR)

Company Name	Contact	Telephone
Central Storage & Transfer Co.	Jeffrey W. Stoner	800-233-5821
Motor Cargo	Patrick M. Reese	801-292-1111
NW Transport Services, Inc.	Edwin D. Gulley	303-289-3511

TRANSACTION SET 210 - FREIGHT DETAILS AND INVOICE (MOTOR)

Company Name	Contact	Telephone
AAA Cooper Transportation	Mark A. Smith	205-793-2284
ABF Freight Systems, Inc.	John Goslin	501-785-8600
Advance Transportation Co.	Paul Wichert	414-747-2419
ANR Freight Systems, Inc.	Douglas Lien	303-273-7642
APA Transport Corp.	Mike Sancilio	201-869-6600
Arkansas Freightways	James R. Dodd	501-741-9000
Atlanta Motor Lines, Inc.	Roy Hollis	404-363-0010
Averitt Express	Judy Godsey	615-526-3306
Bekins Van Lines	Ben Cassell	312-547-2046
Benton Brothers Film Express	Curt Johnson	800-346-6055
Bowman Transportation, Inc.	William Mitchell	404-361-0220
Brown Transport Corporation	Tim Bennett	704-373-1933
Brown Transport Truckload	Tim Bennett	704-373-1933
Builders Transport, Inc.	Amy Connelly	803-432-1400
Builders Transportation, Co.	Gene Phillips	800-238-6803
Burlington Motor Carriers	John Kent	317-378-0261
Campo's Express Inc.	William A. Ballantyne	717-836-2108
Carolina Freight Carriers Corp.	John B. Vick	704-435-6811
Carrano Express	Richard Oko	203-239-5361
Carrier Express, Inc.	Linda Mason	800-843-4400
Central Freight Lines	Bob Black	817-772-2120
Central Storage & Transfer Co.	Jeffrey W. Stoner	800-233-5821
Central Transport	Bill Schneider	313-939-7000
Century Motor Freight, Inc.	John J. Roemer	612-786-9650
Charlton Bros. Transportation Co.	Samuel S. Lewis	301-733-2180
Chemical Leaman Tank Lines	Chris McLaughlin	215-363-4386
Churchill Truck Lines, Inc.	Harold L. Atkins	800-522-6499
Commercial Carriers	Larry Birch	813-967-1101
Con-Way Central Express	Debbie Benson	503-226-4692
Con-Way Eastern Express	Debbie Benson	503-226-4692
Con-Way Southern Express	Debbie Benson	503-226-4692
Con-Way Western Express	Debbie Benson	503-226-4692
Consolidated Freightways, Inc.	Debbie Benson	503-226-4692
Contractors Cartage, Inc.	Elmer W. Nesselhauf	314-343-1877
Cooper Motor Lines, Inc.	Jack Roddy	800-845-4276
Crete Carrier Corporation	Tim Zerr	402-475-9521
CRST, Incorporated	David Kuhn	319-390-2696
Dart Transit Company	Rosanne Newville	612-645-0323
Dawg Trucking Company, Inc.	Margaret Brown	404-543-7521
Deaton, Inc.	Tom Headley	205-798-5555
DSI Transports, Inc.	Thomas E. Pope	713-478-1000
Dunne, Steve, Cartage Company	Al Liskey	312-343-1200
Eck Miller Transportation Corp.	Joseph Ruth	812-649-5001
Enterprise Transportation Co.	Ed Woods	713-880-6688
Factory & Steel Transportation	Andy Dodson	615-296-4290
FFE Transportation Services	Jim Rutter	214-565-5565
Fisher Trucking Company	Kevin McDonald	501-751-6605
Floyd & Beasley Transfer Company	Robert Edwards	205-245-4386

TRANSACTION SET 210 - FREIGHT DETAILS AND INVOICE (MOTOR) continued

Company Name	Contact	Telephone
Frederick Transport LTD	Brian Ranger	416-628-4000
General Transfer Co.	Wayne A. Stroup	217-877-5331
Gensimore Trucking Inc.	Barry Gensimore	814-355-5461
George Transfer, Inc.	Sherri Miller-Smith	301-329-4000
GI Trucking Co.	Charlotte Gregory	714-523-1122
Greenwood Motor Lines, Inc.	Judy Burroughs	803-223-1600
Groendyke Transport, Inc.	Dan Buckley	405-234-4663
Gross Common Carrier, Inc.	Arlen Jones	715-423-8400
Hi-Way Dispatch, Inc.	Frank A. Bove	317-664-7374
Highway Carrier Corporation	Gordon Segelke	515-266-5142
Highway Transport Inc.	Steve Fortner	615-584-8631
Hyman Freightways, Inc.	Rich Colburn	612-645-0381
Industrial Freight System	Martin de la Fuente	213-875-0184
Intermodal Transportation Svcs Inc.	David A. Dietrich	513-621-1200
Interstate Distributor Company	Darrel Dunham	206-537-9455
J.B. Hunt Transport, Inc.	Jesse Hopkins	501-659-7108
J.E. Transport	Mark Maloney	519-653-0321
Jones Motor Company, Inc.	Ralph Schlichthernlein	215-948-7900
Jones Transfer Company	Thomas M. Hummer	313-241-4120
Jones Truck Lines	Eldon Swink	501-751-4806
Kane Transfer Co.	James Wormuth	301-625-4900
Kenan Transport Co.	Lonnie Clark	919-967-8221
KeyWay Transport Inc.	Phil Knox	301-327-5800
Kingsway Transports Ltd.	Bob Desjardins	416-745-4833
Leaseway Technology Corporation	Gary Cross	216-765-5601
Leicht Industries, Inc.	Lois A. Graham	414-432-8632
Linden Motor Freight Co., Inc.	Tom Henry	201-862-1400
LoBiondo Bros. Motor Express, Inc.	Robert Griffiths	609-451-2410
M.S. Carriers, Inc.	Kevin Schopf	901-332-2500
Marten Transport LTD	Voin Long	715-926-4216
Material Delivery Service, Inc.	Elmer W. Nesselhauf	314-343-1877
Matlack, Inc.	David L. Riffer	302-479-2730
MBI Data Services (Trimac Tptn Svcs)	C.J. Nesselbeck	403-298-5182
McClendon Trucking	Hugh F. McClendon	800-633-7710
MCI Transporters	John Kent	317-378-0261
MDR Cartage	J. Kevin Watkins	501-972-0626
Merchant Fast Motor Line	Dwayne Donaway	915-677-1881
Miller Transporters, Inc.	Frank Farner	601-922-8331
Mission Petroleum Carrier Inc.	Tom Loop	713-943-8250
Mission Transport	Tom Loop	713-943-8250
Monroe Trucking Co.	John Kent	317-387-0261
Motor Cargo	Patrick M. Reese	801-292-1111
National Freight Inc.	John Lincavace	609-691-7000
Neely Truck Line, Inc.	Phillip Blakey	205-798-1137
No. American Van Lines (Comml Tpt Div)	Kevin Butterbaugh	219-429-3192
Noonan, J.P., Transportation	Audrey Barret	508-588-8026
NW Transport Services, Inc.	Edwin D. Gulley	303-289-3511
O.K. Trucking Company	Robert H. Ash	513-771-8600

TRANSACTION SET 210 - FREIGHT DETAILS AND INVOICE (MOTOR) continued

Company Name	Contact	Telephone
Overnite Transportation Co.	Edward N. Bromley	804-231-8364
P & D Transportation	Donald P. Faulhaber	614-452-5405
P.I.E. Nationwide (Trans-Tel Systems)	Jerry Collins	904-731-0580
Pactran, Inc.	Elmer W. Nesselhauf	314-343-1877
Petroleum Carriers, Inc.	Jerry Polselli	508-839-6000
Pilot Freight Carriers	Ronnie Jewell	919-721-3300
Putnam Transfer & Storage Co.	Donald P. Faulhaber	614-452-5405
Quality Carriers Inc.	Ronald B. Bauman	414-857-2341
R & E Hauling	Jim Burges	301-837-2400
R & L Transfer, Inc.	Lee Johnson	800-543-5589
Red Arrow Freight Lines, Inc.	John B. Vick	704-435-6811
Rediehs Express, Inc.	Linda Mason	800-843-4400
Redwing Carriers Inc.	Silas Nalley	813-621-2046
Reliable Express	Ben Copeland	404-624-4577
Remlo Transportation Inc.	Al Liskey	312-544-5615
Riss International	Kendall Coulson	816-471-3400
Roadway Express, Inc.	Brian Wellock	216-258-6580
Roberts Express Inc.	Joe Greulich	216-773-8942
Rogers Cartage Company	John Weber	312-597-8700
Ruan Transport Corp.	LeRoy Brown	515-245-2525
Ryder Freight System	Lee Horne	801-972-6200
SAIA Motor Freight Line, Inc.	Wayne Herbert	504-868-1030
Schanno Transportation	Bob Bloomer	612-457-9700
Scheduled Truckways, Inc.	Kelly Breslau	800-643-3434
Schilli Corporation	Elmer W. Nesselhauf	314-343-1877
Schneider National, Inc.	Peter D. Strand	414-498-7802
Sibr, Frank J. & Sons, Inc.	Thomas P. McFadden	312-597-4643
Smithway Motor Xpress, Inc.	Mike Scheiber	515-576-7418
Southeastern Freight Lines	Dave Robinson	803-794-7300
St. Johnsbury Trucking Co.	David V. Lavigne	802-748-5051
Stoops Express, Inc.	John Kent	317-378-0261
Super Transport, Inc.	Gary Mitchem	407-241-0100
Tanksley, Sam, Trucking, Inc.	Duane Statler	314-334-7161
Taylor, M.E., Trucking Co.	Mike O'Flaherty	800-237-1956
TNT Canada, Inc.	James Papineau	416-625-7500
TNT Holland Motor Express	David Barry	616-392-3101
TNT Red Star Express	Ardie Dandino	315-253-2721
Trailblazer	Michael George	214-263-7773
Transcon Lines	Carol L. Kromer	213-726-8555
Transus, Inc.	Ralph Joiner	404-627-7331
Truck Transport, Inc.	Elmer W. Nesselhauf	314-343-1877
TSC Express	Jim Baker	404-241-0205
Umthun Trucking Company	James Jorgensen	515-448-4707
Viking Freight System, Inc.	Ed Hulton	408-997-6776
Ward Trucking Co.	Mike Zupon	814-944-0803
Watkins Motor Lines, Inc.	Roy Law	813-687-4545
Werner Enterprises, Inc.	Karen Brigham	402-895-6640
Wingate/Taylor-Maid Transportation	John Kent	317-378-0261
Yellow Freight System, Inc.	Kent Jamison	913-345-3742

TRANSACTION SET 211 - FREIGHT DETAILS AND INVOICE SUMMARY (MOTOR)

Company Name	Contact	Telephone
Campo's Express Inc.	William A. Ballantyne	717-836-2108
Gensimore Trucking Inc.	Barry Gensimore	814-355-5461
Leaseway Technology Corporation	Gary Cross	216-765-5601
M.S. Carriers, Inc.	Kevin Schopf	901-332-2500
Motor Cargo	Patrick M. Reese	801-292-1111
NW Transport Services, Inc.	Edwin D. Gulley	303-289-3511

TRANSACTION SET 213 - INQUIRY (MOTOR)

Company Name	Contact	Telephone
Gensimore Trucking Inc.	Barry Gensimore	814-355-5461
Leaseway Technology Corporation	Gary Cross	216-765-5601
M.S. Carriers, Inc.	Kevin Schopf	901-332-2500
Motor Cargo	Patrick M. Reese	801-292-1111
NW Transport Services, Inc.	Edwin D. Gulley	303-289-3511
United Parcel Service	Robert J. Gillen	201-265-8040

TRANSACTION SET 214 - SHIPMENT STATUS MESSAGE (MOTOR)

Company Name	Contact	Telephone
AAA Cooper Transportation	Mark A. Smith	205-793-2284
ABF Freight Systems, Inc.	John Goslin	501-785-8600
Advance Transportation Co.	Paul Wichert	414-747-2419
ANR Freight Systems, Inc.	Douglas Lien	303-273-7642
APA Transport Corp.	Mike Sancilio	201-869-6600
Arkansas Freightways	James R. Dodd	501-741-9000
Averitt Express	Judy Godsey	615-526-3306
Bekins Van Lines	Ben Cassell	312-547-2046
Benton Brothers Film Express	Curt Johnson	800-346-6055
Bowman Transportation, Inc.	William Mitchell	404-361-0220
Brown Transport Corporation	Tim Bennett	704-373-1933
Brown Transport Truckload	Tim Bennett	704-373-1933
Builders Transport, Inc.	Amy Connelly	803-432-1400
Burlington Motor Carriers	John Kent	317-378-0261
Campo's Express Inc.	William A. Ballantyne	717-836-2108
Carolina Freight Carriers Corp.	John B. Vick	704-435-6811
Carrano Express	Richard Oko	203-239-5361
Central Freight Lines	Bob Black	817-772-2120
Central Storage & Transfer Co.	Jeffrey W. Stoner	800-233-5821
Central Transport	Bill Schneider	313-939-7000
Century Motor Freight, Inc.	John J. Roemer	612-786-9650
Chemical Leaman Tank Lines	Chris McLaughlin	215-363-4386
Commercial Carriers	Larry Birch	813-967-1101
Con-Way Central Express	Debbie Benson	503-226-4692

TRANSACTION SET 214 - SHIPMENT STATUS MESSAGE (MOTOR) continued

Company Name	Contact	Telephone
Con-Way Eastern Express	Debbie Benson	503-226-4692
Con-Way Southern Express	Debbie Benson	503-226-4692
Con-Way Western Express	Debbie Benson	503-226-4692
Consolidated Freightways, Inc.	Debbie Benson	503-226-4692
Contractors Cartage, Inc.	Elmer W. Nesselhauf	314-343-1877
Cooper Motor Lines, Inc.	Jack Roddy	800-845-4276
Crete Carrier Corporation	Tim Zerr	402-475-9521
CRST, Incorporated	David Kuhn	319-390-2696
Dart Transit Company	Rosanne Newville	612-645-0323
Dawg Trucking Company, Inc.	Margaret Brown	404-543-7521
DSI Transports, Inc.	Thomas E. Pope	713-478-1000
Dunne, Steve, Cartage Company	Al Liskey	312-343-1200
Eck Miller Transportation Corp.	Joseph Ruth	812-649-5001
Enterprise Transportation Co.	Ed Woods	713-880-6688
Fisher Trucking Company	Kevin McDonald	501-751-6605
Frederick Transport LTD	Brian Ranger	416-628-4000
Gensimore Trucking Inc.	Barry Gensimore	814-355-5461
George Transfer, Inc.	Sherri Miller-Smith	301-329-4000
GI Trucking Co.	Charlotte Gregory	714-523-1122
Groendyke Transport, Inc.	Dan Buckley	405-234-4663
Gross Common Carrier, Inc.	Arlen Jones	715-423-8400
Hi-Way Dispatch, Inc.	Frank A. Bove	317-664-7374
Highway Transport Inc.	Steve Fortner	615-584-8631
Hyman Freightways, Inc.	Rich Colburn	612-645-0381
Industrial Freight System	Martin de la Fuente	213-875-0184
Intermodal Transportation Svcs Inc.	David A. Dietrich	513-621-1200
Interstate Distributor Company	Darrel Dunham	206-537-9455
J.B. Hunt Transport, Inc.	Jesse Hopkins	501-659-7108
J.E. Transport	Mark Maloney	519-653-0321
Jones Motor Company, Inc.	Ralph Schlichthernlein	215-948-7900
Jones Transfer Company	Thomas M. Hummer	313-241-4120
Jones Truck Lines	Eldon Swink	501-751-4806
Kane Transfer Co.	James Wormuth	301-625-4900
KeyWay Transport Inc.	Phil Knox	301-327-5800
Leaseway Technology Corporation	Gary Cross	216-765-5601
Leicht Industries, Inc.	Lois A. Graham	414-432-8632
LoBiondo Bros. Motor Express, Inc.	Robert Griffiths	609-451-2410
M.S. Carriers, Inc.	Kevin Schopf	901-332-2500
Marten Transport LTD	Voin Long	715-926-4216
Material Delivery Service, Inc.	Elmer W. Nesselhauf	314-343-1877
Matlack, Inc.	David L. Riffer	302-479-2730
MBI Data Services (Trimac Tptn Svcs)	C.J. Nesselbeck	403-298-5182
MCI Transporters	John Kent	317-378-0261
MDR Cartage	J. Kevin Watkins	501-972-0626
Minn-Dak Transport, Inc.	Edmund Rydeen	218-863-5450
Mission Petroleum Carrier Inc.	Tom Loop	713-943-8250
Monroe Trucking Co.	John Kent	317-387-0261
Motor Cargo	Patrick M. Reese	801-292-1111

TRANSACTION SET 214 - SHIPMENT STATUS MESSAGE (MOTOR) continued

Company Name	Contact	Telephone
National Freight Inc.	John Lincavace	609-691-7000
Neely Truck Line, Inc.	Phillip Blakey	205-798-1137
No. American Van Lines (Comml Tpt Div)	Kevin Butterbaugh	219-429-3192
NW Transport Services, Inc.	Edwin D. Gulley	303-289-3511
Overnite Transportation Co.	Edward N. Bromley	804-231-8364
P.I.E. Nationwide (Trans-Tel Systems)	Jerry Collins	904-731-0580
Pactran, Inc.	Elmer W. Nesselhauf	314-343-1877
Pilot Freight Carriers	Ronnie Jewell	919-721-3300
Preston Trucking Co., Inc.	Lawrence J. Callahan	301-673-7151
Red Arrow Freight Lines, Inc.	John B. Vick	704-435-6811
Refrigerated Transport-Texas	Joe Wagnon	214-565-0297
Reliable Express	Ben Copeland	404-624-4577
Remlo Transportation Inc.	Al Liskey	312-544-5615
Riss International	Kendall Coulson	816-471-3400
Roadway Express, Inc.	Brian Wellock	216-258-6580
Ryder Freight System	Lee Horne	801-972-6200
SAIA Motor Freight Line, Inc.	Wayne Herbert	504-868-1030
Schanno Transportation	Bob Bloomer	612-457-9700
Schilli Corporation	Elmer W. Nesselhauf	314-343-1877
Schneider National, Inc.	Peter D. Strand	414-498-7802
Southeastern Freight Lines	Dave Robinson	803-794-7300
St. Johnsbury Trucking Co.	David V. Lavigne	802-748-5051
Stoops Express, Inc.	John Kent	317-378-0261
Tanksley, Sam, Trucking, Inc.	Duane Statler	314-334-7161
TNT Canada, Inc.	James Papineau	416-625-7500
TNT Holland Motor Express	David Barry	616-392-3101
TNT Red Star Express	Ardie Dandino	315-253-2721
Trailblazer	Michael George	214-263-7773
Transcon Lines	Carol L. Krömer	213-726-8555
Transport Service Company	Chet Dickerhoof	312-920-5809
Truck Transport, Inc.	Elmer W. Nesselhauf	314-343-1877
United Parcel Service	Robert J. Gillen	201-265-8040
Viking Freight System, Inc.	Ed Hulton	408-997-6776
Watkins Motor Lines, Inc.	Roy Law	813-687-4545
Werner Enterprises, Inc.	Karen Brigham	402-895-6640
Willis Shaw Express	David Murphy	800-643-3540
Wingate/Taylor-Maid Transportation	John Kent	317-378-0261
Yellow Freight System, Inc.	Kent Jamison	913-345-3742

TRANSACTION SET 216 - REPETITIVE PATTERN MAINTENANCE (MOTOR)

Company Name	Contact	Telephone
Central Storage & Transfer Co.	Jeffrey W. Stoner	800-233-5821
Motor Cargo	Patrick M. Reese	801-292-1111
NW Transport Services, Inc.	Edwin D. Gulley	303-289-3511

TRANSACTION SET 602 - TRANSPORTATION SERVICES TENDER

Company Name	Contact	Telephone
Central Storage & Transfer Co.	Jeffrey W. Stoner	800-233-5821
Motor Cargo	Patrick M. Reese	801-292-1111
Yellow Freight System, Inc.	Kent Jamison	913-345-3742

TRANSACTION SET 820 - PAYMENT ORDER/REMITTANCE ADVICE

Company Name	Contact	Telephone
ABF Freight Systems, Inc.	John Goslin	501-785-8600
Advance Transportation Co.	Paul Wichert	414-747-2419
ANR Freight Systems, Inc.	Douglas Lien	303-273-7642
Bowman Transportation, Inc.	William Mitchell	404-361-0220
Burlington Motor Carriers	John Kent	317-378-0261
Carolina Freight Carriers Corp.	John B. Vick	704-435-6811
Central Transport	Bill Schneider	313-939-7000
Century Motor Freight, Inc.	John J. Roemer	612-786-9650
Con-Way Central Express	Debbie Benson	503-226-4692
Con-Way Eastern Express	Debbie Benson	503-226-4692
Con-Way Southern Express	Debbie Benson	503-226-4692
Con-Way Western Express	Debbie Benson	503-226-4692
Consolidated Freightways, Inc.	Debbie Benson	503-226-4692
Gensimore Trucking Inc.	Barry Gensimore	814-355-5461
Hyman Freightways, Inc.	Rich Colburn	612-645-0381
MCI Transporters	John Kent	317-378-0261
Monroe Trucking Co.	John Kent	317-387-0261
NW Transport Services, Inc.	Edwin D. Gulley	303-289-3511
Overnite Transportation Co.	Edward N. Bromley	804-231-8364
P.I.E. Nationwide (Trans-Tel Systems)	Jerry Collins	904-731-0580
Red Arrow Freight Lines, Inc.	John B. Vick	704-435-6811
Riss International	Kendall Coulson	816-471-3400
Roadway Express, Inc.	Brian Wellock	216-258-6580
Schneider National, Inc.	Peter D. Strand	414-498-7802
St. Johnsbury Trucking Co.	David V. Lavigne	802-748-5051
Stoops Express, Inc.	John Kent	317-378-0261
Watkins Motor Lines, Inc.	Roy Law	813-687-4545
Wingate/Taylor-Maid Transportation	John Kent	317-378-0261
Yellow Freight System, Inc.	Kent Jamison	913-345-3742

TRANSACTION SET 856 - SHIP NOTICE/MANIFEST

Company Name	Contact	Telephone
ABF Freight Systems, Inc.	John Goslin	501-785-8600
ANR Freight Systems, Inc.	Douglas Lien	303-273-7642
Consolidated Freightways, Inc.	Debbie Benson	503-226-4692
P.I.E. Nationwide (Trans-Tel Systems)	Jerry Collins	904-731-0580

TRANSACTION SET 924 - LOSS OR DAMAGE CLAIM (AUTOMOTIVE)

Company Name	Contact	Telephone
Leaseway Technology Corporation	Gary Cross	216-765-5601

TRANSACTION SET 926 - CLAIM STATUS REPORT & TRACER REPLY

Company Name	Contact	Telephone
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TRANSACTION SET 980 - FUNCTIONAL GROUP TOTALS

Company Name	Contact	Telephone
FFE Transportation Services	Jim Rutter	214-565-5565
Leaseway Technology Corporation	Gary Cross	216-765-5601
P.I.E. Nationwide (Trans-Tel Systems)	Jerry Collins	904-731-0580
Roadway Express, Inc.	Brian Wellock	216-258-6580
Schneider National, Inc.	Peter D. Strand	414-498-7802
Viking Freight System, Inc.	Ed Hulton	408-997-6776
Watkins Motor Lines, Inc.	Roy Law	813-687-4545

TRANSACTION SET 990 - GENERALIZED FEEDBACK

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Central Storage & Transfer Co.	Jeffrey W. Stoner	800-233-5821
MCI Transporters	John Kent	317-378-0261
Monroe Trucking Co.	John Kent	317-387-0261
Motor Cargo	Patrick M. Reese	801-292-1111
NW Transport Services, Inc.	Edwin D. Gulley	303-289-3511
Roadway Express, Inc.	Brian Wellock	216-258-6580
Schneider National, Inc.	Peter D. Strand	414-498-7802
Stoops Express, Inc.	John Kent	317-378-0261
Wingate/Taylor-Maid Transportation	John Kent	317-378-0261

TRANSACTION SET 994 - ADMINISTRATIVE MESSAGE

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Hyman Freightways, Inc.	Rich Colburn	612-645-0381
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Viking Freight System, Inc.	Ed Hulton	408-997-6776

TRANSACTION SET 997 - FUNCTIONAL ACKNOWLEDGMENT

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ANR Freight Systems, Inc.	Douglas Lien	303-273-7642
Bowman Transportation, Inc.	William Mitchell	404-361-0220
Central Freight Lines	Bob Black	817-772-2120
Century Motor Freight, Inc.	John J. Roemer	612-786-9650
Commercial Carriers	Larry Birch	813-967-1101
Consolidated Freightways, Inc.	Debbie Benson	503-226-4692
CRST, Incorporated	David Kuhn	319-390-2696
FFE Transportation Services	Jim Rutter	214-565-5565
George Transfer, Inc.	Sherri Miller-Smith	301-329-4000
Highway Carrier Corporation	Gordon Segelke	515-266-5142
Highway Transport Inc.	Steve Fortner	615-584-8631
Hyman Freightways, Inc.	Rich Colburn	612-645-0381
Linden Motor Freight Co., Inc.	Tom Henry	201-862-1400
NW Transport Services, Inc.	Edwin D. Gulley	303-289-3511
Overnite Transportation Co.	Edward N. Bromley	804-231-8364
P.I.E. Nationwide (Trans-Tel Systems)	Jerry Collins	904-731-0580
Petroleum Carriers, Inc.	Jerry Polselli	508-839-6000
Preston Trucking Co., Inc.	Lawrence J. Callahan	301-673-7151
Roadway Express, Inc.	Brian Wellock	216-258-6580
Schanno Transportation	Bob Bloomer	612-457-9700
Scheduled Truckways, Inc.	Kelly Breslau	800-643-3434
Schneider National, Inc.	Peter D. Strand	414-498-7802
TNT Canada, Inc.	James Papineau	416-625-7500
TNT Red Star Express	Ardie Dandino	315-253-2721
Viking Freight System, Inc.	Ed Hulton	408-997-6776
Watkins Motor Lines, Inc.	Roy Law	813-687-4545
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Yellow Freight System, Inc.	Kent Jamison	913-345-3742

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312-920-5809

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TSC Express
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404-241-0205

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Omaha, NE 68137
402-895-6640

Willis Shaw Express
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800-643-3540

Wingate/Taylor-Maid Transportation
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Overland Park, KS 66207
913-345-3742

APPENDIX E

"EDI'S FUTURE: THE TORCH IS IN YOUR HANDS", J. SHAW

EXECUTIVE Briefing

EDI Executive Briefing Report for senior management

Circulate to:

EDI's future: The torch is in your hands

By Jack Shaw

Something wonderful is happening. Companies are understanding their customers and suppliers better, and cooperative efforts are replacing adversary relationships among trading partners.

The changes represent just a sampling of the benefits of electronic data interchange (EDI)—the exchange of routine business transactions in structured formats for processing by application software. Besides improving trading-partner relations, EDI also boosts productivity, staff morale, and profits.

Competitive Necessity

Recognizing the benefits of EDI, several industries have embraced EDI wholeheartedly. In the automotive, chemical, pharmaceutical and railroad industries, EDI is a prerequisite for doing business. Companies that haven't adopted EDI are at a severe competitive disadvantage.

The apparel, textile, retail, electronics and health-care industries are moving in the same direction. If your company is part of these industries and is not trading electronically, you'd better develop your EDI strategy quickly.

The federal government also is becoming a major EDI player. The U.S. Defense and Treasury departments, the General Services Administration, and the U.S. Customs Service have implemented EDI pilot projects. Customs plans to use EDI not only in the United States but also for exchanging data with other nations using the international EDIFACT (EDI for the Administration of Commerce and Transport) standards.

Market Growth. Corporate EDI users will triple their number of electronic trading partners by 1990, according to a study by EDI Strategies, Inc., Marietta, GA; the Chicago office of the accounting firm, Coopers & Lybrand; and the Bank Administration Institute. More than 600 companies discussed EDI activities, needs and plans as part of the study last summer.

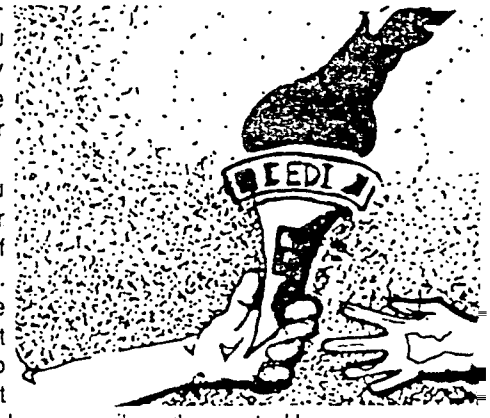
The number of companies using EDI should double annually until 1990, the study shows. EDI use will grow faster than expected during the next five years because of expanding use of personal computers by businesses and the availability of user-friendly software. At least 70 percent of U.S. companies will make significant use of EDI by the end of 1993.

EDI applications now include everything from purchase orders to invoices and payments, according to the study. By next year, you will see widespread use of EDI for corporate payments.

Benefits

Companies participating in the study cited improved relationships with trading partners as the top benefit of EDI. Other benefits were: improvements in working capital (including reductions in inventories and accounts receivables), reductions in error identification and correction expenses, reductions in routine clerical and administrative expenses, and improved employee morale.

Respondents agreed that the quantitative benefits of EDI, such as inventory reductions, provided a significant return on investment. EDI also improves the quality and timeliness of material deliveries and cuts down on data-entry errors.Did you know that 5 percent of business documents have data-entry errors that affect the underlying business transactions? When you reduce data-entry errors, you reduce the static in your business.



With EDI, you have a clearer perception of what's happening. People still make mistakes, but fewer of them, so the ones that occur are identified more easily and corrected less expensively.

The benefits cited as most significant by respondents were the improvements in trading-partner relationships and employee morale. Companies that conduct business electronically discuss with each other how that information is used and learn more about how "the other guy's" business operates. And elimination of boring paperwork makes people more committed to quality.

Purchasing agents, for example, often spend 80 percent of their time doing paperwork and only 20 percent of their time studying the commodities that they purchase and negotiating the best terms for price, quality and delivery. With EDI, purchasing agents can spend 80 percent of their time doing creative procurement work.

Costs

The greatest cost involved with EDI implementation stems from installing and interfacing EDI software, the survey shows. Other costs, in order of significance, include coordination of EDI implementation with trading partners; internal training; and network communication costs.

EDI entry costs, however, have dropped rapidly in the last few years as inexpensive EDI software packages, operating in a wide range of computer environments, have become available. Just five years ago, no complete, packaged EDI management systems were available. The latest issue of the Guide to EDI Products and Services lists 26 packaged EDI management systems, with more expected this year.

But companies can't take full advantage of the depth of information that can be conveyed through EDI because their applications software hasn't been designed with EDI in mind. Most software for applications such as customer service, procurement and accounting is built with 1970s designs. As software companies' customers recognize EDI's value, they'll demand that suppliers design software to receive and process all EDI information available.

Numerous value-added networks now ease EDI communications. The number of such networks has increased to more than a dozen from only two or three as recently as 1985. More than 20 such networks will exist by the end of 1989. Businesses now can implement packaged software, contract with an EDI value-added network, and be up and running with EDI in 21 days.

And with entry costs dropping and benefits coming sooner, the time needed to pay back the investment in EDI is decreasing dramatically. By 1990, the few companies that have not started EDI will recoup their investments less than a year after taking the EDI plunge.

Implementation Considerations

However, rapid implementation isn't the best way to begin EDI: Well-managed companies develop strategic plans for EDI.

Some companies, such as Hewlett-Packard, Texas Instruments, and Westinghouse, are organizing centralized EDI management staffs to develop business strategies for orderly implementation of EDI across divisions and business functions and with various trading partners. Those companies have recognized that the absence of EDI strategies will lead to redundant efforts, increased costs, and reduced benefits.

Most companies, however, have not arrived at that level of EDI understanding. They see and understand only one aspect of EDI and have no EDI strategy. A lack of awareness among trading partners about EDI and its benefits looms as the most significant barrier to further EDI implementation, the study shows. Respondents say top management often doesn't understand EDI's importance.

For EDI to continue its rapid growth, upper management must realize that EDI isn't a technical issue. It's a business issue. EDI has technical aspects, but it's too important to leave to data processing.

Integration

The key word for EDI in the future will be integration. Under the X.400 international message-handling and document-delivery standards, EDI and electronic mail (the exchange of text in unstructured formats for processing by human beings) will be integrated into a single transmission.

Also look for the integration of EDI and computer-integrated manufacturing (CIM). The benefits of CIM, the big brother of just-in-time (JIT) manufacturing, cannot be realized fully without EDI because CIM depends on the timely and accurate exchange of large volumes of data. You'll also see the integration of EDI and electronic funds transfer (EFT).

An International Future. EDI will also play a significant role in international trade, and U.S. companies don't have a monopoly on EDI expertise. The British like to note that, on a per-capita basis, they have more companies using EDI than the United States has. Canada, Western Europe, Japan, and the Pacific Rim nations are only a year or two behind.

The costs of processing paper in international trade, which cost companies more than $140 billion last year, out or $2 trillion in international trade, will lead to a single worldwide EDI network five years from now. It will consist of at least 25 different national and international EDI network service providers exchanging data on a worldwide basis and using the X.400 communications standards.

The introduction of EDI into international trade will make it significantly more profitable. That will accelerate the growth of international trade and will bring nations together, just as EDI is bringing companies together in the domestic marketplace.

Actions to Take

To gain advantages from these rapid changes, you must first make a personal commitment to EDI. Read EDI periodicals and attend EDI conferences. And develop a written EDI strategy for your company.That doesn't mean you have to spend a year developing a strategy before you do anything. Choose the most likely opportunity to benefit from EDI and get started with a low-cost pilot project.

At the same time, and before you start investing significant sums of money in EDI, start developing a well-structured EDI strategy. EDI, however, is more than strategy, standards, and software.

It's more than networks, consultants and publications. EDI is about people working together to make our world work a little better. And, ultimately, it's about you.

The EDI torch is in your hands. The world is watching and depending on what you do. Carry it forth as a shining example for all who follow in your footsteps.

Jack Shaw is publisher of EDI EXECUTIVE and president of EDI Strategies, Inc. He also publishes the Guide to EDI Products and Services, and in 1987 founded EDI Executive Search. As head of EDI Strategies, he has helped numerous large and small corporations, banks, software companies, and networks plan for EDI.

APPENDIX F

A BIBLIOGRAPHY OF DOCUMENTED SAVINGS FROM EDI--GOVERNMENT BANKING TEAM

A BIBLIOGRAPHY OF DOCUMENTED SAVINGS FROM EDI

SEPTEMBER 1988

Government Banking Team
The First National Bank of Chicago

THE PROJECT

The Consulting Services Division of The First National Bank of Chicago (First Chicago) has prepared this report on the documented savings in the private sector from EDI. These savings are both quantitative, actual dollars saved, and qualitative, improved customer service.

OBJECTIVE

The research results in an annotated bibliography of publicly available articles documenting company specific examples of savings from EDI. The bibliography is cross-referenced by industry, company and corporate function. The listing of companies cited is cross-referenced by industry and corporate function.

METHODOLOGY

The research was conducted in two phases. Phase one identified all possible sources of publicly available articles documenting actual corporate savings as a result of implementing EDI. Articles from newspapers, general and trade periodicals and journals were reviewed. The search was limited to the period between July 1985 and the present. Phase two compiled and analyzed the information from phase one.

There are over 1,000 articles on EDI since July 1985. The 100 articles related to corporate specific savings from EDI are included in this Report.

ANALYSIS

The research confirms that the majority of EDI activity is within manufacturing and wholesale industries. The corporate functions generally using EDI are: purchasing, order processing and invoicing. The specific industry segments within manufacturing and wholesale that have greatest EDI utilization are:

Manufacturing:	Automotive and Related
	Consumer Products
	Chemical
	Clothing
	Aerospace/Defense
Wholesale:	Clothing
	Grocery
	Health/Drug

Across all industries the most widely used corporate application of EDI is purchasing.

SAVINGS

The research results show significant savings from EDI implementation. These savings are both quantitative, hard-dollar savings and qualitative improvements. Companies have cited quantitative savings of up to $167MM in inventory, $60MM in purchasing operations costs, $300,000 yearly in clerical costs and $600,000 yearly in invoice processing costs.

Qualitatively, companies have cited improved marketing and customer service from implementing EDI, enhanced production and inventory management, and closer relationships and goodwill/loyalty with suppliers and buyers. Companies are also citing improved competitive positions and advantages with EDI.

Quantitative Savings (partial listing):

COMPANY	SAVINGS OR IMPROVEMENTS
° General Motors	° $200 per car or $1.3 billion per year.
° Haggar Apparel	° 52% sales increase, 14% inventory reduction, 73% increase in inventory turns.
° Service Merchandise	° 75% error reduction, Purchase Order Savings between $12-$14 per PO, $7.5MM yearly savings.
° Super Valu	° 50% reduced billing error, reduce accounts payable personnel by 30 FTE.
° IBM	° $60MM over five years from purchasing application.
° General Electric	° $600,000 year, 2,000 square feet freed, decrease PO cost $50-$75, decreased paper flow by 30,000 pieces.
° Wal-Mart	° $35,000 personnel reduction.
° Bergen Brunswig	° $1MM year. Inventory turns increase from 6 times a year to 9.8 times a year.
° Ralph's Grocery	° $1.6MM year.
° Navistar International	° $167MM in inventory in 18 months, $80,000 year in processing costs, premium payments for rapid shipment of freight reduced by 90%. 70% inventory reduction.
° Burlington Northern	° reduce accounts payable processing costs 50%.
° Hewlett Packard	° 40% reduction in incorrectly filled orders.

COMPANY	SAVINGS OR IMPROVEMENTS
° Seaboard Railroad	° reduce inventory from $80MM to $60MM, $20MM savings.
° LTV Steel	° $360,000 year in clerical cost.
° Conrail	° $10,000 year in audit.
° First Chicago Corp.	° $1.0MM year in purchasing.

Qualitative Savings/Improvements:

° Customer Service

- improved inquiry mechanism
- improved inquiry resolution
- reduced data-entry errors
- improved delivery times
- quick response
- JIT

° Management

- improved sales data
- improved product tracking
- improved logistics and inventory management
- improved production operations
- improved administrative processing
- improved competitive advantages
- better control of cashflow
- more productive use of personnel

CONCLUSIONS

EDI has proved most cost-beneficial to industries and companies where one or more of the following conditions exist:

- distribution intensive industries - grocery, clothing, health/drug and consumer products.
- low margin industries - grocery and clothing.
- industries with tight inventory management practices (for example, JIT operations); and industries with an extensive product portfolio - wholesale and retail trade, especially in grocery and pharmaceutical.
- industries with a leading company or individual willing to adopt a new business strategy:
  - General Motors
  - Navistar International
  - Levi Strauss
  - Bergen Brunswig, McKesson
  - General Foods
  - Super Valu Stores
  - Texas Instruments
  - K Mart, Wal-Mart
  - Burlington Northern, CSX, Conrail

TABLES

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American Motors Corporation
Baxter Healthcare
Bethlehem Steel Corp.
Bergen Brunswig
Burlington Northern Railroad
Caterpillar Incorporated
Charm Corporation
Consolidated Rail
CSX Transportation
Dow Chemical
DuPont EI du Pont
First National Bank of Chicago
Gates Rubber
General Electric Co.
General Foods
General Motors Corporation
Giant Food Stores
Haggar Apparel Company
Hercules Inc.
Hewlett Packard
International Business Machines Corp.
J.C. Penney
K Mart
Kraft International
LTV Steel
Levi Strauss & Company
McDonnell Douglas
McKesson Drug
Mervyn's
Navistar International Corp.
Norfolk Southern Corporation
PPG
Playtex Incorporated
Proctor & Gamble
Railine Corp.
Ralph's Grocery
Rockwell International Corp.
Safeway Stores Incorporated
Seaboard Railroad
Sears Roebuck & Company
Seminole Manufacturing Company
Ship Net
Sun Health Hospital
Super Valu Stores
Texas Instruments
3M Corporation
Trans Freight Rail
Union Carbide
Union Pacific Corporation
United Refrigerated Services Inc.
Wal-Mart Stores
Warren Featherbone Company
Westinghouse Electric Supply Co.
Xerox
Zare

56 Companies were cited in the reviewed articles

INDUSTRY/FUNCTION MATRIX OF RELATED ARTICLES

FUNCTION / INDUSTRY	PURCHASING	ACCOUNTING	ORDER PROCESSING	FREIGHT/WAY BILLS	INVOICE	SHIPMENT	BILL OF LADING	PRODUCTION SCHEDULING	PAYMENT ADVICE	MIS
Manufacturing	X	X	X					X		
Retail	X			X	X					
Auto	X		X						X	
Defense	X		X		X					
Health	X		X							
Rail	X	X		X			X			X
Chemical			X		X	X				
Consumer Products	X		X	X						
Pharmaceutical	X	X	X		X					
Airline				X						
Steel	X									
Clothing/Textile	X		X							
Financial Services	X									
Food Mfg.				X						
Energy				X						

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