# VOLUME ONE

# TRADACOMS MANUAL OF STANDARDS FOR ELECTRONIC DATA INTERCHANGE



**THE ARTICLE NUMBER ASSOCIATION (UK) LTD.**

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The TRADACOMS Manual of Standards for Electronic Data Interchange is published by the Article Number Association (UK) Ltd. It has been developed since 1979 by many people from the member companies of the ANA giving their time and talents. Their contributions are gratefully acknowledged.

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# PREFACE

"No business is an island"

Once upon a time I observed that the major problem in electronic communications began with the second computer in the world. It incorporated all the good ideas of the first, and also some valuable enhancements, as a result of which it became "incompatible" with the first. Ever since, many people have tried to find standards, be they "open" or "proprietary", by which computers could communicate quickly and accurately with each other. EDI standards are designed to allow all computers, irrespective of their pedigree, to communicate well with each other. They do not have to be built to the same computing standards to use EDI standards to talk cogently to each other.

I could equally well say that the real problem began with the second business in the world. Being competitive by nature, its owner organised it differently from the first so that he could sell and make things more efficiently. Hence, his procedures did not easily interface with those of the first business. Tablets of stone were difficult to process then. They are even more awkward to cope with today, in a world where speed and certainty are essential for commercial survival.

With countless businesses each wishing to communicate without doubt or delay with their trading partners across the many supply chains, but each starting with different ways of doing business, computerised with a variety of incompatible hardware and software, EDI is a fundamental answer to the business prayer of how to make straight an electronic highway through the paper mountains.

The ANA EDI message standards are based on the best of business practice to promote immediate actioning of trading communications by supply chain partners. They help UK business to trade within and beyond our islands, without the danger of being insular and hence isolated.

TOM McGUFFOG
Chairman, ANA EDI Management Committee

**TRADACOMS**

**MANUAL OF STANDARDS FOR ELECTRONIC DATA INTERCHANGE**

**CONTENTS**

**VOLUME 1**

The other volumes in the set are:

Volume Two - File Formats

Volume Three - File Formats

Syntax and Data Dictionary

## HOW TO USE THIS MANUAL

This manual gives the background to the development of the TRADACOMS standards for Electronic Data Interchange.

The manual is laid out in sections which give an increasing level of detail. The Introduction provides an executive summary of EDI and the ANA's role in the development of the TRADACOMS standards. This covers the achievable business benefits and relates the use of EDI to management of the supply chain.

Section A gives an introduction to the many factors which affect the standards, including the EAN numbering system, legal requirements and user requirements. Most of these areas are then covered separately in more detail, either in this volume or in subsequent volumes which make up the set.

Section B gives a basic grounding in the EAN International numbering systems for products, services and locations. User experience has shown that the use of a standard numbering system to identify the goods traded helps to avoid ambiguity and duplication of effort when establishing an EDI relationship. The use of codes minimises transmission costs and also supports the automatic processing of data sent electronically. The growth of EDI has increased the use of the location numbering system which provides a recognised, secure way of identifying ordering, delivery and invoicing locations.

Section C contains the requirements laid down by H M Customs and Excise for electronic trading. It explains how these specifications can be met by using the TRADACOMS invoice and credit note files. There is also a section on the new VAT regulations which came into force on 1 January 1993.

Section D provides guidance on system design. This is aimed at the person responsible for the technical side of EDI implementation. It covers the routines for constructing and translating the messages.

Section E gives the specifications for exchange of data on magnetic tape.

Section F lists the trade sectors where specialised file formats have been created.

Volumes 2 and 3 of the set contain the TRADACOMS file formats. These cover the common business transactions as well as master files, reports and planning files.

The syntax rules upon which the TRADACOMS files are based can be found in the Syntax and Data Dictionary reference manual which completes the set. This also contains the current data elements and segments comprising the messages and the Standard Code Values Lists.

## CONTENTS

# 1. ELECTRONIC DATA INTERCHANGE

The TRADACOMS standards for Electronic Data Interchange (EDI) are intended to help UK businesses improve their trade communications. Effective communications are increasingly vital in business: to understand the needs of customers; to reduce errors and therefore costs; to build up trading partnerships; and to ensure future success. This manual provides a guide to an increasingly important area of communications and shows how it can be used most effectively to improve your business.

## 1.1 What is EDI?

EDI is the exchange of **structured** data in electronic form direct from one computer system to another. EDI relies on the use of standards for the structure and interpretation of the data. Use of a common standard, such as TRADACOMS, ensures that all parties are able to communicate successfully, irrespective of their internal computer systems. It is critical to the success of EDI that all trading partners use the same standards for structuring their data. This minimises the extent to which their internal systems need to be extended to format data to be sent and received electronically.

## 1.2 Where do the TRADACOMS standards fit in to EDI ?

There are three basic levels involved in transferring data from one computer system to another. These are: the physical connection: the telecommunication protocol; and the application data level. The TRADACOMS standards provide a means of structuring data for communication between one system and another at the application level.

The physical connection includes the cabling and modem links to whatever telecommunications service is being used. The telecommunications protocol provides the rules and techniques for transferring the data between computer systems in an uncorrupted form, eg. X.25. These two areas are outside the scope of this manual. Similarly, this manual does not provide specific guidance on the type of software or hardware to be used. TRADACOMS standard messages are fully independent of the methods used to transfer the data.

## 1.3 When and why should TRADACOMS be used?

TRADACOMS messages have been in existence for over ten years and are widely used in the UK. Changing users needs are reported to the ANA which responds to requests by maintaining the standards to reflect common business requirements. Thus the number of messages available has grown to the current figure of twenty five. The ANA is committed to supporting these standards as long as there is user demand.

The TRADACOMS messages have been designed to provide a uniform way of communicating the core business information used in trade.

The messages include: master files, such as product and price information; transactions, such as orders andinvoices; reports, such as stock availability; financial messages, such as payment instructions; and planning data, such as forecasts. Every attempt has been made to incorporate the majority of data which is common across all trade sectors.

The basic feature of any EDI standard is that it must be common to both trading partners. TRADACOMS is not the only message standard in use although it remains the most widely used solution for domestic trade. Most notably the EDIFACT (EDI for Administration, Commerce and Transport) standard is growing in popularity particularly for international trade. The choice of message standard should be dictated by each partner's commercial requirements. The ANA also supports the EDIFACT standard through the publication of two EDIFACT subsets: UK EDIFACT and for international trade EANCOM.

## 2. BUSINESS BENEFITS OF EDI

There are significant business benefits to be gained from the introduction of EDI. These benefits are there for both the customer and supplier in any trading relationship. There are short term cost benefits, but more importantly, strategic long term benefits to be exploited in an increasingly competitive environment.

### 2.1 Short term benefits

The primary benefit of using EDI is the **increased accuracy of data** communicated, as there are **fewer keying errors** and interpretation of the data received is easier as it is sent in a standard format.

EDI **reduces the supply chain cycle time** as telecommunications are fast and efficient, in some instances shortening the acceptance and preparation of an order from weeks to hours. As data which enters the supplier's system is more reliable, there is **greater certainty** built into the supply chain. **Costs are reduced** in the administration of order processing invoicing, sometimes by as much as 20%, with less time spent on the telephone answering queries. **Paperwork is also reduced**, so staff are freed to provide more value added activities. The automatic processing and routing of regular transactions is **faster, easier and cheaper.**

By providing more accurate data, faster, the lead times in the supply of goods and services can be dramatically reduced, allowing all partners to **remove stock and therefore cost from the supply chain**.

### 2.2 Long term benefits

Commitment to EDI in trade is becoming increasingly necessary as a strategic development in business practice. The improved speed and accuracy of information exchanged leads to better responsiveness to market demands. This helps to ensure continued success in that marketplace.

EDI is tied in with Just in Time or Quick Response strategies as a vital tool in changing business practices. The use of EDI also stimulates a review of existing procedures, as standards such as TRADACOMS encourage best business practice. Only essential data needs to be sent in an EDI message, so traditional paper systems may become obsolete or more streamlined. EDI provides the opportunity to evolve new procedures, such as EPOS generated orders and demand forecasting, which are being adopted by some far-sighted companies.

A major aspect of setting up EDI communications with a business partner is the increasing sense of partnership. It is a declaration of commitment to that relationship and shows a willingness to provide service to customers. Because of this, more data is being shared within the supply chain, such as sales and forecast information. This allows suppliers to plan more accurately and increase their responsiveness to customers, as well as reducing their costs and inventory.

EDI is being used by management as a facility for maintaining a strong position

in existing markets, to improve business efficiency and for growth into new nternational markets.

## 2.3 Costs of EDI

Any review of the benefits of EDI must be set against the costs involved. It is not necessary for any business to reinvent the wheel to implement EDI as there are now many affordable software solutions available, which provide the requisite translation capabilities. These are able to run on various types of hardware, from a PC upwards.

The major benefits of EDI are only achievable by the full integration of this data into a company's internal systems. It may be necessary to change or adapt these systems to provide an uninterrupted flow of information from the trading partner to the application which processes the data. It is recognised that the receiver of EDI messages needs to do more work than the sender, but the potential benefits are greater.

One aspect of these changes will be the need to introduce common terminology between trading partners. The use of the unambiguous and well-established EAN numbering system for identifying products, services and locations can help businesses reduce the amount of work involved here.

Strategic changes in business practices as a prerequisite for EDI will require vision supported by careful planning. It is up to each business to identify those changes which must be made to benefit their particular business and satisfy their commercial requirements.

## 3. GOOD BUSINESS PRACTICE

Communications relating to the what, when and where of a customer's needs are the lifeblood of successful business. Technology has had just a dramatic an impact on the nature of these business communications as it has on the nature of the goods and their method of manufacture.

This section examines the critical role of sound effective business practice as a pre-requisite for the design and implementation of standards for electronic data interchange (EDI).

It is the firm belief of the committee responsible for the format of the TRADACOMS messages published in this manual that a fresh, simplified approach to the principles of business communication is essential.

EDI messages can be designed to accommodate any degree of complexity, but at the price of clarity and ease of use. Great efforts have been made to keep these standards simple and consistent with good business practice. This has been achieved by eliminating data that is not necessary to a particular data transmission, or which would best be exchanged via a separate EDI message.

### 3.1 Data Flow in the Supply Chain

Associated with the physical flow of materials and goods between supplier, manufacturer, distributor, and customer is a supporting flow of data in both directions. This usually takes the form of instructions to do things, eg. supply goods, provide transport, pay money, and confirmation that action has been or is being taken eg. order received, goods delivered.

Errors in these physical or informative exchange processes are costly and counter-productive.

Traditionally, suppliers have controlled the movement of goods and associated data using documentary records. By compartmentalising the key items of data eg. product description and quantity, such documents impose a degree of discipline and structure into the order-based transaction.

There is still scope for error, particularly since human intervention is involved ie. writing out the order, translating it into action at a later stage and generating subsequent documentation such as delivery notes and invoices.

The advent and computerisation of order processing and matching with deliveries and invoices improved matters to a degree, but there still remains the problem of ensuring that the raw data supplied to the computer is accurate, particularly since most of it must be key entered.

Even with the latest techniques of electronic data interchange, where data transactions are assembled in electronic format, then moved from point of creation to point of receipt and actioned without human intervention, we have not achieved a total panacea, if all we are doing is using technology to expedite the transfer of inaccurate or ambiguous messages. Indeed, there is a real danger that in the rush to implement new,

faster means of data communication, the underlying principles of good business practice may be overlooked.

The key component of a business data transaction is the quality of meaning, not the medium for exchange. In business communications, as with verbal or written dialogue, we can be clear or vague in our instructions.

Vague instructions will lead to unsatisfactory results.

A standard approach is essential if the needs of one party are to be understood and acted upon faultlessly by another. The objectives of any business transaction should be to convey the minimum amount of data which will result in correct, timely action with a minimum risk of error.

These objectives are assisted by adherence to certain standard procedures such as:

- The use of standard, international codes to identify products services, organisations and locations.

- Standard means of identifying quantities, using internationally recognised units of measure.

- A simplified approach to the flow of data associated with the supply chain based upon one order resulting in one delivery resulting in one invoice.

- The use of master files for product price and customer information to eliminate the need to exchange repetitive data in every transaction.

- Simplified pricing and discounting procedures. It is recommended that line discounts are reflected in a 'net' line price.

- Standard procedures for dealing with VAT and tax related data to accord with HM Customs requirements.

- The development of a common, agreed understanding of business terms and promotion of these across industry sectors.

- To address these principles in more detail, it is worth examining, as a starting point, the essential components surrounding the placing of an order. It is the order which triggers the chain of events leading to an activation of the supply chain.

## 3.2 The Order: What, When Where

Most business transactions stem from the customers requirement for one or more goods or services. The customer is likely to have quite specific requirements concerning the nature of the products, acceptable substitutes, date and time of delivery, delivery location, quantity and price.

All these details must be communicated accurately between customer and supplier if satisfactory supply is to be achieved.

How can this be achieved in the simplest way?

One approach is to define very clearly what the order instruction should comprise, and then to remove from it any information which could more effectively be communicated as a separate process. The order may be defined as an instruction to deliver defined quantities of specified items, usually at fixed prices to a specified location on a specified date. In this way, there can be clear matching of deliveries against outstanding orders, since a delivery can only be of one or more items to one place on one date. Invoices can be quickly matched against confirmed deliveries. The following components are therefore required:

## 3.3 Product Identity

Codes are the most efficient means of identifying a product. They can be assigned as a unique tag which unambiguously identifies a specified product in a specified packaging configuration. The International Article Numbering System (EAN) provides the infrastructure for a total coding solution.

The EAN system is the only one which, on an international scale, allows for every item, in every graduation of size, colour, or other variant, and regardless of its place of origin or destination, to be given a unique code. This code can if necessary, be physically marked on the item to which it relates, both in human and machine readable form, allowing rapid and, if necessary, automatic recognition.

The message standards are based on the premise that there is no point in including detailed product descriptions and packaging arrangements in the order when these can be defined in advance and referred to by a simple code. Textual descriptions cannot be automatically processed, and are prone to misinterpretation. They are, therefore, of little value in an electronic transaction.

## 3.4 Customer/Supplier Identity

As with products, codes are a more efficient means of communicating location or company identification than full text descriptions. They can be stored easily on a computer file, allowing easy cross reference to full postal address when needed. The EAN coding system also makes provision for location coding.

## 3.5 Quantity of Goods

Physical goods can be considered in two categories;

- fixed weight goods ie. those that are packaged, ordered, delivered and coded in discrete, stable configurations of a predefined quantity eg. Consumer Unit, Case, Pallet.

- variable measure items ie. those that are available in potentially infinite graduations of a given unit of measurement, and where the product code

remains the same regardless of quantity.

The quantity for fixed weight goods is a simple declaration of the number of agreed units of trade eg. 6 cases, 4 pallets. The product code itself identifies what that unit of trade is. For variable weight goods an additional factor is needed - the unit of measure. This defines the standard measure unit eg. litres, meters, tonnes to which the quantity relates.

By referring consistently throughout the supply chain and its associated transactions to a single predefined quantity measure, ambiguity of meaning is reduced. A situation where goods are priced, ordered, delivered and invoiced in different multiples, creates opportunities for errors and makes a simple matching of goods received against outstanding orders very difficult.

## 3.6 Master Files

In the previous definition of the key components of an order transaction, it was suggested that certain data could be omitted from the order file and communicated separately, the aim being to keep the order instruction as simple and as accurate as possible.

The communication of this data eg. product descriptions, prices, full postal addresses, packaging arrangements, is therefore a vital precursor to the day to day exchange of order files and should be conducted in a consistent structured way.

The most efficient means of exchanging this data is via standard master files. For example, the TRADACOMS Standards contain master file formats for Product Information, Price Information and Customer Location Information.

These allow trading partners to establish a current schedule of all the relevant data associated with the purchase and supply of goods, including;

Product Definitions
Packaging Configurations eg. Pallet Count
Standard Product Codes
Unit of Ordering
Product Dimensions
Storage Instructions
National and Regional Price Variations
Delivery and Invoice Location Points

Once both parties have established this mutual understanding of current data, their day to day transactions need only contain the dynamic components eg. product codes and quantities.

## 3.7 Conclusion

EDI is not about transporting ineffective, outmoded business techniques into a hightech, electronic environment. Poorly designed trading transactions will be no better just because they have been embodied in an EDI message. Indeed, EDI standards which are built to reflect established trade transactions without questioning their relevance usually prove too complicated to implement.

Prospective EDI users will find it pays to re-examine and to simplify their internal procedures, irksome though this may seem, before embarking on an implementation programme.

## 4. ACHIEVEMENTS OF THE ANA

### 4.1 ANA Mission Statement

> The purpose of the ANA is to take the lead in developing, promoting and establishing a worldwide, multi-sector system for the identification of goods, services and locations and for related communications, based on business led standards agreed through the International Article Numbering Association.
>
> The objective is to improve inter-company logistics, increase the efficiency of trade and add value to the partners involved and to customers.

### 4.2 Stable Standards

The ANA's TRADACOMS standards for EDI were the first cross-sector message standards to be used in the UK. They have been proven to fulfil UK business requirements since 1982 and their usage is still growing. The key to this success has been the underlying principles of user involvement; best business practice; sector-independence; and full documentation and guidance.

The ANA had originally helped its member companies to deal with the multiplicity of paper documents exchanged during normal trade by the publication of a Standard Documentation manual. The ANA brought together representatives from a range of industries and functions to standardise the core information requirements for common trade documents. As the demand for electronic documents grew, there was again the need to standardise the formats, to enable companies to process the data efficiently and reduce the number of conversion tables which had to be supported. The ANA membership was able to provide the relevant expertise to work on these new standards for trading data communications - TRADACOMS.

The original TRADACOMS messages have been in existence since 1980, with the first published standards in 1982. Since that time the TRADACOMS Group (now the TRADACOMS Message Development Group) have maintained the standards and published new messages as the needs of users have become known. The messages range from basic transactions such as orders and invoices to financial documents (eg credit notes and statements); acknowledgements and confirmations; and reports (eg planning data).

The TRADACOMS standards provide a stable platform for doing EDI across all trade sectors. The experience gained during the last 12 years is also now being put to good use in the development of EDIFACT message standards at the international level.

### 4.3 Support and User Input

The ANA is committed to supporting its members in their use of EDI by recognised standards. There is an active Message Development Group working to maintain and develop the TRADACOMS standards, as well as the UK EDIFACT Trade Message Convention which provides guidelines and workable subsets of the EDIFACT messages.

The strength of these groups lies in their membership: they comprise representatives from all sectors of trade and industry, providing a mixture of business and technical resources. All committee members are active users of the EDI standards, each in their different fields, so can bring much valuable experience to the development process. This ensures that the standards produced are efficient and functional.

Any ANA member can request changes to the message standards to fulfil genuine business requirements. Procedures can be found in Section A.

## 4.4 The ANA EDI Service

As part of its commitment to support and encourage the growth of EDI the ANA has set up the EDI Service. The full time Secretariat services the work of the Message Development Group and provides help, information and advice to members on all aspects of EDI.

## 4.5 The Development of TRADANET

The TRADACOMS standards were designed for exchange of data in any electronic medium. Many early implementations used magnetic tapes to send files between trading partners. The increasing sophistication in telecommunications led to the ability to send data directly from one computer to another. Thus a demand for point to point exchange of data between business partners grew. As the use of electronic data interchange grew, the number of direct links needed began to multiply, along with the number of communication protocols and standards.

In response to these problems the ANA laid down the specification for the first UK Value Added Network (or VAN) which could offer member companies a single link to all their EDI trading partners. The specification was put out to tender, which drew 16 responses. The successful company which fulfilled users needs was ICL and the TRADANET network was built in 1985. TRADANET is now operated by GE Information Services, INS Division and has always been commercially independent of the ANA. It is acknowledged that the ANA's role as the driving force behind the setting up the this network service has stimulated the growth of EDI in the UK.

Further details of INS and other VANS can be found in Section A under Data Communications.

## 4.6 The Network Liaison Group

The ANA continues to represent the views of EDI users with all the network services with the setting up of the Network Liaison Group. This forum brings together the major network providers and their business users to promote co-operation and discussion of areas of mutual interest.

## 4.7 Documentation Guidelines

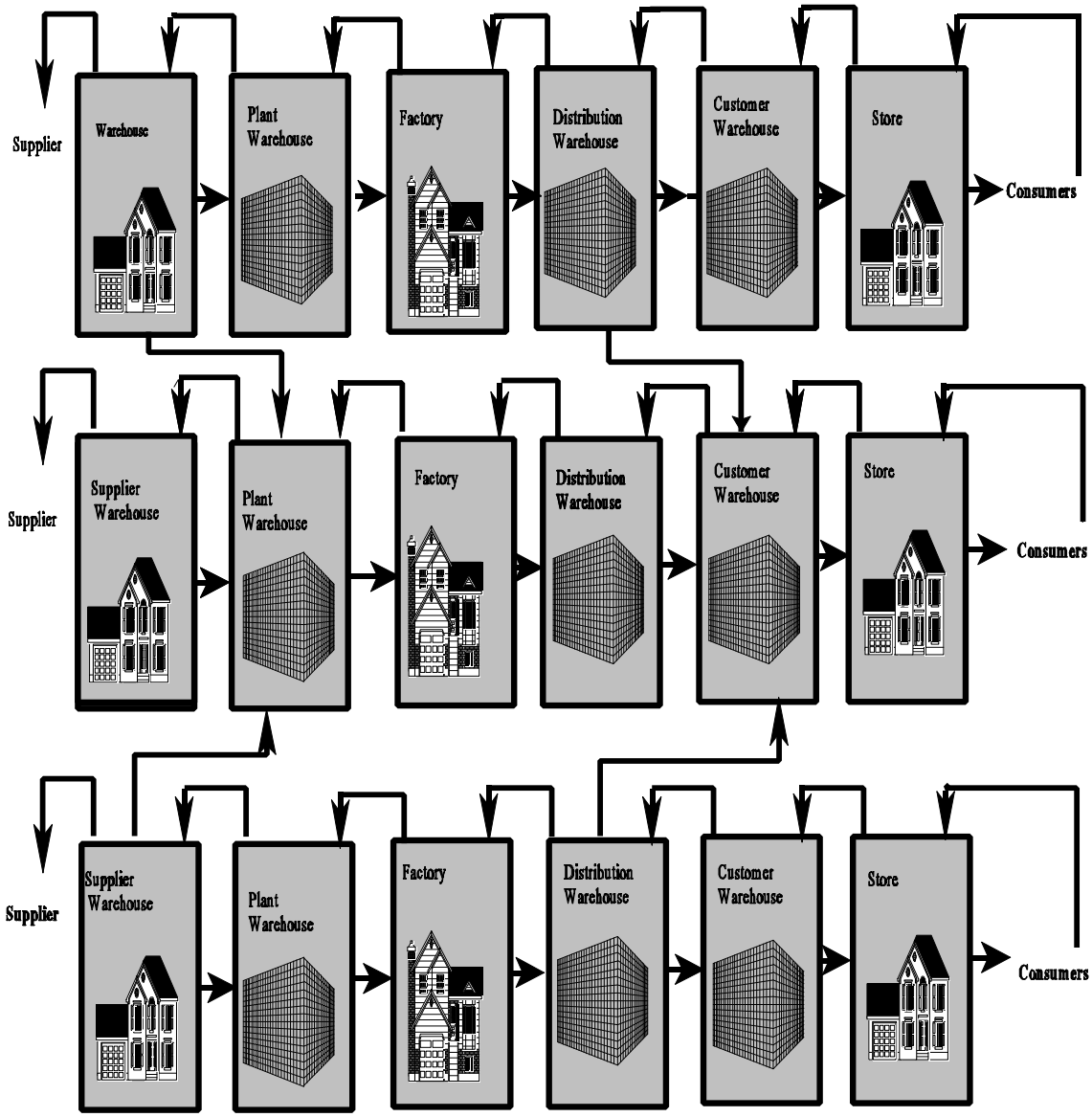
The ANA continues to maintain a set of standard documentation guidelines which incorporate good business practice for companies operating a paper-based system. These guidelines also provide the basic foundation from which to migrate to the TRADACOMS or EDIFACT EDI message standards. They include a detailed section on how to link the fields present on each standard document to the corresponding EDI message segments.

## 5. SUPPLY CHAIN MODEL

The ANA has recently supported work on the development of a Supply Chain Model which gives the theoretical framework for EDI business communications.

One of the key aspects of the model is the interconnection of linear supply chains across many industry sectors. There are common information flows and data requirements in most areas of trade. The use of common standards (such as TRADACOMS) to communicate this data is therefore vital to efficient information flow. This interconnection is shown in the diagram below.

**Figure 1 INTERCONNECTION OF SUPPLY CHAINS**



At each stage in the supply chain there is a customer - supplier relationship. Each individual trading relationship contributes to the total chain, thus affecting the speed and responsiveness of supply to the final customer (the consumer). In increasingly competitive times every business must act to increase its responsiveness, reducing lead times, stock holding and operating costs. As each link in the supply chain is interdependent, there has been a growing awareness that sharing information across company boundaries can be mutually beneficial. The communication links provided by EDI, which speeds up data flow, whilst ensuring accuracy and completeness of data, are ever more important in supply chain management.

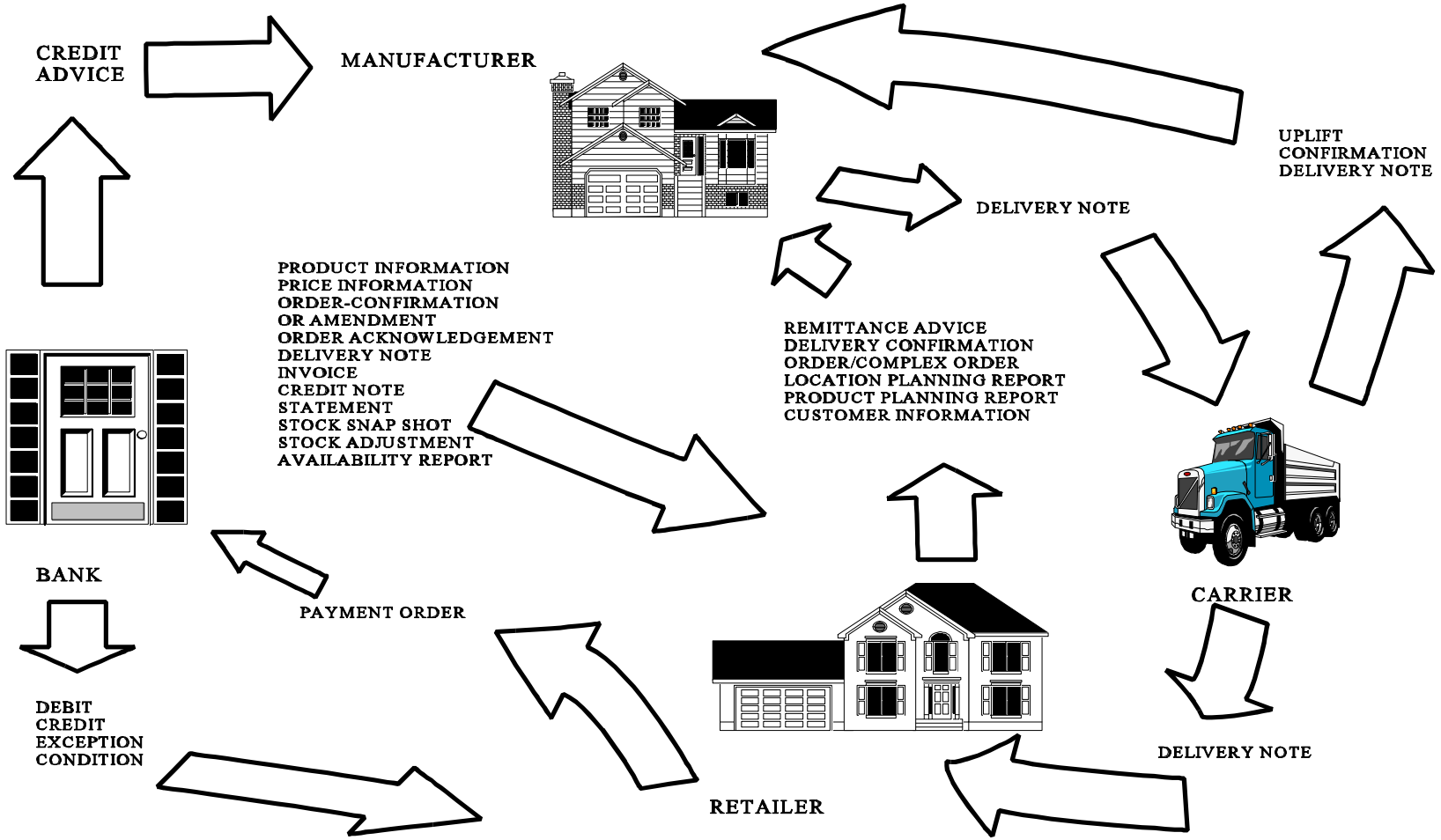
The flow of information is bi-directional in every trading relationship. It will always follow the flow of goods and materials throughout the supply chain.

## 6. TRADACOMS DATA FLOW

An example of data flow using the TRADACOMS standards is given in the following diagram.

To obtain a copy of the Supply Chain Management brochure contact the ANA.

**Figure 2** **DIAGRAM OF TRADACOMS DATA FLOW**



## SECTION A: OVERVIEW OF THE TRADACOMS STANDARDS

### CONTENTS

## SECTION A: OVERVIEW OF THE TRADACOMS STANDARDS

### 1. INTRODUCTION

This section introduces the various aspect of the TRADACOMS standards. Most topics covered are expanded in a later section of this volume, or in another volume in the set.

The ANA's objective as an association is to assist members in achieving increased efficiency in their business operations. Standard article numbering and bar coding using the EAN International system is one method of improving the identification and control of the physical goods throughout the supply chain. The EAN numbering system also covers locations, so that the various trade premises where physical goods may be ordered, invoiced, stored or distributed can also be unambiguously identified. The benefits of standard numbering can be fully exploited in the TRADACOMS messages, as this data can be communicated effectively and securely, in automatically processed format. The ANA acts to enhance communications between companies by designing and disseminating cost effective standards.

The TRADACOMS standards are designed to communicate trading data efficiently. They include standard files covering a range of business transactions, master files for the exchange of standing data, and report files. These standard files may be exchanged using a variety of electronic media.

The use of electronic media has caused a minor revolution in the way that companies conduct their business. The ANA acts to ensure that the TRADACOMS standards comply with the prevailing laws and regulations, and has even lobbied for changes to those laws when necessary, on behalf of its members.

Communications standards must enable companies to exchange data easily and effectively without imposing significant burdens on their internal systems and without requiring them to use particular computers or software. The syntax and structure of the TRADACOMS standards ensure that businesses have the freedom to select these systems on the criteria relevant to their business.

### 2. PRODUCT NUMBERING

Any item which is traded between companies can be uniquely identified with a 13 digit number allocated under the International Article Numbering (EAN) System. Thus any data which may be sent electronically about the product or service which is ordered, invoiced or delivered, can be reduced to a minimum by replacing names with unambiguous code numbers. The TRADACOMS standards rely upon the use of article numbering as it simplifies the messages and improves the efficiency of information transfer. Whenever a product is to be identified within a TRADACOMS message, the preferential option is always to use an EAN number.

To ensure that EAN numbers can be used effectively within EDI, the identifying number and agreed definition of each unit of trade must be communicated to trading

partners prior to any electronic transactions about these products taking place. This information can be communicated using the Product Information and Price Information master files. Once this data has been communicated, the trading partner can set up a reference or database containing the identifiers. Subsequent transactions can then be reduced to a stream of codes and associated quantities, suitable for automatic processing by the recipient's system.

Further details of the EAN numbering system can be found in Section B International Standard Numbering.

## 3. LOCATION NUMBERING

The EAN numbering system covers locations, which can also be identified uniquely by a 13 digit number. The use of location numbering has become increasingly popular in EDI, for the same reasons as article numbering. Each location of trading significance can be unambiguously identified by the use of an easily processed number. The locations to be identified may include the ordering office, delivery locations, accounting functions and other relevant departments or buildings. It is also recommended that an EAN number be used to identify a mailbox on a Value Added Network.

Again the full name and address of each location to be identified using this system must be communicated to all trading partners before they can be understood and interpreted in an EDI transaction. All TRADACOMS messages which include data on trading locations provide the facility to use EAN location numbers in preference to a full address.

For further details on EAN numbering see Section B.

## 4. INFORMATION TO BE EXCHANGED

The TRADACOMS standards contain a series of standard files covering a range of business transactions. There are three master files permitting the exchange of Product, Price and Customer Information. These master files contain standing data which should be used to update the trading partners database. Once this standing data has been incorporated into the recipient's system, then the ensuing transactions can be reduced to a series of codes and quantities, which can be fully processed automatically.

Transaction files have been defined for: Orders; Picking Lists; Delivery Notification; Delivery Confirmation; Invoices; Credit Notes; Statement/Remittance Advices; Uplift Instructions; Uplift Confirmation; Stock Adjustment; Complex Orders; Acknowledgement of Orders; and Utility Bills. Thus many of the common paper documents in use can be replaced by EDI.

The ANA has worked with the banks to provide a set of payments files, including: Payment Order; Debit Advice; Credit Advice; and Exception Condition. New messages at trial or draft stage include: Hot Card; Electronic Funds Transaction; and

Interchange Acknowledgement.

There are also planning and report files: Stock Snap Shot; Availability Report; General Communications; Product Planning Report; and Location Planning Report. These files provide a mechanism for sharing data on stock, sales and forecasts between trading partners.

Most of the common data exchange requirements between manufacturers, retailers, wholesalers, carriers, raw materials suppliers, agents, distributors and their banks are catered for, across the broadest spectrum of industry.

The scope of all EDI communications must be agreed between individual pairs of trading partners. It is expected that all information exchanged by electronic means will conform to the TRADACOMS standards or to a recognised subset of the EDIFACT standards. For further details of the ANA's guidelines for EDIFACT, please contact the secretariat for information on an alternative manual.

## 5. MEDIA OF EXCHANGE

The ANA specifications for the files and their components, and the syntax rules by which they are structured, are independent of the media used for exchange of data. TRADACOMS files may be sent on magnetic tapes or floppy discs as well as by telecommunications transmission.

There are certain aspects of the physical media (tapes or discs) which also need to be standardised for successful data exchange. These include the type of tape or disc used, the standard of recording and the labelling conventions. The recommended TRADACOMS standards in these areas are detailed in Section E for magnetic tape. The development of many types of floppy discs prevents the publication of a specific recommendation for this medium of exchange. However, users exchanging discs should ensure that they understand the disc size, density, machine operating system and labelling convention before commencing this type of exchange.

The growth in the use of EDI in the UK has largely been due to the successful operation of telecommunications networks which carry the files of data between trading partners. There are no specific TRADACOMS recommendations for protocols covering trading data exchange over telecommunications links, and individual networks may operate any of a range of OSI, de facto or proprietary standards.

## 6. DATA COMMUNICATIONS

The use of telecommunications provides a fast, secure and reliable means of exchanging trading data. This has proved popular in the UK and has led to the growth of network services for EDI and related communications.

### 6.1 Value Added Network Services

Value Added Networks (VANS) provide a service for interworking between a number of EDI trading partners. The use of a store and forward approach decouples one partner's communications from the other. This allows users to batch messages to meet their own

processing schedule. Outgoing messages are held in an electronic postbox prior to transmission and stored in an incoming mailbox before processing.

VANS currently offer OSI (X.25) or proprietary protocols (eg 2780, 3780, SNA) and the Odette File Transfer Protocol (OFTP). The main VANS are also starting to introduce X.400 services as a further option for VAN access.

The VAN can offer different communications protocols to different partners depending on the requirements of each partner, as well as conversion between different protocols where necessary. This provides the user with a seamless transfer of data. The VAN takes responsibility for successful information exchange between partners.

Although the data security is usually of a very high standard, the networks cannot be held liable for the business consequences of any information loss. Users need to ensure that the security arrangements will satisfy their business requirements.

The main advantage of using a VAN is that only one connection is necessary to communicate with all trading partners on that network. The choice of network will depend on a company's business environment and intended electronic trading partners. The VAN should be able to transfer data produced on any standard hardware, using any recognised operating system and software. The VAN will provide, or recommend, suitable hardware and software for EDI communication where necessary.

The main VANS in the UK are:

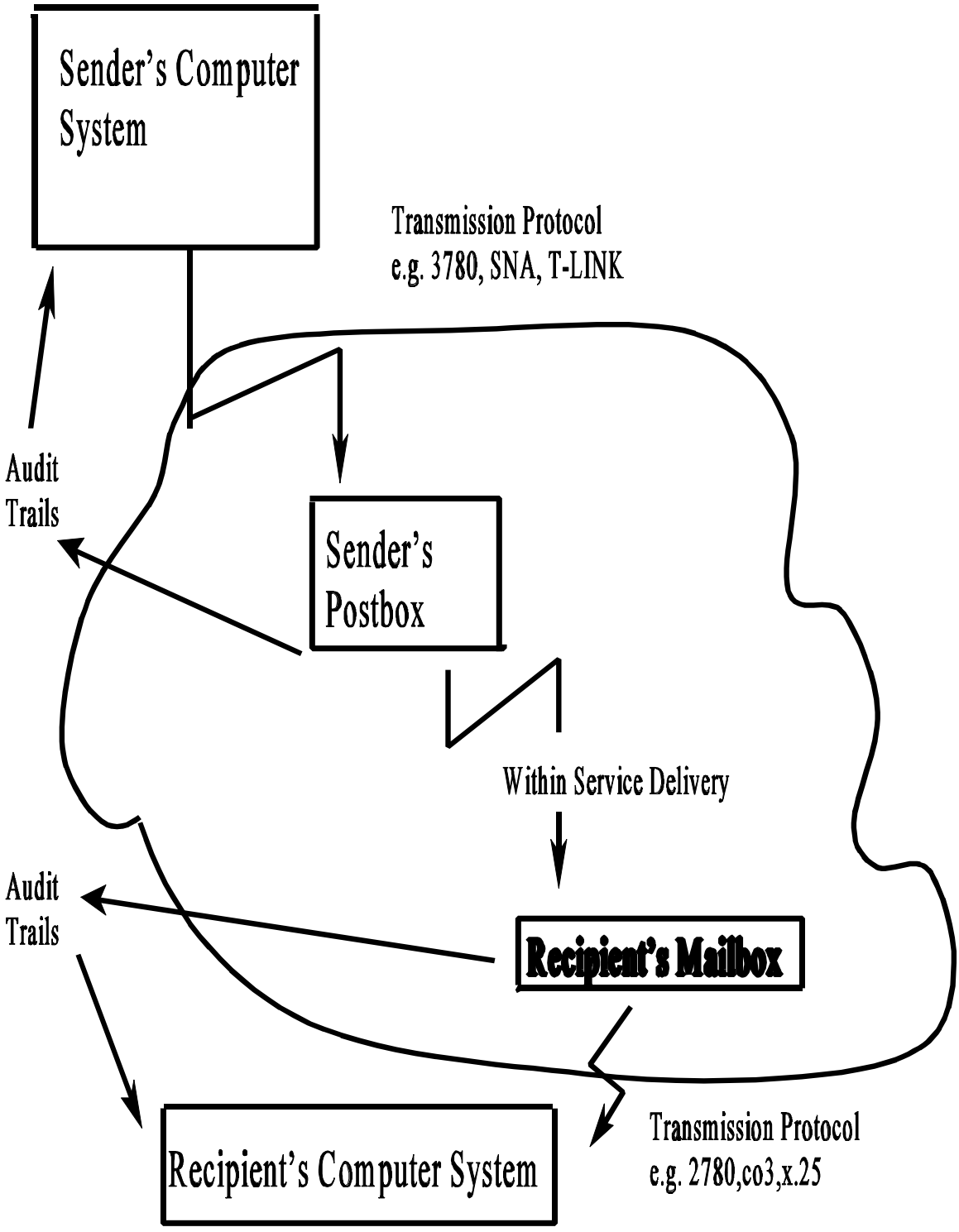
AT&T EASYLINK SERVICES
4, Moons Park
Burnt Meadow Road
Redditch
Worcester
B98 9PA Tel. 01527 67585

BT EDI*NET
BT Tymnet
Network House
Brindley Way
Hemel Hempstead
Hertfordshire
HP3 9RR Tel. 0800 212255 or 0800 282444

IBM INFORMATION NETWORK
P O Box 117
Mountbatten House
Basing View
Basingstoke
Hampshire
RG12 1EJ Tel. 01256 343545

TRADANET SERVICE
COMMERCE*EXPRESS SERVICES
GE Information Services, INS Division
INS House
Station Road
Sunbury on Thames
Middlesex
TW16 6SB Tel. 01932 776000

**Figure A.1**
**DIAGRAM OF A VALUE ADDED NETWORK**



### 6.2 Direct Communications between Trading Partners

Where a limited number of trading partners are involved or where the bulk of the high volume data is sent to a small number of partners, leased lines from the public telecommunications service providers (BT, Mercury, Sprint and other companies which may start operations in the UK) may be a cost-effective option. These direct links could support proprietary or OSI communications standards such as X.25.

Where communications are required to a number of trading partners then use of an X.25 packet switched data network may be appropriate. These services are charged on a combination of a subscription charge, the duration of the connection and the volume of data transferred.

A recent additional option is the Integrated Services Digital Network (ISDN) from BT. This provides a switched 64 kbps transparent data service which may be more economical than X.25 for certain volumes of data exchange. This service is becoming increasingly available throughout the UK.

All direct service providers put the responsibility onto the trading partners concerned to agree, commission and validate the addressing and interworking protocols required for EDI. They must also agree the level of joint control required to handle any communication problems which arise during the course of day to day operations.

### 6.3 X.400

The CCITT (International Consultative Committee for Telephony and Telegraphy) X.400 standards for store and forward message handling services could also be used as a basis for EDI communications over a VAN or the public packet switched services.

Message handling software and services which comply with the original (1984) X.400 standards and the later (1988) standards are in use and becoming more widely available. The recent publication of the Protocol for EDI (X.435) standard has provided a method of including EDI messages within the X.400 Message framework.

The X.400 standards allow the integration of EDI with other inter-business information exchange, such as electronic mail and graphics data. Different types of data can be sent in one X.400 message.

## 7. LEGAL AND AUDIT

As paper is supplanted, it is anticipated that the legal and audit requirements will evolve in a manner which will not hinder the pace of development.

### 7.1 Interchange Agreements

The ANA does not publish or recommend an interchange agreement as we recognise that only the medium of communication between parties has changed. The way

companies perform their business should already be established under the usual terms and conditions of business set out in the commercial contract. However, to help parties establishing an EDI relationship the ANA has published a set of **guidelines** which all trading parties can work to.

Some trading parties still insist on using an interchange agreement and a number of these types of agreements are available. However, it is recommended they are examined by your legal department to ensure they comply with your company's status.

### 7.2 Security of Data

Companies should take all reasonable steps to comply with the Computer Misuse Act 1990 by establishing and maintaining procedures to ensure that messages are properly stored, only accessible to authorised persons, and are not altered, lost or destroyed.

Some data may be subject to the Data Protection Act 1984. Special consideration should be given to the storage, access and transmission of such data. Where permitted by law, parties may apply special protection to messages by encryption.

Each party should also be aware of its obligation to store data and log messages. In many countries there is a legal requirement to store certain data/messages for a minimum time period. This period may vary according to the type of data being stored.

### 7.3 Finance Act 1980

During 1980 ANA held discussions with HM Customs and Excise. This led to an amendment to the 1980 Finance Act which had the effect of allowing VAT invoices to be exchanged on magnetic media or by data transmission. Previously tax invoices had to be on paper documentation.

The VAT aspects of the electronic exchange of invoices and credit notes are clearly of special importance, and these are reviewed together in Section C.

Companies should note that at least ONE MONTH'S notice must be given to the local VAT office of the companies intention to commence EDI. HM Customs may then wish to audit both the sender's and receiver's systems.

### 7.4 Audit

Companies starting EDI should consider their control procedures under the new operating environment. If data is being automatically processed, management will need to identify the business criteria which will prevent unauthorised transactions being processed and ensure these processes exist within their own systems.

Transmissions via value added networks give some audit trail of key events and may have techniques to prevent unauthorised data transfer.

It is sensible to ensure that company auditors, internal and external, are satisfied with

any control procedures by advising them of the proposed system at an early stage and involving them in the decision to implement.

# 8. CONTROLS

## 8.1 Control of Transmissions

The TRADACOMS standards provide data elements which, when reconciled, allow EDI partners to be confident that all files have been received and no duplicate files have been sent. This section describes how EDI transmissions can be controlled by both the sender and receiver. The ANA recommends that users of the TRADACOMS standard implement all the available controls as a basic principle of good business practice.

This involves the use of the Sender's Transmission Reference (SNRF) in the Start of Transmission (STX) segment and the File Generation Number (FLGN) and File Version Number (FLVN) data elements in the File Details (FIL) segment.

## 8.2 Sender's Control of Transmission

Each TRADACOMS file transmitted must begin with the Start of Transmission (STX) segment which acts as an envelope for the file. It therefore contains sufficient addressing information to route the file to its recipient. The sender's identity is given in the FROM data element field and the receiver's identity in the UNTO field.

The Sender's Transmission Reference (SNRF) allows the unique identification of every **transmission** by the use of an alphanumeric identifier. This reference should be allocated to a transmission as it is sent out.

When an incoming EDI transmission is received into the recipient's system the STX segment may be stripped off, thus losing the transmission references.

It is recommended that SNRF should be a sequential number, allocated in ascending order, to allow the sender to track every transmission issuing from the EDI system.

## 8.3 Receiver's Control of Transmission

Data exchange using TRADACOMS (or UN/EDIFACT) messages requires the sender to create files of data for each message type. It will be necessary for both the sender and receiver of EDI transmissions to monitor and control each **file**. A unique reference is created for every file, similar to a document reference. This reference should enable the recipient of the file to check that a complete message or transmission has been received and that there has been no duplication of transmissions.

The file reference to be used by the receiver is recorded in the Header Message of each complete file transmitted, in the FIL segment. In the TRADACOMS standard this is a numeric reference. It is recommended that the File Generation Number (FLGN) generated by the sender is sequential for each trading partner, and, within

each trading relationship, per file type.

The File Version Number should also be an application-generated sequential number, which is increased for every copy of a file created for transmission.

Other conventions for numbering the files exist, but the ANA recommends use of the above convention. Whatever control system is agreed by trading partners, these must satisfy H M Customs & Excise requirements before Invoice Files may be sent. Both sender and receiver must be able to demonstrate that there are adequate checking processes in place to ensure completeness of transmissions and prevent processing of duplicates. This is necessary for H M Customs & Excise to approve the invoicing system.

## 8.4 Control Count of Messages within a File or Transmission

The TRADACOMS standards provide a means of monitoring the completeness of the transmission by the use of the message reference data element (MSRF in the MHD segment of every message). The first message in every transmission is number 1, and each message following is numbered sequentially in ascending order. Thus it is possible for the recipient's system to count each message arriving into the system and check for missing messages.

There is also a control total of the number of messages in a transmission given in the NMST data element of the END segment which must complete each transmission.

Within each file, there is usually a data element which allows the number of details messages within the file to be recorded, again providing a signal to the receiver of a file if there is any discrepancy between the figure given and the number of messages received.

## 8.5 Control Count of Segments within a Message

There is a control total of the number of segments sent in a message, the NOSG data element in every message trailer (MTR) segment. This allows control of transmissions at a greater level of detail.

## 8.6 Integrity Checking

There is an optional Transmission Reconciliation Message, RSGRSG which allows companies to check the integrity of transmissions. The ANA strongly recommends that this facility be used.

The syntax on which TRADACOMS is based does not facilitate a matching of END segments to the preceding STX segment. To provide an extra level of security a reconciliation message was developed in 1987 to provide an integrity checking facility to those users who wished to implement it.

The reconciliation message is used at the end of each transmission, before the END segment, to confirm that the end of the transmission belongs to the same UNTO party and has the same SNRF as that recorded in the STX segment. Companies using this

facility can implement checks to prevent processing of the transmission if a mismatch is found.

See Annexe B in the Syntax and Data Dictionary reference manual for further details.

## 9. SECURITY

The issue of security is becoming increasingly important especially as the EDI community grows. However, the level of security applied must be proportional to the value of the data transmitted.

One of the principle issues driving security is the development of financial EDI with the transmission of payment instructions. Various methods of ensuring adequate security are available, such as smart cards and digital signatures.

For further information on security and the other organisations involved contact the ANA.

A publication prepared jointly with the Association of Payment Clearing Services (APACS) entitled 'Electronic Payments - A Framework for Financial EDI' is also available from the EDI Service.

## 10. ADDRESSING

### 10.1 Addressing Transmissions

It is obviously of prime importance that an EDI transmission and the messages contained within it are addressed correctly, to be able to reach the intended recipient. Each network service will have its own conventions for identifying the sender and receiver of transmissions within their service, usually by means of a mailbox reference number. This enables the service provider to route the transmissions correctly. The TRADACOMS standard provides full addressing at several levels within an EDI transmission, to allow the relevant parties to be identified: the point of transmissions; the head office or administrative location, which is fixed but must legally be sent in the document; the operational locations eg department, delivery point etc. which may vary in each transmission

The Start of Transmission segment STX is particularly relevant for the increasing number of users of Corporate Gateways. The ANA recommendation to users is to follow the principle that the contents of one envelope are intended for one recipient, and the information contained in STX should be enough to route the file to its intended recipient. This mirrors the postal system.

Further details of the use of STX can be found in Section A of the Syntax and Data Dictionary reference manual.

## 10.2 Addressing of Message Files

The Customer Details and Supplier Details segments appear in every header message, to identify the sender and receiver of the file. It is possible to identify particular departments, locations or companies using these segments. For instance in the invoice file, the parties to be identified are 'invoicer' and 'invoicee', whilst in the order file, the parties to be identified are the ordering party and the supplier. The delivery location for goods may be different to the ordering location, so the delivery address is given in the Customer Details segment CLO in the detail message.

The use of EAN location numbering to identify each location is encouraged in TRADACOMS messages, as the EAN system provides a unique and unambiguous reference. See Section B on International Standard Numbering for further details of this system.

# 11. THE SYNTAX RULES

The objective of this Section is to introduce the concept of Syntax rules and to direct the reader to the part of the publication where a full description of the ones used for TRADACOMS can be found.

Syntax rules are created and used to ensure that EDI messages are constructed in an intelligible way. They define characters to structure the information and the conventions used to identify data groups of data and use of data. A combination of syntax rules, message design guidelines and good business practice produces the messages described in Volumes 2 and 3.

The Syntax Rules applied to TRADACOMS are known as UNGTDI (or TDI for short). They are explained in the Volume entitled "TRADACOMS SYNTAX AND DATA DICTIONARY". Users will be aware that other syntax rules exist. Messages written to rules developed by ANSI X.12 are prevalent in the United States. Messages using the EDIFACT syntax (ISO 9735) are being developed. The ANA also supports EDIFACT syntax messages published as UK EDIFACT and EANCOM. Other syntax rules eg. ASN.1 are used by other groups.

# 12. THE DATA ELEMENT DIRECTORY

The basic TRADACOMS data unit is the **data element**. There are several hundred data elements defined for use in trade. Each data element is specific in identity eg. supplier's identity; invoice number; delivery date etc. A data element may contain a small number of sub-elements. All the current TRADACOMS data elements are defined in detail in the Standard Data Element Directory which makes up Section B of the Syntax and Data Dictionary reference manual. The data elements are listed in alphabetical order by identifying code.

## 13. THE SEGMENT DIRECTORY

The data elements are combined, in accordance with the syntax rules, into standard **segments**. A segment provides a logical grouping of related data eg. the Supplier Details segment contains data on the supplier's identity, name, address and VAT registration number. A full listing of the TRADACOMS segments is given in the Segment Directory which forms Section C of the Syntax and Data Dictionary Reference manual.

## 14. THE STANDARD MESSAGE FORMATS

The standard segments are combined into standard **messages**, which are sent in sequence making up **files**. Every file starts with a single File Header Message, followed by a variable number of File Details Messages, and completed by a single File Trailer Message. This pattern is common to most of the TRADACOMS files, except those which carry VAT details (the Invoice, Credit Note and Utility Bill Files) which also contain additional VAT Trailers before the File Trailer message.

The file formats are given in Volumes 2 and 3 of the TRADACOMS manual.

## 15. STARTING TO TRADE ELECTRONICALLY

The ANA has published a checklist for companies starting to trade electronically. The Guidelines for Establishing an EDI Trading Relationship is available from the EDI Service.

## 16. SYSTEM DESIGN GUIDELINES

Organisations seeking to exploit the full benefits of electronic data interchange must extend their existing computer systems to be able to automatically process the documents which are sent and received. The data which had previously been printed out onto paper must be formatted into a structured file for electronic transmission, and the files received must be de-formatted prior to integration into in-house application systems.

This will involve additional computer programming, and to aid users of the TRADACOMS standards, Section D contains extensive System Design Guidelines for Message Construction and Translation. Commercial software packages for format conversion are also widely available. Users may need to ensure that any software they purchase for translation and communication is compatible with their chosen network provider. The ANA EDI Service can advise companies on how to find out about EDI software packages.

There are certain issues involved in sending data directly from, and receiving data directly into a company's computer system. The control of files created for transmission is covered in Section D. Receivers of EDI transmissions will also need to consider how each file of information will be monitored and processed by their

system. The use of a standard data format does not obviate the need to validate the data which is received. The change from keying in data to automatic processing of an electronic file means that alternative means of verifying the data received will need to be built in.

## 17. EVOLUTION OF THE STANDARDS

### 17.1 Moving forward: - A timetable for implementing the 1993 revision

There is never a good time to release a revision to a Standards Manual. In the three years since the last revision, the number of users has probably trebled and companies have taken strategic decisions to use and implement EDI.

However the solutions offered by EDI standards have to be developed and refined over time. Changes have been made at the request of and in consultation with user companies. The changes and developments (new messages) have been used in trial to ensure that no functionality has been lost and the desired functionality has been gained.

The ANA recommends that all companies migrate to the latest published version of the standards over a nine month time period. It recommends that companies plan to upgrade to be able to **receive** the new version by

31 July 1993

and to **send** the latest version by

31 October 1993

The ANA recognises that, in practice, the previous published version may stay in production during 1993. It believes that to gain the maximum benefits all companies should aim to implement the latest version during 1993.

Message versions published before 1.1.90 (the previous manual dated October 1989), should be particularly reviewed as they may not meet present VAT requirements or general interchange requirements and detailed support of these can not be guaranteed.

## 18. CHANGE CONTROL PROCEDURE

Users of the TRADACOMS standards may request changes to the file formats and the following procedure is in place.

### 18.1 Lodge a written request

Any change to TRADACOMS standards must be authorised by the ANA Message Development Group, which meets on a regular basis throughout the year. Users should submit a written request to the ANA EDI Service detailing their business requirement, and a form is available for this purpose.

TRADACOMS MESSAGE STANDARD CHANGE REQUEST FORM

Log No. _____

Name of
Requester _____ Date _____

Company or Organisation _____

Address _____

_____

_____ Phone No. _____

Nature of Business _____

Message to be Changed: Name _____ Version _____

Or New Message _____

Nature of Change/Message Required _____

_____

_____

_____

eg. additional data elements/segments, restructure of hierarchy, syntactical change, new use of the message.

Business Requirement _____

_____

_____

_____

_____

Description of the business process being addressed with this message.

Please detail the direction of data flow between the Trading Partners, the type of data which needs to be sent, and the purpose of this data.

Identify the key data, any hierarchical relationship between data types, and any data which is optional.

Is this message in response to another EDI message, or likely to trigger another message?

Will this change affect another message?

Use additional sheets as necessary.

Date Required _____

Date Received _____

Date of Submission to MDG _____

Commitment to Trial:

By (Trading Partners) _____

_____

Report back to MDG _____

_____

_____

_____

### 18.2 Who can make a request

Requests will be accepted from any ANA Member. However, to ensure that TRADACOMS messages remain widely applicable, preference will be given to requests from acknowledged Industry EDI User Groups. Software houses and Networks may also make change requests on behalf of clients, if they are ANA Members.

### 18.3 New Codes, elements and segments

The ANA will maintain a Master File of all Data Elements, Segments and Code Lists*. Any additions must be administered centrally to avoid duplication of codes.

* Some Code Lists referenced in DNAC in Data Narrative segments may be maintained by industry groups or users.

### 18.4 Review and consultation period

The ANA Secretariat will analyse the request and compare it with existing messages, to find if there is a reasonable match. The validity of a proposed change or addition to an existing message will be assessed in light of the functionality of the message.

Attention will be given to the message syntax, and any alterations will be suggested to the Requester.

The ANA may approach other User Groups for comments on new message formats, to ensure that a standard solution is developed. The ANA cannot condone company-specific message formats and will seek input from a wide range of potential users of a message.

### 18.5 Submission to the Message Development Group (MDG)

The Secretariat will submit a paper to the MDG detailing the change request, and any recommendations. The Requester will be informed of the date when the request will be discussed, and may be asked to attend. The MDG meets every 6-8 weeks throughout the year and Requesters will be given an indication of the timescale involved in reviewing their change request.

Papers need to be circulated at least 2 weeks prior to any meeting. The group will discuss the change request, with reference to existing users, processibility of the data, legal requirements and best business practice, and make a recommendation. The decision of the group will be reported promptly to the Requester with details of any further action/information needed.

The change request may need to be discussed at further meetings of the group, before a final decision or draft message is given. The approximate time scale from a request for a new message to availability of a trial draft is 6 months, dependent on the current workload of the group.

## 18.6 Message Trials

Any new or revised message must be trialed successfully by the Requester before the change is authorised by the MDG and published by the ANA. A report of these trials must be made to the MDG, indicating that both the Sender and Recipient were able to process the data correctly.

## 18.7 Publication of Revised/New Messages

The new or revised message will be published after a suitable period of successful testing. Message revisions will be sent out as updates to existing manual holders.

## 18.8 Upgrade Timetable

TRADACOMS Users would be expected to upgrade to the latest version of a message between 9 and 18 months from publication.

## 19. USER PROBLEMS AND QUERIES

No matter how much careful thought has been put into the content, order, mandatory/conditional status etc. of data in a particular message, once particular trading partners start to implement the standards they are liable to run into snags - albeit minor ones.

The **worst possible** solution is for users to implement ad hoc changes in order to overcome problems. The dangers are obvious - if a series of bi-lateral, ad hoc changes are agreed in isolation, chaos ensues when the bi-lateral interchanges become multi-lateral.

To take a simple example, a particular data element, defined as mandatory, may cause difficulties for some companies because they cannot supply the data. One pair of participants could agree to omit the data element, another to use a default value 'a', another to use default value 'b', and so on.

The method of dealing with such problems is via the Message Development Group, using the procedure and change request form given in the previous section. Every TRADACOMS user identifying a problem in the standards must notify the ANA EDI Service. Suggestions for overcoming the problem could also be sent.

All problems will be considered in detail by the Message Development Group, which will make a recommendation. When appropriate, all TRADACOMS users (ie. all TRADACOMS manual holders) will be consulted to ensure that the recommendations would be generally acceptable.

All agreed changes to the standards will be circulated to manual holders in the form of new pages for substitution or insertion into the manual. It is therefore essential that all purchasers of this manual complete and return the form at the front of the manual so that they can be placed on the circulation list. Any changes in this contact name or address must also be notified to the ANA.

**SECTION B: EAN NUMBERING**

## CONTENTS

## SECTION B: EAN NUMBERING

To achieve the full benefits of EDI the contents of the messages sent must be automatically processed. Computers understand numbers and codes rather than blocks of text, so the ideal EDI message will contain a simple stream of predefined codes and numbers. The key items of information in any trade message will be the products or services which are being traded, and the relevant locations where these items are ordered, delivered and invoiced.

Many companies have developed their own coding system to identify their products and locations. When these company-specific codes are used, each trading partner must hold a cross-reference to their own codes for the goods they purchase and supply. There is always the danger that two companies will use the same code for two different items, which may cause a problem when validating or matching the information which has been received.

The EAN numbering system provides an open system for identifying all goods, services and locations, without ambiguity, anywhere in the world. The system relies on the principle of unique identification without classification. Every item which can be ordered, delivered, priced, invoiced or stored in the supply chain is allocated its own unique 13 digit number. The system has been used since 1973 and is now accepted in over 70 countries worldwide, across all business sectors.

The EAN standard numbering system is very simple. It is a system of identification, not classification, and this gives it the flexibility to be used in a multi-industry and multi-national environment.

Using EAN numbering minimises the need for translation between internal codes, thereby reducing misunderstanding and errors, and improving efficiency. The article numbering standards support partnerships between trading companies and enable greater control over the supply chain.

It is strongly recommended that EAN numbering is used wherever possible in EDI communications, and the EDI standards issued by ANA are designed to allow companies to take advantage of the system.

The way in which the system is administered ensures that the numbers issued are unique and unambiguous. The ANA is responsible for the administration of the EAN International standards in the UK, and there are similar authorities in other countries around the world.

### 1. NUMBERING OF GOODS AND SERVICES (EAN-13)

The purpose of the international standard article number is to provide a standard reference for all goods and services in trading transactions. Any item can be given a unique and unambiguous article number to identify it anywhere in the world. Article numbers replace plain language descriptions, making EDI messages more effective. They are also represented as bar code symbols on physical items to make data capture more accurate and efficient.

EAN-13 article numbers comprise thirteen digits which are divided, purely for administrative reasons, into three parts:

| Company Prefix Number | Item Reference Number | Check Digit |
|---|---|---|
| 50NNNNN | NNNNN | C |

Companies which apply for article numbers from the ANA are issued a company prefix number which is seven digits long and begins 50, and does not necessarily identify the company actually producing or providing the item.

A five digit item reference number is allocated by the company to each different type and variation of item they wish to identify.

It can be seen that each company prefix number can be used to create 100,000 different article numbers. Item reference numbers are normally allocated in numerical order, beginning with 00000 and going up to 99999.

The check digit is calculated according to a special modulo-10 algorithm described in section 1.1 below.

This structure does not imply that the number is meaningful, rather, that the complete number is a reference used to access information held on a computer file. The country of origin of a product, its size, shape, price or any other information cannot be directly extracted from the digits within the number.

**The standard article number is always used as one complete number within companies' computer systems.**

Every variant of an item must be allocated a separate unique EAN number whenever the variation is in any way apparent and significant to any partner in the trading chain, or to the retail customer. What is understood to be an apparent and significant variation may differ from industry to industry. Nevertheless, there are rules which should be respected.

Unique numbers are always required for:

- Each different item or product by type, colour, size, and so on.
- Each item containing a different number of items, for example multi packs.
- Each item where it is necessary to distinguish stock keeping units separately.
- Modifications to items, as with product relaunch, improved formula, redesigned pack etc., when the change makes a distinction necessary between old and new stock, particularly when this has legal connotations.
- Items source marked by the manufacturer with different retail prices.
- Different packaging configurations within a traded unit.
  Every time the article number of ANY unit within the traded unit is changed the traded unit number must also change.

### 1.1 Check Digit Calculation

The check digit calculation used for EAN numbering of products, services and locations is a modulo-10 algorithm with a 3,1 weighting, and is calculated as follows:

1. Starting with the right hand digit of the number (excluding the check digit) sum all the alternate values, reading from right to left.

2. Multiply the result of step 1 by 3.

3. Sum all the remaining digits.

4. Add the result of step 2 to the result of step 3.

5. The check digit is the smallest figure which must be added to this sum to reach a multiple of 10.

For example, to calculate the check digit of the number 501234567890C:

1. 0 + 2 + 4 + 6 + 8 + 0 = 20

2. 20 x 3 = 60

3. 5 + 1 + 3 + 5 + 7 + 9 = 30

4. 60 x 30 = 90

5. C = 0

The complete 13-digit number is 5012345678900.

### 1.2 8 - Digit International Article Number (EAN-8)

The EAN system provides for a second, **entirely independent** series of numbers, 8-digits in length, in addition to the full length 13-digit series. The availability of EAN-8 numbers is limited, and their use must be restricted to articles whose size or design genuinely precludes the printing of an EAN-13 bar code symbol.

The EAN-8 number consists of:

2 digit prefix denoting the numbering authority administering the remainder of the number

5 digits structured at the discretion of the numbering authority

1 check digit calculated according to the standard modulo-10 algorithm.

When entered in a 13-digit field, this 8-digit number must always be **right justified** or, alternatively, considered as having five implied zeros in the left hand positions.

The prefix values in the EAN-8 system which are issued to numbering organisations by EAN International are the same for both the standard and the short numbers. Note however that since prefixes occur in different field positions in the two series of numbers, use of the same digit values does not make the two series coincide.

## 1.3 In-Store Numbers (EAN-13 and EAN-8)

In-store numbers are only used in a **restricted distribution** environment. EAN International have assigned prefix values 21 to 27 and 29 for 13-digit in-store numbers, and 2 and 0 for 8-digit numbers.

| EAN - 13 | | EAN - 8 |
|---|---|---|
| 21 to 27,29 | Prefix | 0, 2 |
| XXXXXXXXXX | In-store use | XXXXXX |
| C | Check Digit | C |

The intention of this number is that companies should have the flexibility to work out with their equipment suppliers any non-standard encodation they require for internal purposes. For example it could be used for in-store coding of item identity and price, to allow scanning at the point of sale without using a price look-up facility.

In-store numbers must NEVER be used for traded units because they will appear in locations other than the retailer's environment and so will not uniquely identify the unit.

## 1.4 Universal Product Code (UPC)

The UPC numbering system is used in the USA and Canada, mainly for consumer units. The UPC system predates EAN, and was originally conceived as consisting of 10 digits, plus a single prefix digit on the left and a single check digit on the right, giving 12 digits in total.

Some companies which export to the USA and Canada will need to allocate UPC numbers to their products, and these should always be treated as EAN-13 numbers within the TRADACOMS standards.

Within a company's computer system, UPC numbers are completely compatible with EAN-13 article numbers, when they are **right justified**, which is equivalent to a 13-digit number beginning with a zero prefix.

## 1.5 Note on 14 Digit Numbers (DUN-14)

As described in the previous paragraphs, the ANA has adopted the EAN-13 numbering standard. However, it should be noted that outside the UK a second format exists for the numbering of traded units and standard transport units. This is called the DUN-14 numbering system, standing for Distribution Unit Number. It should be noted that some units circulating in UK trade will be numbered according to this standard, and provision should be made to handle them.

The format allows the use of fourteen digit numbers constructed as follows:

| | |
|---|---|
| 1 digit | Logistical Variant (VL) from 1 to 8 only. |
| 12 digits | Article number of the consumer unit within the traded unit **without** the check digit |
| 1 digit | Check digit calculated according to the standard modulo-10 algorithm on **all** the previous digits, including the VL. |

The fourteen digit numbers thus formed are unique with respect to one another and with respect to EAN-13 numbers.

Provision has been made in the TRADACOMS standards for the use of DUN-14 numbers. This means that TRADACOMS users trading in imported goods may also use the standard messages. Companies importing items from abroad need to allow a 14 digit field within their computer systems to accommodate these identifiers for traded units.

## 1.6 Serial Shipping Container Code (SSCC)

The SSCC is an EAN standard designed to enable unique identification of traded and transport units. It is used extensively to identify individual units that are constant and repeatable, ie. standard, such as uniform pallets, that need to be tracked and traced uniquely throughout the supply chain.

The serial shipping container code is particularly useful for identifying transport packages which contain a non-standard mixture of products, ie. a mixture which is not pre-defined nor repeatable, and provides a unique identity for traceability and tracking purposes.

It enables merchandise where products are picked and packed to meet individual orders, to be identified and traced, and supports operations such as despatch, distribution and receipt of packages.

The format of the SSCC is as follows:

| Serial Shipping Container Code (SSCC) | | | | |
|---|---|---|---|---|
| Application Identifier | Packaging Identifier | Company Prefix Number | Serial Number | Check Digit |
| 00 | P | 50NNNNN | NNNNNNNNN | C |

The Serial Shipping Container Code can be represented in bar code form using EAN-128 symbology. This type of bar code can contain many types of data, so an additional application identifier (AI) must be used within the symbol to indicate that the data following it is an SSCC. The AI (00) defines the format of the SSCC explicitly. It is equivalent to a data element identifier in an EDI message, and never needs to be sent as part of the data in EDI messages.

The initial digit after the AI is a packaging identifier. It is recommended, for simplicity, that the packaging identifier should always have a value equal to 3, which means undefined packaging type. Specific packaging identifier digits are used by some sectors of USA industry to identify various levels of packaging, and the full list is as follows:

0 = Case or carton
1 = Pallet (larger than case)
2 = Container (larger than pallet)
3 = Undefined
4 = Internal use (intra-company)
5 = Bilaterally defined (supplier/customer)

The seven digits following the packaging identifier are the EAN company prefix number, as allocated by the ANA in the UK, or by another EAN numbering organisation. Note the six digit UPC company prefix number can be accommodated by adding a leading zero, and eight digit company prefix numbers can be accommodated by reducing the serial number which follows by one digit.

The nine (or eight) digits following the EAN company prefix number are the serial number, and are used to identify uniquely each transport package or unit packed by a supplier.

The method used to allocate serial numbers is at the discretion of the company coding the unit. However the serial number must remain unique for a period of at least twelve months for each company prefix number, longer if the nature of the items contained within merit this.

The digit following the serial number is a check digit calculated from the preceding seventeen digits according to the standard modulo-10 algorithm described in section 1.1 above.

### 1.7 Symbolisation

Traded and transport unit codes can be represented in either EAN-13, ITF-14 or EAN-128 bar code symbol formats. Full details of the specification for symbolisation are given in the ANA Article Numbering and Symbol Marking Operating Manual.

### 1.8 Notification

It is absolutely vital that article numbers are properly notified. It is the supplier's responsibility to notify all trade customers of the article numbers that refer to, and no longer refer to, the goods that are supplied.

The initial information of a product's article number should be made by printed or electronic communication and should be received by the trading partner at least three weeks before delivery of the product.

Precise and consistent descriptions, sufficient to describe the stock keeping unit uniquely must be shown on the initial notification. The TRADACOMS Product Information File can be used to notify trading partners of this data.

## 2. LOCATION NUMBERING

The purpose of the international standard location number is to provide a commonly understood reference for all locations relevant to trading transactions. It is fundamental to the automatic processing and routing of EDI messages. The benefits are:

- Avoids conflicts from different companies using different codes to identify the same trading locations;

- Improved accuracy and speed in inter-company (and intra-company) communications for suppliers, shippers and buyers of goods;

- Simplified data processing and reduced administrative costs;

- Clearer identification of trading locations for subsequent analysis;

- The EAN location number standard supports all types of EDI standard messages, whether TRADACOMS or EDIFACT based.

### 2.1 Use of Location Numbers

EAN location numbers can identify companies, accounting departments, warehouse areas, delivery points, transmission points, even particular individuals where necessary. Used together with product numbers they can make electronic messages simpler and less expensive, removing the need for plain language descriptions about products, places or operational requirements.

The sort of information that might be held on file against the location numbers could include:

- Address
- Type of location (eg shop, depot, factory, head office)
- Region
- Telephone and fax numbers
- Associated location (eg Head Office for invoicing and mailbox number for EDI transmissions)
- Delivery requirements or restrictions

## 2.2 Location Number Structure

The EAN location number is a 13 digit number which is structured, for administrative purposes, into three parts. In the UK the split is as follows:

| Company Prefix Number | Location Reference Number | Check Digit |
|---|---|---|
| 50NNNNN | NNNNN | C |

The location number is composed in exactly the same way as the EAN article number and the check digit is calculated using the same modulo-10 algorithm (see paragraph 1.1 above). However this was not the case prior to 1 September 1995, so companies need to be aware that some existing locations will be identified using the previous calculation. It is therefore recommended that systems which will receive data containing location numbers should be set up to match the full 13 digits of these numbers, and not to perform a check calculation, when validating the data.

Companies which have been allocated a company prefix number by the ANA can also identify their trading locations using the same block of 100,000 numbers.

Note that this structure does not imply that parts of the number are meaningful. Rather, the entire thirteen digits are the unique reference in which the structure merely ensures lack of ambiguity. For example, the 50 prefix does not signify that the location is in the UK, only that the ANA allocated the company number.

Each physical address must have a different 13-digit number, and within one address different 13-digit numbers will be allocated to different functions where separate identification is required. This is particularly important when two invoicing departments are at the same address and HM Customs and Excise require each department to be identified separately.

It is the duty of the company assigning the codes to inform its trading partners of its standard location numbers, the corresponding locations and the relevant information about those locations. The TRADACOMS Customer Information File enables this to be done effectively by electronic communications. Please note that **location numbers may only be assigned by the owner of the location or by a trade association which has registered for the ANA's Location Numbering Service.**

## 2.3 Mailbox Numbering

Following discussions with the value added network providers the following rules apply to the location numbering of postboxes/mailboxes used for moving EDI messages between trading partners.

- Mailboxes are "electronic locations" on the network and the location numbers are used to direct or address EDI messages.

- Mailboxes are owned by the network and leased to users.

- The mailbox number **must** be assigned by the mailbox owner, ie. the value added network provider, and **not** by the network user.

- A mailbox number is **not** a trading company's identity number or head office location number.

- At present a user has a different mailbox for each network connection. Each mailbox must have its own unique location number allocated by the value added network provider.

**SECTION C: VAT AND TRADACOMS**

CONTENTS

## SECTION C - VAT AND TRADACOMS

### 1. INTRODUCTION

Invoices are subject to stringent requirements imposed under the VAT regulations. The TRADACOMS Standards have been developed in close liaison with HM Customs and Excise to ensure that these requirements are met and the ANA will continue to work with the tax authorities to ensure that no problems arise as the Standards and UK laws change in the future.

However, the ANA believes that the adoption of electronic invoicing should not involve a change of principle. The guidance given in the VAT Guide (HM Customs and Excise Notice No. 700) should continue to be followed, particularly Section (vi) - Tax Invoices. The TRADACOMS electronic invoicing standards reflect the practices used with paper systems - only the medium of communication has changed. The ANA is anxious to avoid unnecessary restrictions imposed merely due to a change in medium.

**Companies wishing to use EDI for invoicing must inform HM Customs and Excise of their intentions at least one month prior to starting transmissions.**

N.B. THROUGHOUT THIS SECTION 'INVOICE' IS USED AS A GENERIC TERM AND EMBRACES ALSO CREDIT NOTES AND DEBIT NOTES, WHERE THESE CONTAIN VAT.

Companies starting to use electronic credit notes should therefore also notify HM Customs and Excise in advance. The local VAT office should be kept informed of new trading partners for both invoices and credit notes.

Certain changes to the operation of the EDI communication may also need to be notified to HM Customs and Excise. These include: changing transmission media eg from magnetic tape to telecommunications; changing message standards eg TRADACOMS to EDIFACT; internal systems development which affects the audit trail and control procedures; changing the EDI software; or reverting to paper invoicing.

## 2. CALCULATION AND INDICATION OF VAT ON INDIVIDUAL INVOICES

### 2.1 VAT Values on Each Invoice

It is a requirement of HM Customs and Excise that all tax invoices should provide a total of "the amount of tax chargeable at each rate, with the charge to which it relates" and the total VAT of the invoice. The TRADACOMS Standards conform with this requirement.

### 2.2 Settlement (Cash) Discounts

When settlement (cash) discounts are available, on condition that the customer pays immediately or within a specified time, VAT must be calculated on the discounted amount. If there are alternative settlement discounts the highest commercially reasonable and freely available discount must be used in the VAT calculation.

### 2.3 Trade Discounts

The VAT must be calculated on the net amount after trade discounts have been applied, except contingency discounts, eg. for reaching a specified level of purchases. VAT may be adjusted later when the latter type of discount is earned, but it cannot be anticipated.

### 2.4 Mixed VAT Rate Items

**2.4.1** **Definition**: Some products are composite and their various components have different VAT rates. Examples include hampers containing food and wine (food zero rated, wine standard rated), tea in tea caddies (tea zero rated, caddy standard rated) and plain biscuits in toy drums (biscuits zero rated, drum standard rated).

At the time of writing there are four VAT categories in normal use: No VAT applies; 0% VAT rate; standard VAT rate; and lower rate for energy supplies. It is quite possible for further rates to be introduced and the TRADACOMS standards allow for this.

**2.4.2** **Method**: When invoicing for a product with a mixed VAT rate, a line describing the composite product (code, quantity, value, extended value) should be entered. This should be followed by lines describing the products individual components, categorised by VAT rate, in order of ascending VAT rate.

In the composite product line the VAT rate code (VATC) entered should be 'A', and the Mixed VAT Rate product Indicator (MIXI) should take a value of zero. In the lines detailing the product's components the relevant VAT rate code should be entered. In the first line showing a component, the Mixed VAT Rate Product Indicator should be set at '1', and incremented by '1' for each component line.

The code of the composite product and the quantity invoiced should be quoted in the component lines, together with the value and extended value of the component part.
A visual representation of the data is shown in Figure C.1.

**Figure C.1 Mixed VAT Rate Items**

The following elements appear in the segment ILD

| SPRO<br>Supplier's Prod. No. | QTYI<br>Quantity Invoiced | AUCT<br>Unit Cost Price | LEXC<br>Extended Line Cost | VATC<br>VAT Rate Code | MIXI<br>Mixed VAT Rate Product Indicator | TDES<br>Description of Traded Unit |
|---|---|---|---|---|---|---|
| 5012345678900 | 24 | 350000 | 8400000 | A | 0 | Hamper |
| 5012345678900 | 24 | 170000 | 4080000 | Z | 1 | |
| 5012345678900 | 24 | 70000 | 1680000 | S | 2 | |
| 5012345678900 | 24 | 110000 | 2640000 | E | 3 | |

It is important to note that the components are not separated by type of product, but merely by the VAT rate which they attract. For example if a standard rated container contains standard and zero rated products there will be one line for the container and all the standard rated products.

As tax invoices are normally required to show full descriptions, the method of dealing with each mixed VAT rate product should be agreed with the supplier's local VAT office. The agreement should involve full component descriptions being made available at the supplier's and at each customer's premises.

## 2.5 VAT Type of Supply

There is a legal requirement to identify the invoice type in terms of the following:

(a) sale

(b) hire purchase, conditional sale, credit sale or similar transactions

© loan

(d) exchange

(e) hire, lease or rental

(f) process (making goods from someone else's materials)

(g) sale on commission (for example, by an auctioneer)

(h) sale or return on similar terms

There is an indicator (TSUP - Type of Supply) in the invoice message to meet this requirement. If the indicator is omitted, the transaction is assumed to be a sale.

## 2.6 Free Goods

In certain circumstances H M Customs and Excise require that VAT must be paid on goods supplied free of charge. Such arrangements include "dealer loader", and similar schemes.

### 2.6.1 Definition

Dealer loader schemes are promotional schemes in which additional goods are offered to trade customers in return for orders of a specified size, as an inducement to order in greater quantities.

### 2.6.2 General Rule

Promoters of dealer loader schemes are required to calculate the tax of the additional goods, on their open market value, as well as on the goods which they supply. The additional goods must be shown on the tax invoice together with the tax due. It is optional whether the VAT on the additional goods is charged to the customer.

### 2.6.3 Exception

If the free/additional goods are incorporated with the main goods and supplied at an inclusive price ("combined supply", eg. 13 for the price of 12) tax is payable on the amount required from the customer only, provided that both are shown, included within the same invoice message and, if different products, an apportioned value is allocated to each.

### 2.6.4 Dealer Loader Schemes in TRADACOMS Invoices

There are two ways of showing the free goods:

(I) As a separate line in an invoice message

(ii) As an invoice message containing the free goods line only

In either case the VAT may, or may not, be charged to the customer.

In both cases, in order to separate the free goods from the main goods in the VAT summary, it is necessary to use separate VAT codes for the free goods in the VAT Code (VATC) data element.

The codes to be used are detailed in Code List 12 (see the Syntax & Data Dictionary Section D).

This automatically leads to separate VAT rate summaries for the free goods and thereby meets the legal requirement.

### 2.6.5 VAT Payable on Free Goods

Where VAT is charged to the customer the supplier may **either** set up new product codes for the free items, with no unit price but with VAT payable, **or** use the same product codes and prices as usual, but, with the VAT code as an indicator, calculate the amount payable from the VAT amount alone. The advantage of the second option is that it shows how the VAT has been calculated.

## 3. RESPONSIBILITY FOR ACCURACY OF THE CALCULATIONS

HM Customs and Excise have confirmed that the recipient of the tax invoice is **not required** to check the value of the VAT calculated by the supplier. The total VAT shown on the invoice is the figure which the invoice recipient should use for input VAT purposes - the accuracy of the calculation is the responsibility of the supplier. This applies to "electronic" invoices in the same way as to paper invoices. However, HM Customs and Excise do request that a customer satisfies himself that the VAT charge made by a supplier is reasonable (ie. the customer is prepared to pay that charge) in a similar way to checking any other demand/request for payment.

HM Customs and Excise require that whichever party calculates VAT on invoice files the resultant total is always exactly the same. The standard formula for the calculation is given in the VAT regulations (the VAT Guide para. 55).

## 4. VAT CONTROL TOTALS FOR INVOICE FILES

### 4.1 Checks to be Performed by the Recipient

The invoice recipient is required to check that the sum of the invoice file's VAT total (FVAT) is equal to the sum of the VAT totals (VVAT) in the file VAT Trailer, which in turn equals the invoices' VAT totals (TVAT) in all the invoice messages within the file.

FVAT = sum of VVAT = sum of TVAT

This total should correspond with the sum of the VAT totals given on the **File Control Report** discussed in paragraph 5 following.

The totals in the control document will equal the control totals in the VATTLR messages of the TRADACOMS invoice files. These file totals are calculated to two decimal places simply by summing the invoice totals. Note that in TRADACOMS standards VAT is not communicated at line level.

### 4.2 Rounding Errors

The total amounts payable on a TRADACOMS invoice allow two decimal places, as would appear on a paper invoice. The line charges within the file allow 4 decimals, and differences in companies' internal systems can mean that discrepancies due to rounding errors arise.

There is no one recommendation for rounding figures up or down, except that companies should be consistent in their approach. An agreement can be reached in advance on the allowed tolerance in the final totals which will be accepted by both trading partners. This tolerance can then be written in to the application which checks the invoice calculations and included on the File Control Reports.

## 5. THE REQUIREMENT FOR VAT FILE CONTROL REPORTS

HM Customs and Excise requires summary control documents to be created by both interchange partners in respect of each invoice interchange either sent or received by EDI.

These documents fulfil a number of purposes in that they provide a reference point, or source audit document, from which local VAT inspectors may conduct detailed verifications into the commercial and VAT accounting records and provide a ready made means of cross-check between the local VAT office for the sender and that of the receiver. They also offer a reasonable level of audit assurance over the completeness and accuracy of the end to end data transfer process.

The ANA has produced a standard File Control Report which meets the needs of both HM Customs and Excise and trading partners. Examples are given in the following Figures. Figures C.2, C.3 and C.6 are examples of sender's and receiver's reports, and Figures C.5 and C.7 show how these are derived from the TRADACOMS file.

**Figure C.2 Magnetic Tape Invoice Data Interchange File Control Report**

REPORT NO. ANA001 INVOICE DATA INTERCHANGE FILE CONTROL REPORT DATE 30/12/95

| | FROM: | TO: |
|---|---|---|
| ANA IDENTITY/LOCATION | 5000999000019 | 5000001000994 |
| LEGAL NAME | GENERAL SUPPLIES PLC | HIGH STREET STORES |
| ADDRESS | GROCERY DIVN HEADQUARTERS<br>THREADNEEDLE STREET<br>LONDON<br>EC2B 4WZ | HSS HOUSE<br>CHECKOUT LANE<br>GARDEN CITY<br>HERTS GC1A 1QT |
| VAT REGISTRATION NO | 412 9017 11 | |
| INTERCHANGE MEDIUM | MAGNETIC TAPE (REEL NO. 000067) | |

FILE DETAILS & CONTROL TOTALS:

| Invoice End Date | Delivery End Date | Generation Number | Version Number | VAT Code | VAT Rate | Invoices Cost (exc VAT) | Total VAT | Invoices Cost (inc VAT) |
|---|---|---|---|---|---|---|---|---|
| 24/12/92 | 22/12/92 | 74 | 1 | Z | 0.00 | 2489.26 | 0.00 | 2489.26 |
| | | | | S | 17.50 | 87204.73 | 15260.82 | 102465.55 |
| | | FILE TOTALS (503 INVOICES 506 MESSAGES) | | | | | | |
| 31/12/92 | 29/12/92 | 75 | 1 | Z | 0.00 | 4312.87 | 0.00 | 4312.87 |
| | | | | S | 17.50 | 78403.59 | 13720.62 | 92124.21 |
| | | FILE TOTALS (486 INVOICES 489 MESSAGES) | | | | | | |

**Figure C.3 Direct Transmission Invoice Data Interchange - Sender's File Control Report**

REPORT NO. ANA002 SENDER OF INVOICE DATA EXCHANGE - FILE CONTROL REPORT DATE 30/04/95 Page 1 of 2

| | FROM: | TO: |
|---|---|---|
| ANA IDENTITY/LOCATION | 5000999000019 | 5000001000994 |
| LEGAL NAME | GENERAL SUPPLIES PLC | HIGH STREET STORES |
| ADDRESS | GROCERY DIVN HEADQUARTERS<br>THREADNEEDLE STREET<br>LONDON<br>EC2B 4WZ | HSS HOUSE<br>CHECKOUT LANE<br>GARDEN CITY<br>HERTS GC1A 1QT |
| VAT REGISTRATION NO | 412 9017 11 | |
| INTERCHANGE MEDIUM | DIRECT TRANSMISSION | TRANSMISSION DATE: 30/04/1985<br>TRANSMISSION TIME: 10:05 |

FILE DETAILS & CONTROL TOTALS:

| Invoice End Date | Delivery End Date | Generation Number | Version Number | VAT Code | VAT Rate | Invoices Cost (exc VAT) | Total VAT | Invoices Cost (inc VAT) |
|---|---|---|---|---|---|---|---|---|
| 30/04/94 | 29/04/95 | 74 | 1 | Z | 0.00 | 2489.26 | 0.00 | 2489.26 |
| | | | | S | 17.50 | 87204.73 | 15260.82 | 102465.55 |
| | | | | X | 0.00 | 1500.00 | 0.00 | 1500.00 |

FILE TOTALS (504 INVOICES 507 MESSAGES)

**Figure C.4 File Control Report Invoice Cross-References**

REPORT NO. ANA002 SENDER OF INVOICE DATA EXCHANGE - FILE CONTROL REPORT DATE 30/04/92 Page 2 of 2

| | FROM: | TO: |
|---|---|---|
| ANA IDENTITY/LOCATION | 5000999000019 | 5000001000994 |
| LEGAL NAME | GENERAL SUPPLIES PLC | HIGH STREET STORES |
| ADDRESS | GROCERY DIVN HEADQUARTERS<br>THREADNEEDLE STREET<br>LONDON<br>EC2B 4WZ | HSS HOUSE<br>CHECKOUT LANE<br>GARDEN CITY<br>HERTS GC1A 1QT |
| TRANSMISSION FILE ID: | GENERATION NUMBER 0117 | VERSION NUMBER 0001 |

INVOICE NUMBERS:

00300615
00300616

**Figure C.5 Calculation of the Sender's File Control Report**

| REPORT NO. | SENDER OF INVOICE DATA EXCHANGE - FILE CONTROL REPORT DATE (DDMMYY) | |
|---|---|---|
| | FROM: | TO: |
| ANA IDENTITY/LOCATION | SDT SIDN (1) | CDT CIDN (1) |
| LEGAL NAME | SDT SNAM | CDT CNAM |
| ADDRESS | SDT SADD (1)<br>SDT SADD (2)<br>SDT SADD (3)<br>SDT SADD (4)<br>SDT SADD (5) | CDT CADD (1)<br>CDT CADD (2)<br>CDT CADD (3)<br>CDT CADD (4)<br>CDT CADD (5) |
| VAT REGISTRATION NO | SDT VATN | |
| INTERCHANGE MEDIUM | (as appropriate) | TRANSMISSION DATE: STX TRDT (1)<br>TRANSMISSION TIME: STX TRDT (2) |

FILE DETAILS & CONTROL TOTALS:

| Invoice End Date | Delivery End Date | Generation Number | Version Number | VAT Code | VAT Rate | Invoices Cost (before VAT) | Total VAT | Invoices Cost (inc VAT) |
|---|---|---|---|---|---|---|---|---|
| FDT IVED | FDT DVED | FIL FLGN | FIL FLVN | VRS VATC | VRS VATP | VRS VSDI | VRS VVAT | VRS VPSI |

FILE TOTALS: TOT FTNI INVOICES: END NMST messages

**Figure C.6 Direct Transmission Invoice Data Interchange - Receiver's File Control Report**

REPORT NO. ANA003 RECEIVER OF INVOICE DATA INTERCHANGE - FILE CONTROL REPORT DATE 01/05/95

| | FROM: | TO: |
|---|---|---|
| ANA IDENTITY/LOCATION | 5000999000019 | 5000001000994 |
| LEGAL NAME | GENERAL SUPPLIES PLC | HIGH STREET STORES |
| ADDRESS | GROCERY DIVN HEADQUARTERS<br>THREADNEEDLE STREET<br>LONDON<br>EC2B 4WZ | HSS HOUSE<br>CHECKOUT LANE<br>GARDEN CITY<br>HERTS<br>GC1A 1QT |
| VAT REGISTRATION NO | 412 9017 11 | |
| INTERCHANGE MEDIUM | DIRECT TRANSMISSION | TRANSMISSION DATE: 30/04/1985 |

CONTROL DATA:

| Transmission Date | Identification Gen. No. | Identification Version No. | VAT Code | VAT Rate | Invoices Cost (before VAT) | Total VAT | Invoice Cost (inc VAT) |
|---|---|---|---|---|---|---|---|
| 30/04/95 | 74 | 1 | Z | 0.00 | 2489.26 | 0.00 | 2489.26 |
| | | | S | 17.5 | 87204.73 | 15260.82 | 102465.55 |
| | | | X | 0.00 | 1500.00 | 0.00 | 1500.00 |

504 INVOICES 507 MESSAGES

FILE DATA:

| Invoice End Date | Delivery End Date | VAT Code | VAT Rate | Invoices Cost (before VAT) | Total VAT | Invoice Cost (inc VAT) |
|---|---|---|---|---|---|---|
| 30/04/95 | 29/04/95 | Z | 0.00 | 2489.26 | 0.00 | 2489.26 |
| | | S | 17.50 | 87204.73 | 15260.82 | 102465.55 |
| | | X | 0.00 | 1500.00 | 0.00 | 1500.00 |

504 INVOICES 507 MESSAGES

**Figure C.7 Calculation of the Receiver's File Control Report**

| REPORT NO. | | | RECEIVER OF INVOICE DATA INTERCHANGE - FILE CONTROL REPORT DATE (DDMMYY) | | | | |
|---|---|---|---|---|---|---|---|
| | | | FROM: | | | TO: | |
| ANA IDENTITY/LOCATION | | | SDT SIDN (1) | | | CDT CIDN (1) | |
| LEGAL NAME | | | SDT SNAM | | | CDT CNAM | |
| ADDRESS | | | SDT SADD (1)<br>SDT SADD (2)<br>SDT SADD (3)<br>SDT SADD (4)<br>SDT SADD (5) | | | CDT CADD (1)<br>CDT CADD (2)<br>CDT CADD (3)<br>CDT CADD (4)<br>CDT CADD (5) | |
| VAT REGISTRATION NO | | | SDT VATN | | | | |
| INTERCHANGE MEDIUM | | | (as appropriate) | | | TRANSMISSION DATE: STX TRDT | |
| CONTROL DATA: | | | | | | | |
| Transmission Date | Identification Gen. No. | Identification Version No. | VAT Code | VAT Rate | Invoices Cost (before VAT) | Total VAT | Invoice Cost (inc VAT) |
| STX TRDT (1) | FIL FLGN | FIL FLVN | VRS VATC | VRS VATP | VRS VSDI | VRS VVAT | VRS VPSI |
| FILE TOTALS: TOT FTNI, INVOICES: END NMST MESSAGES | | | | | | | |
| FILE DATA: | | | | | | | |
| Invoice End Date | Delivery End Date | | VAT Code | VAT Rate | Invoices Cost (before VAT) | Total VAT | Invoice Cost (inc VAT) |
| FDT IVED | FDT DVED | | VAT VATC | VAT VATP | ∑ STL ASDA | ∑ STL VATA | ∑ STL APSI |
| FILE TOTALS: TOT FTNI, INVOICES END NMST MESSAGES | | | | | | | |

When the invoices are on magnetic tape or disks the documents should be sent with the tapes or disks. An example of a File Control Report to accompany a magnetic tape is shown in Figure C.2.

Where direct transmission is used the sender's paper control document need not be sent to the recipient providing the recipient also prints out a control document showing:-

I) The necessary control totals from the file trailer messages;

ii) The same totals recalculated by totalling the relevant data values at transaction level.

These two sets of totals must be equal. The formats of the control documents for sender and receiver of direct transmissions are shown in Figures C.3 and C.6.

## 5.1 File Control Reports

Control documents, known as File Control Reports, must show the following:

* Report date (the invoice period end date should be quoted)

* Originator's name and address (normally their **VAT Registration** address)

* Originator's VAT registration number

* Recipient's name and address

* File Generation Number

* File Version Number

* Each VAT Code and rate used in the invoice file with the corresponding total invoice cost excluding VAT (VSDI), total VAT (VVAT) and total invoice cost including VAT (VPSI) associated with each rate. If there are two or more files on the tape or disk separate file totals must be shown for each file. It is not recommended that more than one invoice file is sent in a direct transmission, as this causes difficulty in tracing errors on individual invoice messages

* File total cost excluding VAT (FASI), file total VAT (FVAT) and file total cost including VAT (FPSI)

* Total number of invoices

* Total number of any other types of record (if any) in the file.

* On magnetic media the tape/disk serial number must be shown.

* When magnetic tapes are used there should be one control report per tape.

* When disks are used there should be one control report per set of disks.

* When using telecommunications the transmission date and time must be shown.

There should also be one control report per satisfactorily completed transmission. An aborted or otherwise incomplete transmission does not require a control report, unless any of the transmitted data is read into the recipient's own system. In this case a control report is required covering that data.

### 5.2 Audit Requirements

HM Customs and Excise require that invoice data, both sent and received, is archived for a retention period of six years. Invoices sent electronically may be stored on electronic media, or converted to paper or another suitable format. The invoice transmissions must be kept or be able to be regenerated in human-readable form.

The File Control Report is the key document used by HM Customs and Excise when auditing the accounts. To enable VAT records to be located and examined upon request, companies will find it helpful to maintain a cross-reference list of which invoices are covered by each File Control Report (see Figure C.4). This forms part of the audit trail. The numbering of invoice files should also allow both senders and receivers to track these transmissions. The required controls are detailed in Section A, paragraph 8 Controls.

## 6. SENDER/RECEIVER IDENTIFICATION OF DATA AND DOCUMENTS

There is a legal requirement for the full names and addresses of both the invoice originator and the invoice recipient to be shown on tax invoices. When communicating invoices electronically these names and addresses should be shown both in the invoice file header message (elements CNAM, CADD, SNAM and SADD) and on the control document.

EAN International has developed a standard location numbering system which uniquely identifies companies and their locations. It is acceptable to the VAT Commissioners to use the EAN location number in place of the full company name and address, provided that these do appear at least once in the file. Further details of location numbering are given in Section B.

HM Customs & Excise advise users that, where they intend to use a location cod70e in lieu of a text name and address, additional conditions apply. These are that HM Customs & Excise approve the code and require that both the sender and receiver have suitable facilities to relate a code to the name and address information for local verification purposes. These look-up facilities need to be maintained for the full six year retention period over which the invoices must be archived.

Each VAT registered entity is required to have a different EAN location number.

## 7. TAX POINTS

As the tax point date is directly related to the rate of tax and accounting period it has material significance at the end of an accounting period or at the time of a rate change.

ANA Standards require that there should be one invoice per delivery. Thus whether the tax point is taken to be the invoice date or the delivery date, a change in VAT rate will never result in two different rates on one invoice. However, an invoice file, which might typically include invoices for a period of one week, could, in theory, span a VAT change.

As the VAT file trailer and the control document must show VAT totals analysed by rate, it is essential that the old rates for particular codes are in one file and those showing the new rates for the same codes are in another invoice file. These files may be on the same tape or disk or in the same telecommunications transmission. This means that there will be separate file totals for the old and new rates, and these file totals will be shown separately on the control document.

## 8. CREDITS AND DEBITS

Only credit entries in respect of returnable containers, other items used for conveying goods, handling allowances, or categories acceptable to HM Customs & Excise may be entered in the credit line in VAT invoices (see ANA Standard Code Values List 9). Provided this is observed the total shown in the VAT file trailer and control document can be a net figure - there is not a requirement to show a credit total and debit total separately.

In some cases the net total will be a negative figure. This is shown in TRADACOMS by a minus sign.

Other credits must be shown in the credit note file, when using the TRADACOMS standards. If the customer raises manual debit notes in anticipation of credit notes, then agreement must be reached on which of these documents is to be used to adjust VAT entries.

It should be noted that, provided the customer is able to reclaim all the tax charged to him as input tax and provided both trading partners agree, VAT may be omitted from credit notes altogether. Further guidance on this aspect is given in the VAT Guide, Notice No. 700, which is available from HM Customs & Excise local VAT offices.

# 9. ERROR PROCEDURES

## 9.1 Distinction between Rejected Exchanges and Accepted Exchanges

HM Customs and Excise are concerned with two types of error:

I) where the communication cannot be read (for physical reasons or syntactic reasons);

ii) where the communication is read into the recipient's system and errors in the data are then found.

Aborted or otherwise incomplete telecommunications transmissions are treated as being of the first type (ie. rejected exchanges), provided that none of the transmitted data is read into the recipient's system. If any of it is, then that data is subject to all the requirements applying to the second type (ie. accepted exchanges).

## 9.2 Rejected Exchanges

When the communication cannot be read (for physical or syntactic reasons) it must be rejected, and a new communication made. It would be deemed that no valid transaction had occurred. The corrected communication should normally have the same generation number as the original but the version number will be incremented.

However, if equipment used for data transmission is not capable of incrementing the version number (ie. non-intelligent, off-line equipment) the original version number can be used in the retransmissions provided that there is no possibility that the original transmission had been read into any of the recipient's files.

The version number is used to prevent the same data from being processed twice, and, in effect, a transmission which is not accepted is not a 'version'. Note that, for commercial rather than legal reasons, re-submitted tapes or disks must always carry a new version number even if no data had been read into any of the recipient's files.

## 9.3 Accepted Exchanges

If the communication is read into the recipient's system (because the control totals match) and errors in the data are then found, a valid transaction has occurred. The invoice originator must then either raise credit notes to cancel the incorrect invoices and submit new corrected invoices, or the recipient must provide error listings on a "discrepancy advice" which will form part of the legal accounts.

Such notification should form part of the accounts held for the legally defined period by originator and recipient, and could be used to establish an audit trial. Discrepancy notification can be followed up and replaced by credit notes.

# 10. THE SINGLE EUROPEAN MARKET - 1993

## 10.1 Electronic Data Capture Service (EDCS)

EDCS is the facility provided by HM Customs and Excise to help businesses cope with the requirements of the Single Market.

From January 1 1993, the EDCS will become the UK's single reception point for all Single Market applications data supplied electronically.

The EDCS will accept data covering VAT aggregate sales listings, intra-EC supplementary statistical declarations and period entry requirements. This data can be sent in a single transmission. Returns from registered excise dealers and shippers (REDS), however, will not initially be accepted.

Based on the international data message standard EDIFACT, data can be sent via GE Information Services, INS Division TRADANET Service, IBM Information Exchange, AT&T EASYLINK Service and BIFANET. Preferential rates may be available for EDCS traffic. The EDCS will also accept data on standard 9-track magnetic tapes and 3.5 and 5.25 inch diskettes.

## 10.2 VAT Registration Number

From 1 January 1993 there is a requirement by the Originator to incorporate the recipient's VAT/TAX registration number on invoices covering intra-EC supplies. This will not affect domestic trade within the UK.

Companies should contact EC customers for their VAT/TAX registered numbers and record these in their accounting records.

Local VAT offices can inform companies whether a number is valid, but this service is only available for suspect numbers and not routine checking. The format of VAT registration numbers for EU member states differs from the UK standard. A list of these formats is available from the ANA or from HM Customs and Excise.

For advice and further information on EDCS contact:

EDCS, Off-line, Shoebury Computer Complex, Campfield Road, Shoeburyness, Essex, SS3 9BY.

Tel: 0702 36 7248
Fax: 0702 36 6093

**SECTION D: SYSTEM DESIGN GUIDELINES FOR MESSAGE CONSTRUCTION AND TRANSLATION**

## CONTENTS

# 1. SUMMARY

## 1.1 Scope

**1.1.1** This Section gives recommendations on the design and programming of routines to construct and translate messages that have been specified according to the syntax rules, described in the Volume "TRADACOMS SYNTAX AND DATA DICTIONARY".

**1.1.2** When writing this Section, consideration has been given to the following points:-

- techniques are described which are applicable to both the large and small computer user.

- the design guidelines are applicable to the majority of computer languages.

- the programming guidelines refer explicitly to COBOL and PL/1 and use only the most widely implemented features of these languages.

- the programming techniques have been tested in COBOL.

## 1.2 Design Outline

### 1.2.1 Message Construction

Two methods of message construction are considered:

- messages structure coded into message-dependent application programs (subsequently referred to as hard-coded programs).

- message structure defined by means of parameters held in tables.

### 1.2.2 Merits of the Two Approaches

More details of these two methods are developed later in the guidelines, but it is worth reviewing at this point the relative merits of the two approaches.

(a) Hard-coded message construction. This method is based on programs which are developed to process specific messages. The formats of the in-house files and the output messages are coded into the programs. Consequently any changes to the layout of the in-house file or the layout of the output message requires the program coding to be amended. In a dynamic situation where message layouts are changed fairly frequently, such an approach would prove uneconomic. A further consideration regarding this method is that the coding required to process a large message is extensive and requires considerable programming effort.

(b) Table-driven construction. The table driven approach constructs messages according to parameters held in tables. It is therefore relatively flexible. For example, if new messages are to be processed or changes are to be

made to existing messages, no program changes are required and the amendments are implemented by modification to the appropriate table(s).

(c) Where two or more partners are prepared to pool their resources considerable cost and time advantages could be obtained from a consortium approach. The table-driven approach offers the most suitable technique in these circumstances, due to the general nature of the program structures.

(d) A cautionary note is that when using tables it could prove impractical to process the more complex in-house files directly. It is recommended that files be reorganised by an additional program prior to the message construction program.

### 1.2.3 Summary of the Two Methods Recommended for Message Construction

**Hard-Coded programs**

| | **Advantages** | | **Disadvantages** |
|---|---|---|---|
| 1. | The programming, while occasionally labourious, is relatively easy. | 1. | Program sizes will increase in direct proportion to the number of messages and facilities incorporated. |
| 2. | Interfaces with in-house systems can be tailored more readily than the table-driven approach. | 2. | Programmes not readily transportable between partners with different in-house systems. |
| 3. | Fewer programs (eg. no requirement for table maintenance suite programs). | 3. | Changes to existing messages or the addition of new message structures require modification and re-testing of programmes. |
| 4. | Development time is relatively short for a restricted number of messages. | | |
| 5. | Basic use of the syntax rules could be developed in relatively unsophisticated hardware. | | |

**Table Driven**

| | **Advantages** | | **Disadvantages** |
|---|---|---|---|
| 1. | Flexible - additional messages | 1. | Programs are more complex |

| | | |
|---|---|---|
| | require no program changes. | would normally be encountered in an average installation. |
| 2. | Transportable - the table driven approach is ideal if one set of programs is to be developed for use by two or more interchange partners. | 2. Development time is likely to be longer compared to the hard-coded approach. |
| 3. | Program size finite. The size of programs is dependent only on the syntax rules processed. Any number of messages using these rules can be processed without increasing the size of programs. | 3. Table maintenance requires additional programs. |
| 4. | Many of the techniques of message creation can be extended for use in message translation, for which only a table-driven approach has been recommended. | 4. Table creation requires considerable time and effort from both the data processing and user departments. The task of table creation should not be underestimated. |

## 1.3 Message Translation

### 1.3.1 Method

Only one method is described for the translation of messages inwards and this is the table-driven approach. Although a hard-coded system could be developed, extensive numbers of program statements could be generated due to the problems of error conditions, the need to process compressed data, and features such as the omission of conditional data elements and their associated separators.

### 1.3.2 Structure

The structure of incoming messages is defined via the parameters held on tables. Errors such as missing mandatory segments can be detected since the sequence of segments and data elements is also defined within the tables.

### 1.3.3 A Two Phase Translation Process

These guidelines recommend that translation of incoming messages is carried out during two distinct phases:

(a) All transmitted data is de-formatted and expanded into a format suitable for its ultimate use (eg. if the data is to be input to a recipient's own computer system it should be edited to the normal standards applicable to that computer). During this phase all syntax characters such as field

separators are eliminated. The segment codes however are retained as record types and each segment is contained in a fixed length record whose size is large enough to accommodate the largest segment.

(b) These segment records can then be used in whichever way the user wishes within his own in-house system.

## 1.4 Points Arising from the Testing of Guidelines

All of the major features described later in these guidelines were tested in a simulated live environment using the table-driven method, and as a result of these tests the following points were highlighted.

### 1.4.1 Message Design

It is important that no attempt is made to develop any programs until the detailed structure of messages has been agreed between interchange partners. The TRADACOMS SYNTAX AND DATA DICTIONARY Volume of this manual gives guidance on this process. It is also vitally important to document these structures in an absolutely standard way.

### 1.4.2 Data Analysis

Using the agreed standard message structures the data requirements should be analysed relative to the availability of data held on the in-house systems. No attempt should be made to set up tables or write programs until the source of all data has been established. This might include the need for reorganising in-house file structures or even in extreme cases renegotiating the TRADACOMS Standard message structures.

### 1.4.3 Valid Data

No attempt should be made to construct messages from data that has not been validated. If there is any chance that data extracted from the in-house systems can contain errors, a procedure should be established to validate the data before submission to the message construction programs.

### 1.4.4 Reconstitution of Data

Experience gained from testing the guidelines suggests that, where complications might be encountered as a result of the in-house file structures, it is far easier to reorganise the files as a front-end process than to attempt to build tables to reflect the file structures.

The following situations caused particular problems during testing:

(a) **Segments Constructed from Multiple Records**

This was aggravated if one of those records had to be held in store while another segment had to be constructed from an intervening record.

(b) **Repeating Segments**

Problems were encountered whenever segments which repeated were processed in conjunction with either multiple records or held records. Users are strongly recommended to reorganise repeating data into records such that each record relates to one repeating segment only.

(c) **Held Records**

Holding records in store causes difficulties in most situations. Wherever possible files should be reorganised or sorted to eliminate the need for holding records.

### 1.4.5 Co-ordination of Tables for Message Construction and Message Translation

Users should ensure that any changes to message tables should be considered for both message construction and translation.

### 1.4.6 Compression

Extra tests during the programming of the guidelines indicated that the compression process incurred an overhead of about 35% on message construction program execution times. Where the output does not require compression, for example if the exchange medium is magnetic tape, savings on both run and development times could be achieved by not compressing messages. Similarly, where transmission is via telecommunications networks, compression need not be carried out if data volumes are low.

## 2. SUBMISSION OF IN-HOUSE FILES TO MESSAGE CONSTRUCTION

## 2.1 General

### 2.1.1 Introduction

The suitability of an in-house file for use as direct input to the message construction program depends to a certain extent on the mode of message construction. In section 3 two alternative approaches are described:

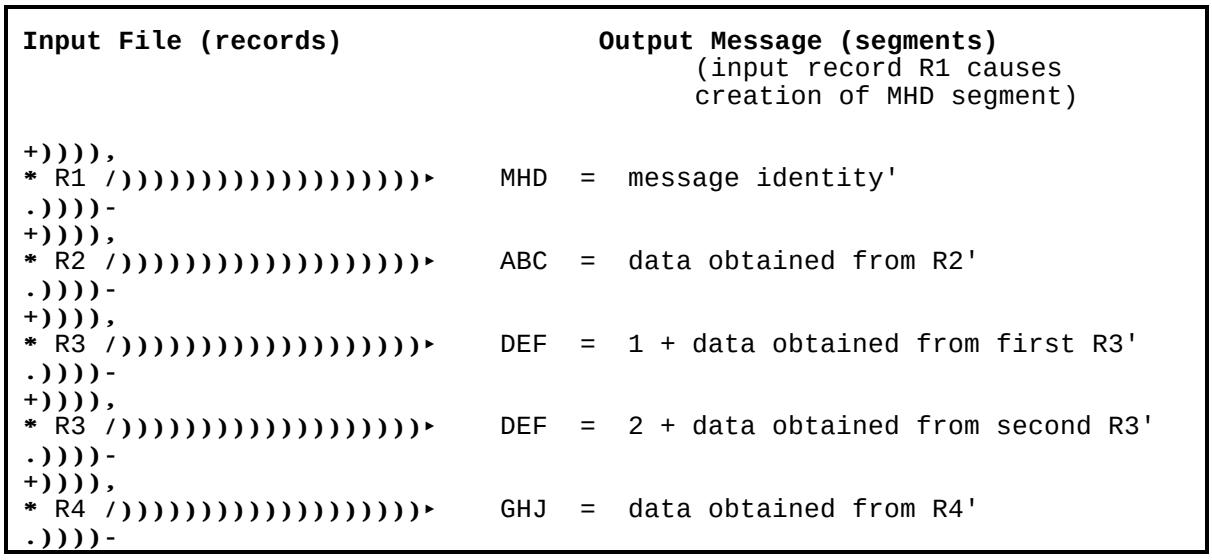
- a message dependent hard-coded method (subsection 3.1)

- a general parameter driven method (subsection 3.2).

### 2.1.2 Alternative Approaches

(a) The 'ideal' input to the message construction program is an input file where there is a one to one correspondence between an input record and an output segment. This input structure (illustrated in Fig. 3.1) reduces the complexity of the message construction programme to a minimum, similarly reducing the programming and processing time.

**Figure D.1**



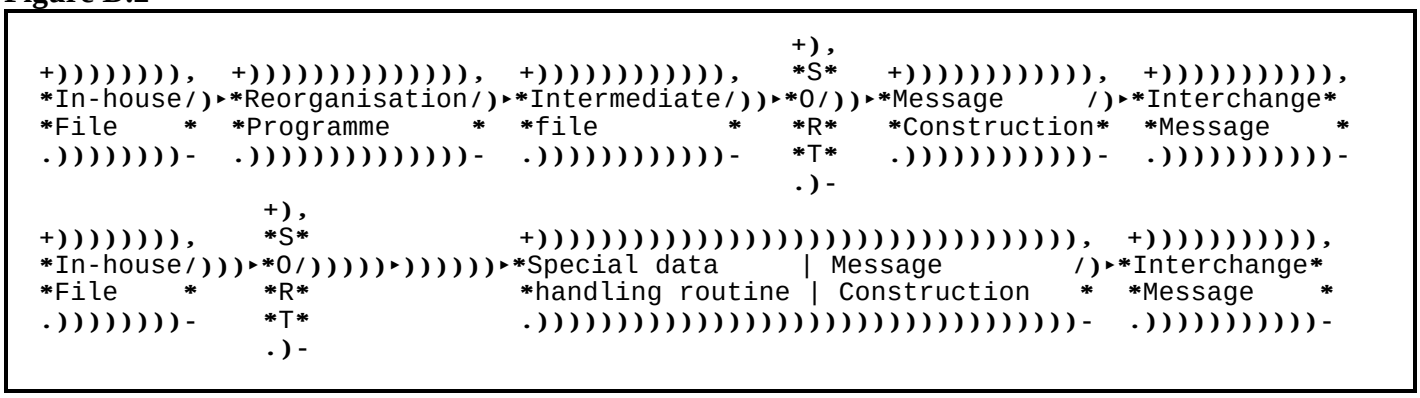

Where the structure of the in-house file does not reflect this 'ideal' file organisation, a choice has to be made between:

- reorganising the in-house file to generate a file structured so as to be as near as possible to the 'ideal' file for input to Message Construction.

- increasing the complexity of the Message Construction program by adding the extra processing necessary to enable the in-house file to be used as direct input into Message Construction.

(b) The two choices can be presented diagrammatically as in Fig. D.2.

**Figure D.2**




Basically the rule should be that if the in-house files are complex they should be ordered into a simple sequential file as described above. Data held, for example, on a database should be extracted, manipulated as required and if necessary sorted into the sequence most suitable for input to Message Construction.

(c) One of the simplest files to process is an image of a formatted print; therefore if a program already exists to produce such a print, this can be utilised as a 're-organisation program'.

(d) If a hard-coded message construction program is being used the tendency can be always to follow the latter alternative and, as reflected in the examples contained in subsection 2.2, many types of file structure can be used as direct input to such a program. However, splitting the hard-coded message construction program into a reorganisation program and a construction program can offer the advantages of a reduced amount of coding, giving a smaller maintenance effort, by:

- allowing full use to be made of any reliable utilities in the reorganisation program.

- reducing the complexity required in the construction program.

An additional consideration is that the 'other processing' required (as described in subsection 2.1.3) can be incorporated into the reorganisation program.

### 2.1.3 Other processing Required in Addition to Message Construction:

(a) Validation of data. It is recommended that all data should be checked for validity before submission to the message construction program. In most cases the data will be validated in the initial data capture stage but in some instances a pre-input validation program will be required.

(b) Conversion of data representation. The data representation specified in

the TRADACOMS Message Standards may be different from that used internally.

Example are:

- Names and addresses. The internal representation may be 4 lines of 40 characters where the interchange standard is one line of 40 characters for names and 4 lines of 35 characters for addresses.

- Dates. The internal representation may use a Julian date or a DDMMYY layout where the interchange standard is for a YYMMDD layout.

The conversion of data can either be carried out:

- prior to input to the message construction program (recommended); or

- as part of the message construction program (this should only be considered if the message-dependent application program technique is being used).

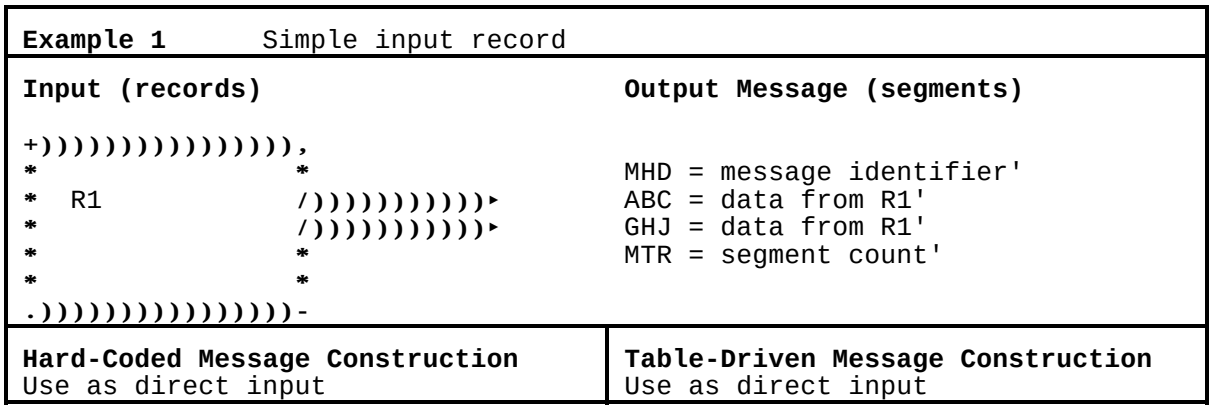
(Note - conversion between data formats ie. from binary or packed decimal is considered to be part of message construction. See section 3)

## 2.2 Recommendations for Input Processing of Particular File Structures

### 2.2.1 One Input Record per Message (containing fixed data only)

**Figure D.3**

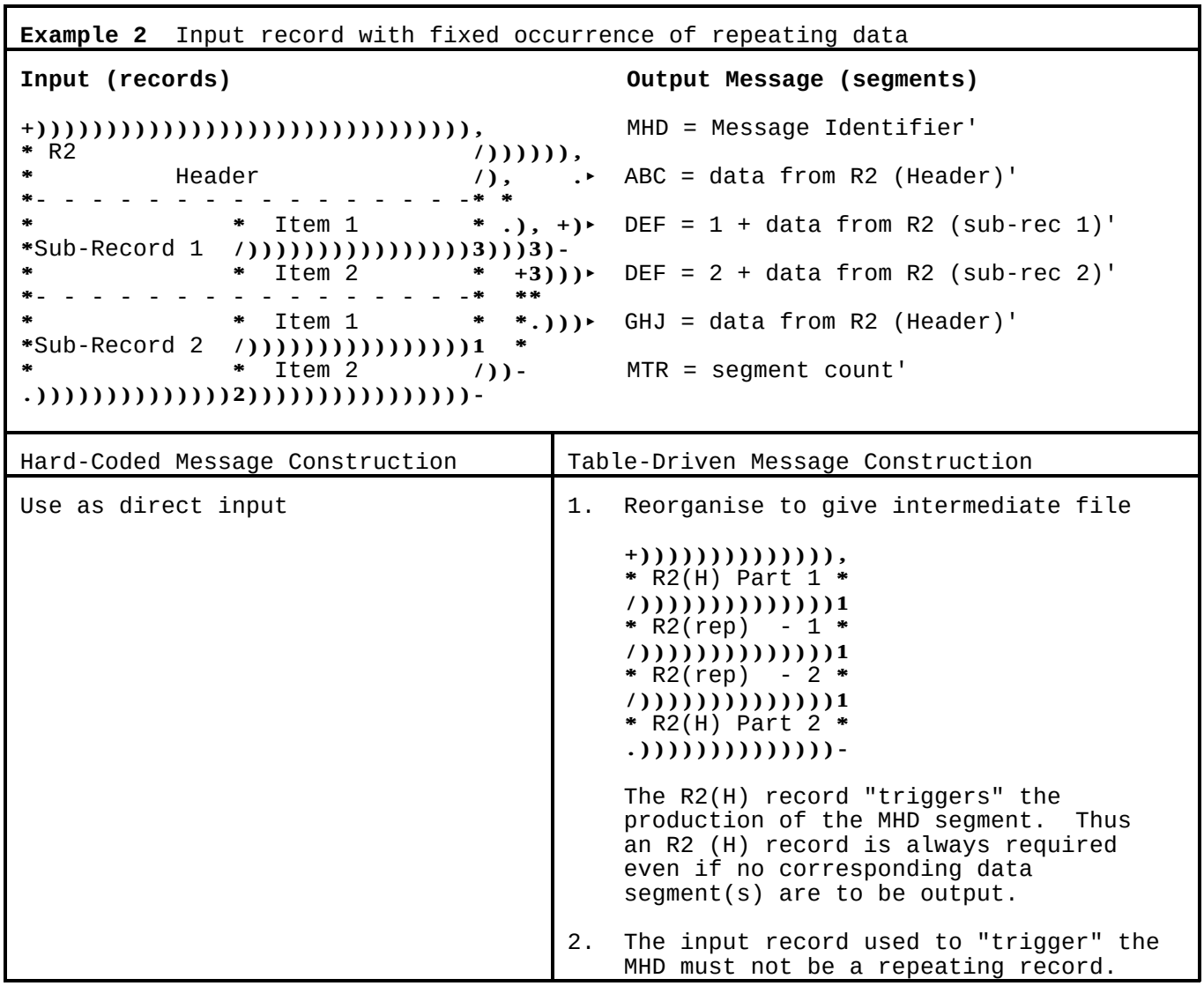
**Example 1** Simple input record




| **Hard-Coded Message Construction** | **Table-Driven Message Construction** |
|---|---|
| Use as direct input | Use as direct input |

**Figure D.4**

**Example 2** Input record with fixed occurrence of repeating data



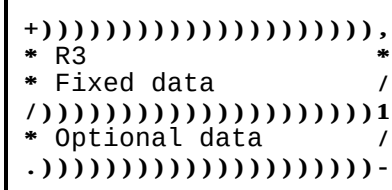

| Hard-Coded Message Construction | Table-Driven Message Construction |
|---|---|
| Use as direct input | 1. Reorganise to give intermediate file<br><br>+)))))))))))))),<br>* R2(H) Part 1 *<br>/)))))))))))))1<br>* R2(rep) - 1 *<br>/)))))))))))))1<br>* R2(rep) - 2 *<br>/)))))))))))))1<br>* R2(H) Part 2 *<br>.)))))))))))))-<br><br>The R2(H) record "triggers" the production of the MHD segment. Thus an R2 (H) record is always required even if no corresponding data segment(s) are to be output.<br><br>2. The input record used to "trigger" the MHD must not be a repeating record. |

### 2.2.2 One Input Record per Message (containing fixed and optional data)

**Figure D.5**

**Example 3** Two part input record - one fixed part and one optional part

**Input (records)**




**Output Message Segments**

MHD = Message Identifier'

ABC = data from R3 (fixed data)'

GHJ = data from R3 (optional data)'

MTR = segment count'

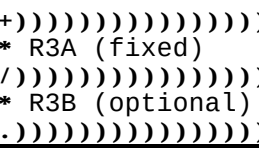
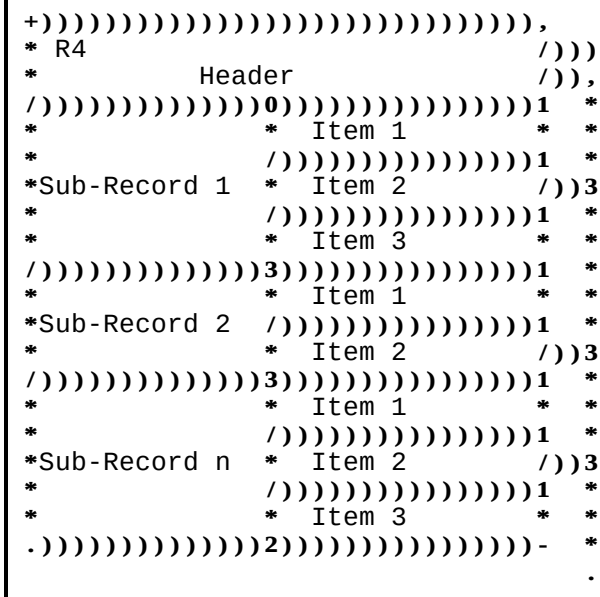
| Hard-Coded Message Construction | Table-Driven Message Construction |
|---|---|
| Use as direct input | 1. Reorganise to give intermediate file<br>  |

**Figure D.6**

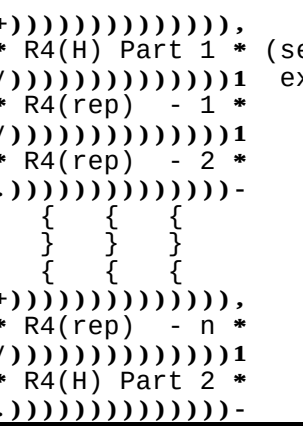
**Example 4** Multi-part input record - one fixed part and multiple repeats of optional part

**Input (records)**




**Output Message (segments)**

```
MHD = Message Identifier'
ABC = data from R4 (Header)'
DEF = 1 + data from R4 (sub-record 1)'
DEF = 2 + data from R4 (sub-record 2)'
DEF = 'n' + data from R4
      (sub-record 'n')'
GHJ = data from R4 (Header)'
MTR = segment count'
```

| Hard-Coded Message Construction | Table-Driven Message Construction |
|---|---|
| Use as direct input | 1. Reorganise to give intermediate file<br>  <br> |

### 2.2.3 Multiple Input Records per Message

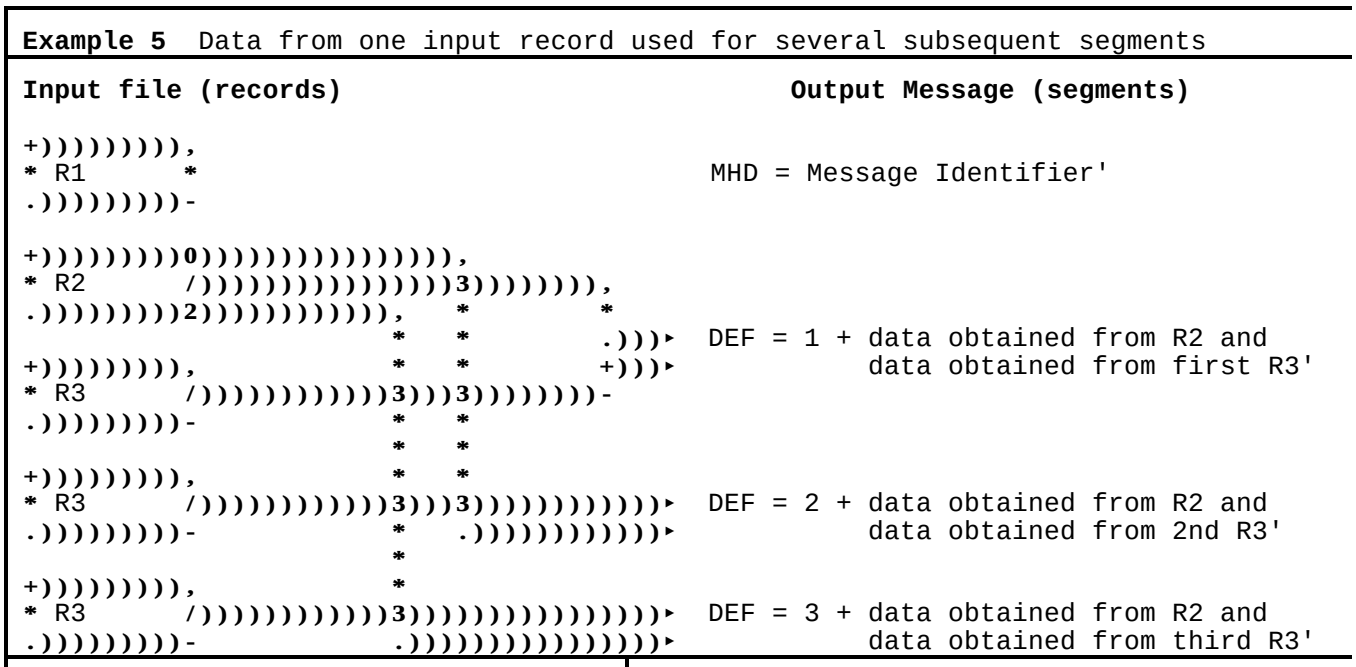
(a) One input record corresponds to one segment.

This situation is illustrated in subsection 2.1.2 and gives the ideal input file for production of interchange messages irrespective of whether a table-driven or hard-coded construction program is being used.

(b) Segments created from more than one input record.

**Figure D.7**

**Example 5** Data from one input record used for several subsequent segments




| Hard-Coded Message Construction | Table-Driven Message Construction |
|---|---|
| Use as direct input | Use as direct input<br><br>'Hold' indicator (a parameter associated with each input record) causes the input record from which data is required for a subsequent segment in the same message to be stored.<br><br>File should be reorganised if there is a;<br><br>- need for more than one record to be stored at one time<br><br>- need for records to be held for use in several messages |

**Figure D.8**

**Example 6** Data from several input records used to create one segment

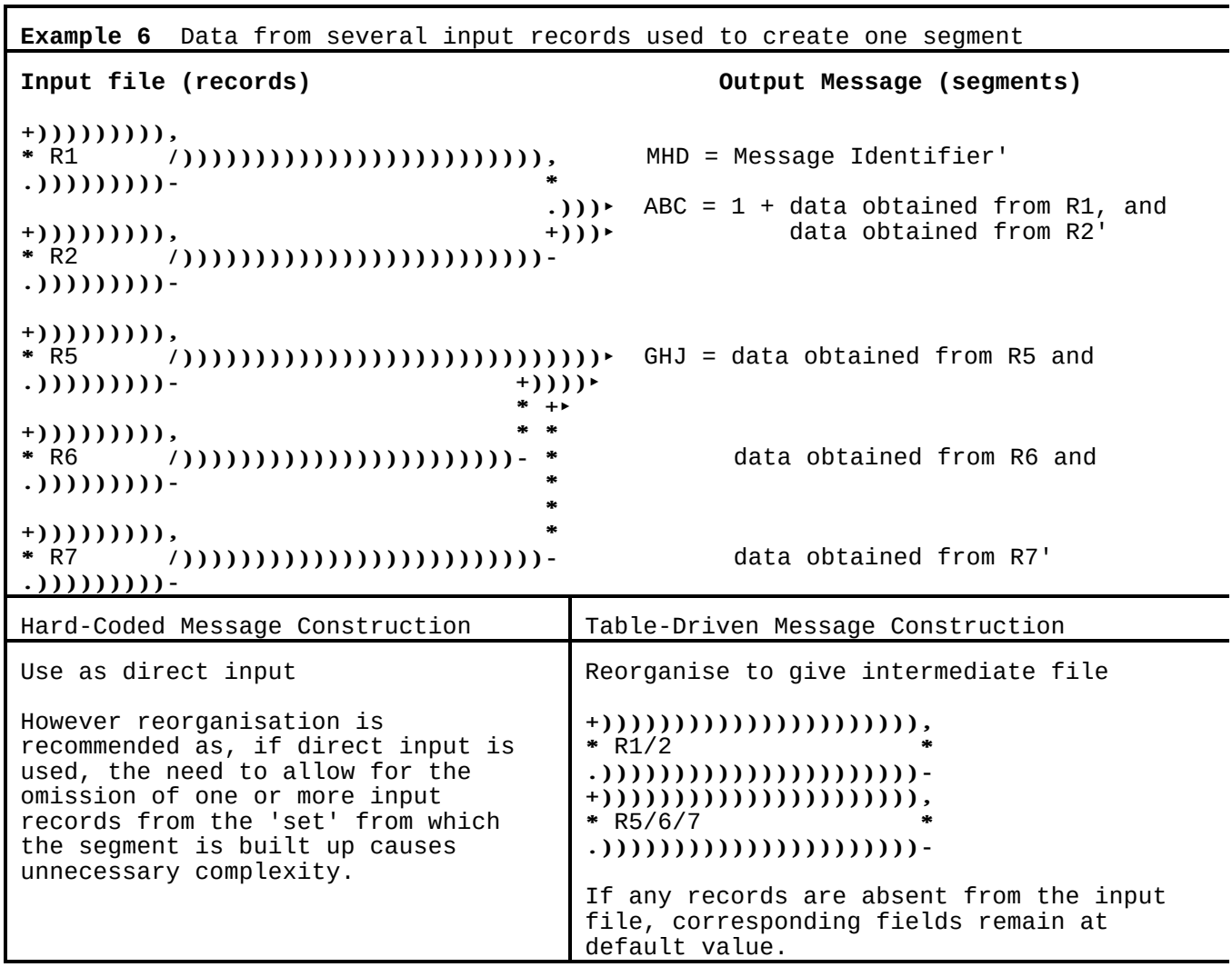
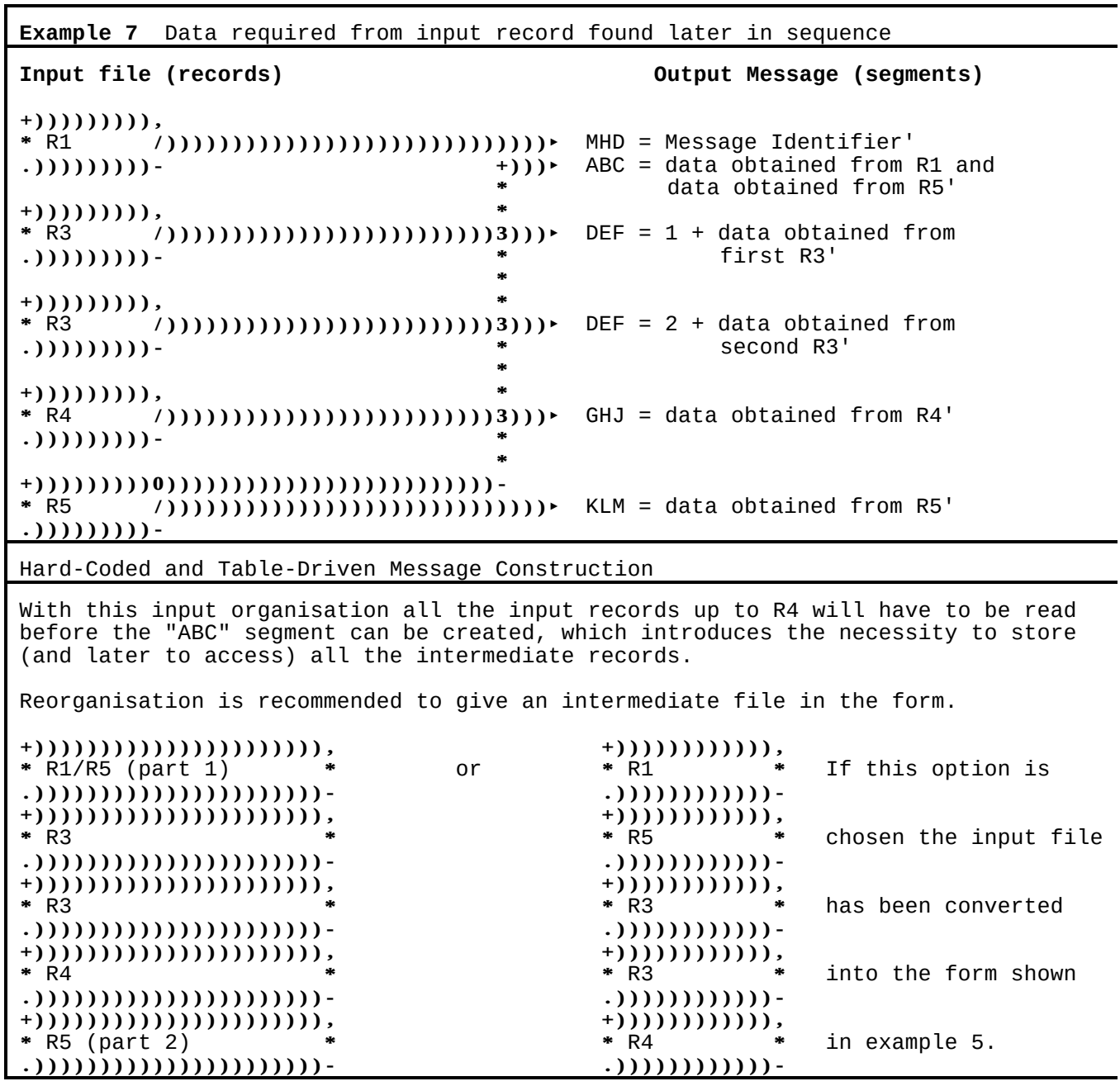


**Figure D.9**

**Example 7** Data required from input record found later in sequence



### 2.2.4 More Complex In-house Files

The structure of the input file can be more complex than shown in the examples, especially where it consists of data or records collected from several in-house files.

As the complexity of the input file increases, so does the complexity of the routine needed to handle the input data. It is recommended that a complex input file should always be pre-processed using a reorganisation program to produce an intermediate file for submission to the message construction program.

The choice of a hard-coded message construction program does mean that most file structures can be used as direct input but, as outlined in subsection 2.1.2(d), there are advantages in having a separate reorganisation program, and the more complex the input file the greater these advantages become.

## 3. CONSTRUCTION OF MESSAGES

### 3.1 Method 1 - Message Structure Coded into a Hard-Coded Message-Dependent Construction Program

#### 3.1.1 Outline

(a) Skeleton areas are defined for each type of message (see example in fig D.10 below). All separator characters are defined as constants within the skeleton area, and space to accommodate each sub-element at its maximum length is allocated between the separators. (The size is that specified in the Data Element Directory in the TRADACOMS SYNTAX AND DATA DICTIONARY Volume of this manual).

**Figure D.10**

| Identifier | Message Area | Defined as |
|---|---|---|
| | +)))))))), | |
| * | *MHD= * | |
| | /)))))))2)))), | |
| MSRF | * * | 9(12) |
| | /))))))))))0)- | |
| * | *+INVFIL:9 * | |
| | /)))0)))))))- | |
| | * * | |
| | /)))2)))), | |
| * | *TYP= * | |
| | /))))))))1 | |
| TCDE | * * | 9(4) |
| | /)))0))))- | |
| * | * + * | |
| | /)))2)))))))), | |
| TTYP | * * | X(12) |
| | /))))))))0))))- | |
| * | *SDT= * | |
| | /))))))))2)))), | |
| SIDN | * * | 9(13) |
| | /)))0)))))))))- | |
| * | * : * | |
| | /)))2)))))))), | |
| | * * | X(17) |
| | /)))0)))))))- | |
| * | * + * | |
| | /)))2)))))))), | |
| SNAM | * * | X(40) |
| | /)))0)))))))))- | |
| * | * + * | |
| | /)))2)))))))), | |
| SADD | * * | X(35) |
| | /)))0)))))))- | |
| * | * : * | |
| | .)))- | |
| | ETC. | |
| | +)))))))), | |
| * | *MTR= * | |
| | /))))))))1 | |
| NOSG | * * | 9(10) |
| | /)))0))))- | |
| * | * : * | |
| | .)))- | |

* DENOTES A CONSTANT FIELD

(b) A record from the in-house file is read:

**Figure D.11**

| Field | Contents | Format |
|---|---|---|
| Record type | R1 | Alpha |
| field A | ABC | Alpha |
| field B | -999 | Signed numeric |
| field C | 0011010 | Binary |
| field D | 1234567 | Numeric character |

(c) The skeleton area before message construction is:

**Figure D.12**

| SEGMENT | FIELD C | | FIELD A | | FIELD D | | FIELD B | | |
|---|---|---|---|---|---|---|---|---|---|
| SGM= | Signed num | + | alphabetic | : | Numeric char | + | Signed num | ' | |

(d) The data from this record is moved into the skeleton area.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| SGM=ØØØØ26 | + | ABCØØØØØ | : | 1234567 | + | Ø-9.99 | ' | |

(e) The skeleton areas making up a message are compressed, eliminating superfluous separators and blank characters (b).

```
SGM=26+ABC:1234567+-9.99'.....................................
```

(f) Output blocks of compressed segments are constructed to the requirements of the chosen transmission media.

**Block X** **Block X + 1** **Block X + 2**

[.....] [.....] [.....]

| | | |
|---|---|---|
| ..... | ....SGM=26+ABC:1234567+ | -9.99' |

### 3.1.2 Skeleton Area

The skeleton areas to be set aside in memory should conform to the following basic description:

(a) A separate area should be set aside for each type of message being

transmitted.

(b) All segments should be defined within the message area in the sequence required for transmission. Each type of repeating segment should be defined once, and reused for each occurrence.

(c) Data elements (and sub-elements) should be defined within a segment in the appropriate sequence.

(d) Separator and terminator characters, and segment codes, should be set up as constants within the skeleton area in the appropriate position according to the format of each segment.

(e) The skeleton areas for the standard segments would also include some of the sub-elements as constants, eg. The message type in the MHD message header segment. Similarly, for the STX start-of-transmission segment, the syntax rules identifier and sender's details could be set up as constants and the remainder of the data input from the hardware of the machine (eg. Date and time of transmission) or from the in-house file (eg. recipient's details). If the recipient details are not available on the in-house file, they must be input via a run time parameter.

(f) After each message has been processed the skeleton area should be re-initialised to ensure that there is no data carried forward from one message to the next

(g) All separator or terminator characters should also be preceded by a special qualifier character, also set up as a constant to differentiate between true syntax characters and those embedded within data. The latter require the insertion of the release character (?) Before final output.

(h) Each sub-element (or simple data element) area should be defined in such a way that the editing facilities of the programming language being used are exploited eg. In COBOL it is possible to edit numeric fields to provide zero suppression, the insertion of a leading minus and a decimal point - all of which are required for transmission. In PL/1, PICTURE DATA provides similar facilities.

## 3.2 Method 2 - Message Structure Defined by Parameters Held in Tables

### 3.2.1 Outline

(a) All message, segment and data element structures are defined as parameters held in tables.

(b) As far as possible processing is controlled by parameters and the hard coding of facilities is avoided.

(c) The modification of existing or the addition of new facilities is achieved by changing the tables. For example, no program changes are required if a new message type is to be processed.

(d) The layout(s) of the in-house file(s) of the form described in section 2 are defined in tables with the source address for each required data element (or sub-element). More complex file structures may require reorganisation into a form more suited to description by tables.

## Diagramatic representation of relationship between table keys

**The In-House File**

| | |
|---|---|
| 40 | Record Type R1 |
| 45 | Data for SIDN |

Record/Message Table

| Record Type | Message Type | Version |
|---|---|---|
| R1 | INVFIL | 9 |

Segment Table

| Record Type | Message Type | Version Number | Segment Code |
|---|---|---|---|
| R1 | INVFIL | 9 | TYP |
| R1 | INVFIL | 9 | SDT |

Data Element Table

| Message Type | Version Number | Segment Code | Data Element Identifier |
|---|---|---|---|
| INVFIL | 9 | TYP | TCDE |
| INVFIL | 9 | TYP | TTYP |
| INVFIL | 9 | SDT | SIDN |

Sub - Element Table

| Message Type | Version Number | Segment Code | Data Element Identifier | Sub Element Number | Position On In-House File | |
|---|---|---|---|---|---|---|
| | | | | | FROM | TO |
| INVFIL | 9 | TYP | TCDE | 1 | 20 | 29 |
| INVFIL | 9 | TYP | TTYP | 1 | 15 | 19 |
| INVFIL | 9 | SDT | SIDN | 1 | 40 | 45 |

Resultant Segment

MHD = .....
TYP = DATA FOR tcde+data for TTYP'

SDT-data for SIDN+.....

3.22 **The Tables**

The tables perform the following functions:-

- Describe the sequence of the components and other characteristics of each type of message (eg. Segments within message, data elements within segments).

- Describe the format and position of the data on the in-house file from Which messages are to be constructed.

- Describe the format of sub-elements to be output.

The structure of each component of a message is defined by means of the table key and this is illustrated in figure D.13. The sequence of entries within each table defines the structure of each component. Foe example the sequence of the entries in the data element table indicates the sequence in which the data elements appear in the segment.

3.2.3 **Record/Message Table (figure D.14)**

(a) Each record input from the in-house file relates to a particular message (Or part of message) to be transmitted. The key of the record table is constructed from record type and message type. In this way a relationship is established between record input and messages transmitted. As each record is read the keys of the record table are scanned until a matching Entry is found. This entry will indicate which message is to be transmitted and can then be used to access the next table.

**Figure D.15**

| KEY | | | | |
|---|---|---|---|---|
| RECORD TYPE | MESSAGE TYPE | VERSION NUMBER | | |
| R1 | ORDERS | 9 | | |
| R2 | ORDERS | 9 | | |
| R3 | INVFIL | 9 | | |

**Figure D.14 Record/Message (message outwards)**

| KEY | | | HOLD |
|---|---|---|---|
| RECORD TYPE | MESSAGE TYPE | VERSION NUMBER | INDICATOR |
| | | | |

(b) HOLD INDICATOR - this is used to indicate that the in-house record must be held in memory and not discarded on reading the next input record. This is necessary where a segment requires data from more than One input record and, moreover, not simply from two adjacent input Records.

Possible values are:-

H - Record must be held in memory until entire message is processed.

Blank - record need not be held in memory.

n - a numeric value indicating that the record is to beld in memory along with records with a greater hold indicator Value until a record is input with the same or smaller hold Indicator value, or until the beginning of a new message, or Until there is another record of the same type.

The use of the numeric indicator may be necessary, for example, when handling nested repeated data and is best illustrated by the following example. This also illustrates the use of the hold indicator when not handling nested or repeated data.

Message to be constructed:-

MHD =.....
AAA = DATA FOR aaaa+data for bbbb+.....
BBB = 1+data for cccc+.....
CCC = 1+1+ data for dddd1+data for eeee1+ data for ffff1+.....

BBB = 2+data for cccc+.....
CCC = 2+1+data for dddd1+data for eeee1+data for ffff1+.....
CCC = 2+2+data for dddd2+data for eeee2+data for ffff2+.....

DDD = data for xxxx+data for yyyy+data for zzzz

Input:-

R1 - data for aaaa,bbbb,zzzz
R2 - data for cccc,dddd1,dddd2,dddd3,.....
R3- data for eeee1,ffff1
R3 - data for eeee2,ffff2
R4 - data for xxxx,yyyy
In this case, there would be an R3 for every occurrence of dddd in R2.

The hold indicator would set to H for R1 as data from R1 is required In segment DDD; R2 will have a hold indicator of 1 as it must be held Until all the associated R3 records, and hence CCC segments,are

Processed and another R2 encountered. This later R2 must be held in the Same manner, replacing the previous R2.

If a further level of nesting (within CCCC) were required and the data from R3 were to be used then R3 would have the hold indicator set to 2.

### 3.2.4 Segment Table (Fig D.16)

(a) The table is in the sequence in which segments are output. The key is Constructed from record type, the message type and segment code.

**Figure D.17**

| KEY | | | | | |
|---|---|---|---|---|---|
| Record Type | Message Type | Version Number | Segment Code | | |
| R1 | INVOIC | 9 | TYP | | |
| R1 | INVOIC | 9 | CLO | | |
| R2 | INVOIC | 9 | IRF | | |
| R3 | INVOIC | 9 | PYT | | |

From the above table entries it can be seen that record type R1 is used to Create segments TYP and CLO, R2 is used to create IRF and R3 PYT Etc.....

**Figure D.16 Segments Table (message outwards)**

| KEY | | | | MANDATORY/ CONDITIONAL INDICATE | NESTING NUMBER |
|---|---|---|---|---|---|
| RECORD TYPE | MESSAGE TYPE | SEGMENT CODE | | | |
| | | | | | |

In addition to the key, each segment is qualified by the following information held on the segment table.

(b) MANDATORY OR CONDITIONAL INDICATOR-indicates whether The data segment is mandatory or conditional in the context of this type Of message.

© NESTING NO. - the nesting number indicates the levels to which nesting Will occur (see TRADACOMS SYNTAX AND DATA DICTIONARY Volume, subsection 2.7). Foe example, within an invoice, there may be One or more ODD order and Delivery reference segments which Themselves have one or more subsidiary ILD invoice line details Segments. There are therefore two levels of nesting with ODD being Level one and ILD level two.

eg. ODD = 1+ Level one
ILD = 1+1+ Level two
ILD = 1+2 Level two

Segments which are to be nested must be entered consecutively in the Table, in ascending order of nesting number.

**3.2.5 Data Element Table (fig D.18)**

(a) The key of the data element table defines the sequence of data elements Within each segment in a particular message type. For repeating and nesting segments the item numbers are included as data elements in the usual way.

(b) In addition to the key the table also confirms the following field:-

MANDATORY OR CONDITIONAL INDICATOR - this is set if the data element Is mandatory for the particular message segment.

**3.2.6 Sub-Element Table (Fig D.19)**

(a) The key of the sub-element table relates each sub-element to its data Element and message usage. There will be at least one sub-element per Data element. It is possible for a particular sub-element to have more Than one entry in the sub-element table if it is to be used in more than one Message type. This is necessary to allow different parameters for the Same sub-element eg. Hash total number. The sub-element number is a Sequence number allocated within each data element, starting at one.

Besides the key table also contains additional fields, next detailed.

**Figure D.18 Data Element Table (message outwards)**

| KEY | | | | DATA ELEMENT IDENTIFIER | MANDATORY/ CONDITIONAL INDICATOR |
|---|---|---|---|---|---|
| MESSAGE TYPE | VERSION TYPE | SEGMENT CODE | | | |
| | | | | | |

**Figure D.19 Sub-Element (message outwards)**

| KEY | | | | | | REPRESENTATION ON OUTPUT | | POSITION ON INPUT RECORD | | **REPRESENTATION ON INPUT** | **INPUT RECORD TYPE** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MESSAGE TYPE | VERSION NUMBER | SEGMENT CODE | DATA ELEMENT NUMBER | SUB-ELEMNT NUMBER | | F/V | PICTURE | FROM | TO | | |
| | | | | | | | | | | | |

(b) FORMAT ON OUTPUT - this group of fields describes the following:

- F/V - Fixed or variable field length

- Picture - Indicating number of numeric (9) digits or Alphanumeric (X) characters. If numeric this Excludes the minus sign, and any implied Decimal point is indicated by V.

(c) POSITION ON INPUT RECORD - this is the start and finish character Positions of the sub-element within its associated source record.

Where the position parameters are blank the data for the sub-element in Question will be generated-either via a default value as in, for example, Segments, by maintaining appropriate accumulators.

(d) FORMAT ON INPUT- this will have the following possible values:

B = binary
P = packed decimal
S = signed numeric character
U = unsigned numeric character
X = character

(e) RECORD TYPE- there are occasions when more than one in-house Record is in memory at the same time, ie. When there are repeating Segments and data from an earlier record is being held for output until all Repeating items have been processed (see also subsection 3.2.3(b)). In This circumstance, the record type on the sub-element table specifically Identifies the source record containing the dtata for the sub-element; Otherwise the record type is that referenced in the segment table.

### 3.2.7 Message Construction

Having described the tables in earlier paragraphs, this is the way they are used to construct messages:-

(a) The message to be processed is decided by reference to the record table Using the in-house record type.

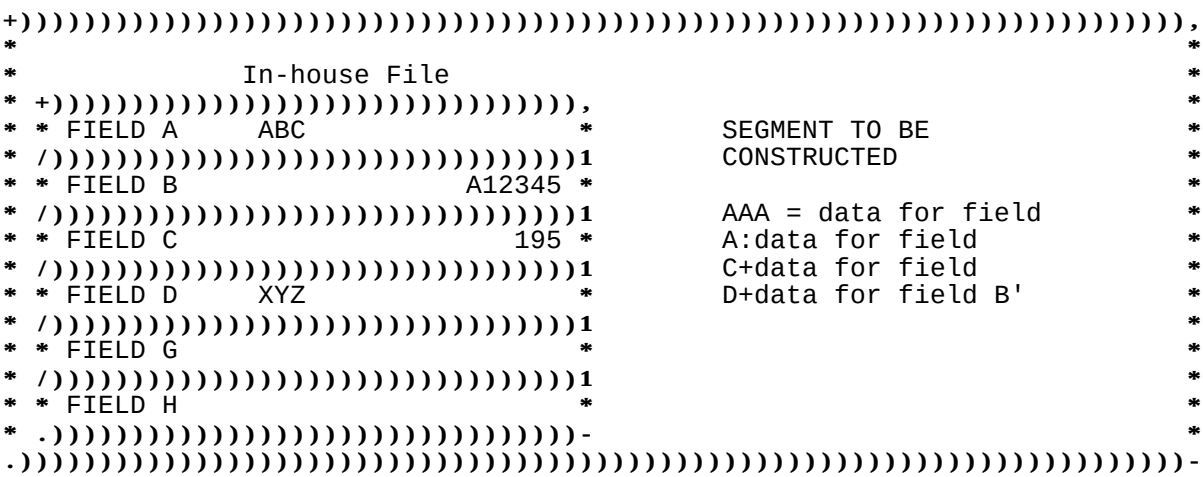
(b) The sequence of segments within the message is obtained from the Segment table.

(c) The sequence of data elements within each segment is obtained from the data Element table.

(d) The sub-element(s) required for each data element are obtained from the Sub-element table. The position of each sub-element on the in-house file is also contained in this table.

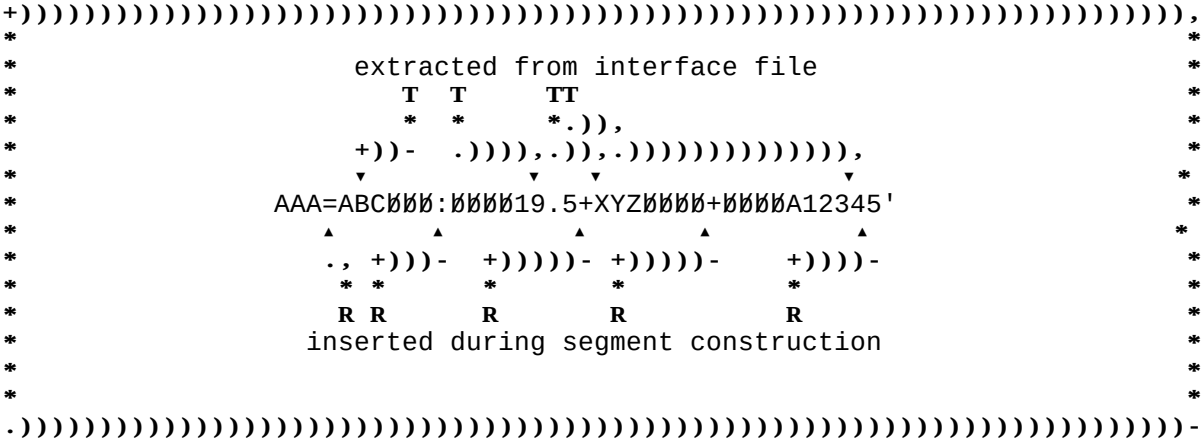
(e) Segments are constructed in a work area and as each sub-element is moved into this area, appropriate separator and control characters are inserted.

**Figure D.20**




The segment is constructed as follows:-

**Figure D.21**




(f) As each segment is completed it is passed to the compression routine to estimate surplus separators and leading or trailing blanks.

AAA = ABC:19.5 + XYZ + A12345'

(g) After compression the segment is moved to the output block area. As each block is filled it is output and a new block started.

NB. It is more efficient to hold the tables in main memory, avoiding time-consuming file accesses. However, where the tables describe more than one message type, memory can be more efficiently utilised by reading in only table entries for the message currently being processed.

## 3.3 Compression

### 3.3.1 Outline

Having created the segments in expanded form, data must be compressed. This process will edit the expanded segments as follows:-

(a) Superfluous separator characters removed.

(b) Leading and trailing blanks removed.

### 3.3.2 Compression Technique

Data is moved from the segment work area into a compression work area large enough to accommodate the largest segment. The work area is then accessed character by character, each of which is tested against the elimination criteria. Any character which is to be eliminated is overwritten by the next required character. This process is first conducted starting at the right hand end of the work area eliminating trailing blanks and superfluous separator characters, thus right-aligning the data.
eg.

```
SEG=␣123+ABC::+AYN+␣␣12+␣␣␣+ABC␣␣'
```

becomes

```
SEG=␣123+ABC+AYN+␣␣12++ABC'
```

It is then repeated starting from the left hand side and removing leading blanks, thus left-aligning the data.

```
SEG=123+ABC+AYN+12++ABC'
```

(NB. the separator qualifier characters have been omitted for clarity).

## 3.4 Transmission Blocks

### 3.4.1 Data Handling

Data is then moved from the compression work area, and the final editing is carried out:-

(a) Release characters are inserted.

(b) Separator qualifier characters are eliminated.

(c) Data is converted into the appropriate character set for transmission.

### 3.4.2 Definition of the Transmission Block

The transmission block must be defined in such a way that data can be moved into it character by character from the compression area. As data is moved from the compression area, a count is kept of the number of characters moved. When this count equals the block size the block is output and the count reset to zero. Any short block will be held in memory until sufficient data to fill it has been processed from subsequent messages/segments, or until the end of transmission.

# 4. TRANSLATION OF INCOMING MESSAGES

## 4.1 Approach

Consideration has been given to two methods of translating messages, corresponding to the two methods of construction, either message-dependent application-coded or table-driven.

It has been concluded that the table-driven approach will prove suitable in the vast majority of situations, for the following reasons:

(a) Syntax errors - a hard-coded approach is inflexible and error detection could not be written into a general routine. This would result in separate error processing for each segment of the message, generating considerable programming overheads.

(b) Certain aspects of the syntax rules, such as omission of blank sub-elements and blank data elements at the end of segments, could not be written into a general routine.

For these reasons only the table-driven approach is described in the following paragraphs.

If however a rigid message format incorporating a limited number of data segments has been agreed then a hard-coded approach could prove suitable with considerable savings in development time.

## 4.2 Outline Design

Each transmission is processed through the following stages. (Figure D.22 illustrates the process schematically).

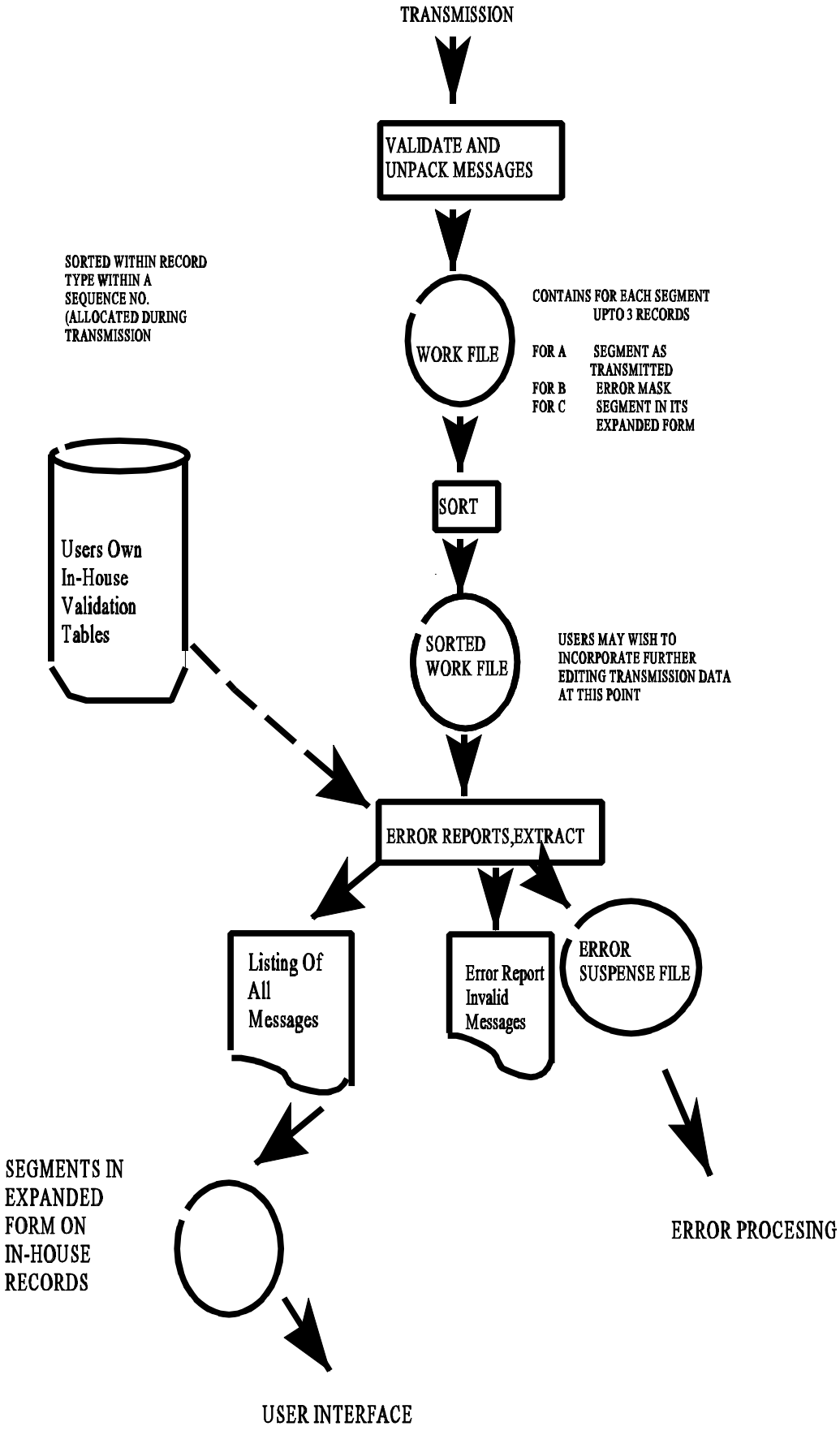
### 4.2.1 Segment Isolation

The message input blocks are scanned character by character, and all data between each set of segment terminators is moved to a segment work area. The size of the work area must be large enough to accommodate the largest segment, plus some allowance for error conditions and release characters. This extra space allocation will be required, for example, if a segment terminator should be missing resulting in two segments being treated as one.

### 4.2.2 Segment Validation

The segment identified is checked against the segment table. This check will indicate missing mandatory segments, invalid segment codes, or segments out of sequence.

Figure D.22


TRANSMISSION
VALIDATE AND UNPACK MESSAGES
SORTED WITHIN RECORD TYPE WITHIN A SEQUENCE NO. (ALLOCATED DURING TRANSMISSION
WORK FILE
CONTAINS FOR EACH SEGMENT UPTO 3 RECORDS
FOR A SEGMENT AS TRANSMITTED
FOR B ERROR MASK
FOR C SEGMENT IN ITS EXPANDED FORM
SORT
Users Own In-House Validation Tables
SORTED WORK FILE
USERS MAY WISH TO INCORPORATE FURTHER EDITING TRANSMISSION DATA AT THIS POINT
ERROR REPORTS,EXTRACT
Listing Of All Messages
Error Report Invalid Messages
ERROR SUSPENSE FILE
SEGMENTS IN EXPANDED FORM ON IN-HOUSE RECORDS
ERROR PROCESING
USER INTERFACE

### 4.2.3 Sub-Element Isolation

The segment work area is scanned character by character and data between two consecutive separator characters is transferred to a sub-element work area. The nature of this data can be deduced by reference to the tables.

### 4.2.4 Numeric Conversion

Any numeric data in the sub-element work area requires additional processing to:

- set the correct sign according to the internal requirements of the computer.
- remove the minus sign if it is present.
- set leading blanks to zeros.
- correctly align the decimal point.
- remove decimal point character if present.
- convert from character to binary or packed if necessary.

eg.

+ -51.76+

becomes

```
S))0)0)0)0)0)0)0)0)0)0))Q
   * * * * * * * * * * *X          over-punch sign
   * * * * * * * * * * *           according to data
   *0*0*0*0*0*0*5*1*7*6*0          element transmitted
S))2)2)2)2)2)2)2)2)2)2))Q
                  ▲
                  assumed decimal point
```

(This assumes the required result as 11 characters long with 3 places of decimals).

### 4.2.5 Output Record Creation

The data unpacked from the incoming messages can then be used to form records to be used in an in-house application. The record layout recommended for this purpose is one record per segment with fields (sub-elements) in the same sequence as the normal format of the segment. These are referred to as "segments in expanded format". Each sub-element is expanded to its maximum size with alphanumeric data left-aligned and numeric data right-aligned. All separator, terminator and release characters are removed. For simplicity these records should be fixed length, with unused space at the end of each record padded with blanks.

### 4.2.6 Character Conversion

Before any processing is possible all characters must be converted to the representation of the character set applicable to the machine being used. Since this is likely to be a time-consuming task in COBOL or PL/1 it is recommended that either an assembler sub-routine within the program or a separate assembler program be used.

### 4.2.7 Null Values

It should be noted that there is a subtle difference between absent numeric fields and zero numeric fields

eg.....++.....absent numeric field

.....+0+.....numeric field with value of zero

In order that subsequent programs can be aware of the difference it is recommended that blank fields be converted to distinctive characters (eg. a series of asterisks) before being output to the segments in expanded format.

## 4.3 Table Processing

### 4.3.1 General

The structure of messages, segments and data elements is defined within parameters held on tables.

(a) Message Structure - the sequence of segments within each message is defined by the sequence of entries in the segment table.

**Figure D.23**

| KEY | | |
|---|---|---|
| MESSAGE TYPE | VERSION NUMBER | SEGMENT |
| ORDERS | 9 | MHD |
| ORDERS | 9 | CLO |
| ORDERS | 9 | ORD |
| ORDERS | 9 | DIN |
| ORDERS | 9 | OLD |
| ORDTLR | 9 | MTR |
| INVFIL | 9 | MHD |
| INVFIL | 9 | TYP |
| INVFIL | 9 | SDT |

(b) Segment Structure - the sequence of data elements within a segment is defined by the sequence of entries in the data element table.

**Figure D.24**

| KEY | | | |
|---|---|---|---|
| MESSAGE TYPE | VERSION NUMBER | SEGMENT CODE | DATA ELEMENT IDENTIFIER |
| INVOIC | 9 | MHD | MSRF |
| INVOIC | 9 | MHD | TYPE |
| INVOIC | 9 | CLO | CLOC |
| INVOIC | 9 | IRF | INVN |
| INVOIC | 9 | IRF | IVDT |
| INVOIC | 9 | IRF | TXDT |
| INVOIC | 9 | PYT | PAYT |
| INVOIC | 9 | ODD | ORRF |
| INVOIC | 9 | ODD | ORNO |

ETC.

In the above, segments are structured as:

MHD = data for MSRF+data for TYPE'
CLO = data for CLOC'
IRF = data for INVN+data for IVDT+data for TXDT'
PYT = data for PAYT'

(c) Data element structure - the format and number of sub-elements within each data element are defined within the sub-element table. (Example in Fig D.25).

**Figure D.25**

| MESSAGE TYPE | VERSION NUMBER | SEGMENT CODE | DATA ELEMENT IDENTIFIER | SUB-ELEMENT IDENTIFIER |
|---|---|---|---|---|
| INVOIC | 9 | MHD | MSRF | 1 |
| INVOIC | 9 | MHD | TYPE | 1 |
| INVOIC | 9 | MHD | TYPE | 2 |
| INVOIC | 9 | CLO | CLOC | 1 |
| INVOIC | 9 | CLO | CLOC | 2 |
| INVOIC | 9 | CLO | CLOC | 3 |
| INVOIC | 9 | IRF | INVN | 1 |

From the above it can be seen that MSRF and INVN are simple data elements (ie. no sub-elements) and TYPE and CLOC are composite data elements.

### 4.3.2 Unpacking Messages using Tables

The contents of the standard segments are output to the in-house file using the tables as described in (b) below.

(a) Part of the standard segment processing, eg. STX, MHD and END, may be fixed and therefore this part may be processed by hard-coded programming.

(b) Data segments are processed according to the message type being transmitted as follows:

- Establish which segment is being dealt with.

- Unpack each sub-element within that segment and, via the data element and sub-element table, convert to the format required for use in the in-house system.

- Create the expanded format record using the address held on the sub-element table.

**Examples of blocks** from a message transmission being translated into a form usable in an in-house application.

**Figure D.26**


### 4.3.3 Tables

#### 4.3.3.1 Segment Table (Fig D.27)

The purpose of the segment table is to define the sequence and occurrence of segments within each message. The key consists of message type, version number and segment code.

The various additional fields are used as follows:

- MANDATORY OR CONDITIONAL - this indicates whether a segment is mandatory (M) or conditional © for a particular message type.

- REPEATING/NESTING INDICATOR - indicates the level of nesting.

eg. ORD=1+.....Level One
ILD=1+1+.....Level Two
ILD=1+2+.....Level Two

#### 4.3.3.2 Data Element Table (Fig D.28)

The purpose of the data element table is to define the sequence of data elements within each segment. The key consists of message type, version number, segment code and data identifier.

- MANDATORY OR CONDITIONAL - This indicates whether a data element for a particular message and segment is mandatory (M) or conditional (C).

#### 4.3.3.3 Sub-Element Table (Fig D.29)

The sub-element table defines the sequence of each sub-element within a data element, its structure, format and position on the output record. The key consists of message type, version number, data element identifier and sub-element number (NB. the sub-element **number** is allocated within these guidelines for reference purposes).

**Figure D.27 Segment Table (message inwards)**

| KEY | | | | MANDATORY/ CONDITIONAL INDICATOR | NESTING NUMBER |
|---|---|---|---|---|---|
| MESSAGE TYPE | VERSION NUMBER | SEGMENT CODE | | | |
| | | | | | |

**Figure D.28 Data Element Table (message inwards)**

| KEY | | | | | MANDATORY/ CONDITIONAL INDICATOR |
|---|---|---|---|---|---|
| MESSAGE TYPE | VERSION NUMBER | SEGMENT CODE | DATA ELEMENT IDENTIFIER | | |
| | | | | | |

**Figure D.29 Sub-Element Table (message inwards)**

| KEY | | | | | | FORMAT ON INPUT | | REPRESENTATION ON OUTPUT | POSITION ON OUTPUT | |
|---|---|---|---|---|---|---|---|---|---|---|
| MESSAGE TYPE | VERSION NUMBER | SEGMENT CODE | DATA ELEMENT IDENTIFIER | SUB-ELEMENT NUMBER | | PICTURE | F/V | | FROM | TO |
| | | | | | | | | | | |

- FORMAT ON INPUT - this group of fields describes the following:

    - Picture, indicating number of numeric (9) digits or alphanumeric (X) characters. If numeric this excludes the minus sign, and any implied decimal point is indicated by V.

    - F/V - fixed or variable field length.

- REPRESENTATION ON OUTPUT - this being indicated in the form required by the programming language used.

- POSITION ON OUTPUT - this is the start and finish character positions of the field on the expanded format record into which the sub-element is to be placed.

### 4.3.4 Error Processing

#### 4.3.4.1 Types of Error Considered

Types of error which might be encountered are:-

(a) SYNTAX - covering:

- the proper use of separators and terminators.

- the appropriate character set.

- the correct length and characteristics of sub-elements.

- the correct set of sub-elements for each data element.

- the correct set of data elements for each segment.

(b) CONTROL TOTALS - including hash totals and counts (eg. segments in messages and messages in a transmission).

(c) STANDARD SEGMENTS - each transmission is checked for complete and correct usage of standard segments (for example every message must be terminated by an MTR message trailer segment).

#### 4.3.4.2 The Recording of Errors

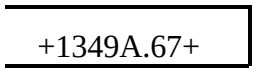
If an error is detected it should be noted and, as far as is practicable, the remaining data in the message should be checked for further errors. The method recommended is:-

(a) Establish an area of blank characters (error mask) corresponding in size to the segment work area.

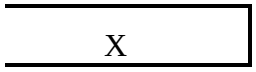
(b) As each error is detected move an appropriate error indicator into the character (or characters) position within the error mask corresponding to

the character (or characters) in error in the segment work area eg.

alpha character in numeric data element




segment work area

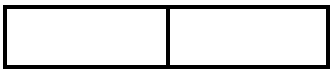



error mask

- Group errors. Where an error is found at a group level, allowance must be made at the beginning of the mask for extra error indicators which do not relate to character positions within the segment work area, such as a missing mandatory segment.

eg. 

segment work area



error mask

group errors

data errors

(c) Intermediate storage of error masks. An intermediate file is output containing four different types of record -

A - an error record indicating that the message contains errors. Records of this type will have the same sequence number as the first record for the message.

B - segment in transmission format.

C - error mask for segment in error.

D - valid segment in expanded format.

Each record will have a key comprising the input sequence number and record type.

The sequence number is allocated as the input message file is read. The value used to increment the sequence number should be greater than one, in order to leave gaps for segment insertion during message correction.

(d) The error report is constructed from the sorted output file containing segments in transmission format and error masks as follows:

**Figure D.30**

```
+)))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))),
* ABC+16418+7771101+BURTON+'  (segment)    |  A    EQUAL MISSING          *
*    A      BBBBBBB       C   (error mask) |  B    INVALID DATE           *
*                                         |  C    EXTRA SEPARATOR        *
R                                         |                              R
```

NB. Where group errors (ie. in the first few characters of the error mask) are indicated these can be printed as a group (eg. at the end of the print line), as in Figure D.31.

**Figure D.31**

```
+)))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))),
* MTR=50'                                          X MHD MISSING              *
*                                                                            *
* TYP= ..............................                                       *
*                                                                            *
R                                                                            R
```

The above example shows a message error where error code X = MHD segment missing.

(e) Methods of correcting errors can range from complex updates to simple merges of rekeyed data. Care should be taken, before developing error correction routines, that they do not become unnecessarily complicated. The following basic approach should be considered, which involves the use of both manual and mechanised procedures.

- All valid segments from messages which are found to have errors are output in compressed form during the error reporting program to an error suspense file, each segment being preceded by the sequence number allocated during the decompression phase.

- Segments which are known to be in error are not written to this file.

- All segments in error are corrected off-line, and rekeyed quoting the sequence number allocated during the compression phase.

- These corrected segments are then merged with the file of valid segments using the sequence number as the key for merging.

**SECTION E: SPECIFICATION OF REQUIREMENTS FOR MAGNETIC TAPE INTERCHANGES**

## CONTENTS

# 1. INTRODUCTION

## 1.1 Scope

This specification contains general requirements for magnetic tape files to be exchanged between customers and suppliers/manufacturers. TRADACOMS messages can be carried in files on magnetic media as well as by data communications.

Appendix 4 defines an interchange standard for the use of magnetic tape.

Other magnetic media such as floppy disks can also be used to carry EDI data. No specific recommendations is offered in this area which is left to trading partners to define.

## 1.2 Standards

The specification is based on the standards laid down by the British Standards Institution which are compatible with the standards issued by the International Organisation for Standardisation (ISO). Where a British Standard is not available, the relevant ISO document will apply.

## 1.3 Summary of Requirements

Magnetic tape files must have the following characteristics:

a) 'Half-inch' (12.7 mm) tape bearing reflective markers.

b) ISO-7-UK character code set.

c) Recording method will generally be:-

   I) 9-track Phase Encoded (PE) recording at a packing density of 1600 r.p.i., or

   ii) 9-track Non Return to Zero (NRZI) recording at a packing density of 800 r.p.i.

d) An alternative recording method, where applicable, will be 7-track Non Return to Zero (NRZI) recording at a packing density of 556 r.p.i.

e) As new recording methods are developed, eg. recording at 6250 r.p.i., provisions may be made to use the new developments.

f) Prior agreement between interchange parties must be achieved as to which magnetic tape recording method will be used, before start of data interchange.

g) Data structure on magnetic tape will conform to BS 4732, with a mandatory Volume Header Label. Other labels, such as File Headers and Trailers (HDR1, HDR2, EOF1, EOV1) may be included.

h) Data formats will be in accordance with the ANA TRADACOMS Standards specified in this manual.

## 2. PHYSICAL REQUIREMENTS

### 2.1 Type of Magnetic Tape

#### 2.1.1 Dimensions

Tapes must comply with the following requirements:-

a) 'Half-inch' (12.7 mm) tape bearing reflective markers to indicate the beginning-of-tape (BOT) and the end-of-tape (EOT).

b) The length of tape can vary between a minimum of 200 feet (61 m) and a maximum of 2400 feet (732 m).

c) The distance from the start of tape to the BOT marker must be 16 feet (+/- 2 feet), (4.9 +/- 0.6 m).

d) The distance from the EOT marker to the end of a tape must be at least 25 feet (7.6 m) and within a maximum of 30 feet (9.1 m).

#### 2.1.2 Quality

Magnetic tapes used for interchange must be of reliable quality. They must be splice free and tapes which have previously been extensively used for 7-track recording should not be used for 9-track recording, even if they have been certified as suitable for both 7 and 9-track recording.

#### 2.1.3 Tape Wind Direction

The tape must be wound in a clockwise direction from the end (nearest the hub) to the start (outer end) if the reel is viewed from the front.

#### 2.1.4 Write Enable Ring

The write-enable ring must be removed from the spool prior to interchange.

#### 2.1.5 Free End of Tape

The free end of tape must be secured on the reel by means of a vinyl strip or a synthetic sponge block made of rubber or plastic.

### 2.2 Spools

#### 2.2.1 Construction

Spools (reels) should be constructed to the manner and dimensions specified in BS 3968 and BS 4503.

#### 2.2.2 Conditions

Spools must be free from damage, such as broken flanges.

## 2.3 Packaging

### 2.3.1 Storage Container

Each reel of tape must be packed in an undamaged, non-magnetic, dust proof container in which it is positively supported on a resilient mounting at the hub.

### 2.3.2 Transport Cases

Magnetic tapes, in their individual storage containers, must be packed in a transport case. More than one tape can be included in each case provided the contents are relevant to the same application. Cases specially designed for this purpose may be used but in the absence of these each transport case should satisfy the following requirements:-

a) The transport case should be rigid, heat transfer resistant and should contain adequate shock absorbent material.

b) The interior of the case must be clean and its construction such that it provides sufficient sealing to prevent the ingress of dirt and water.

c) The case should be designed so that its contents are firmly held within it and so that the distance between the tapes and the outer surface of the case should be at least 3 inches (80 mm) at any point, to guard against the effect of stray magnetic fields.

## 2.4 Transportation

Tapes packed as described above can normally be transported by any convenient commercial means.

## 2.5 Labelling of packaging

### 2.5.1 Labelling of Spools

Spools must be labelled as follows:-

a) The name and address of the organisation to which the reel has to be returned must be included on a label permanently affixed to the spool.

b) In addition, a self adhesive interchange label must be affixed to the front flange of each spool. The whole area of the label must be in contact with the flange and the adhesive should be of such a type that the risk of the label being dislodged during the reading or rewinding is minimised. The adhesive should leave no residue when removed and only the relevant label is to be attached to the spool when the tape is despatched. An indelible medium must be used to write the contents on this label which is to include the following information:-

I) System identification, eg. "Invoice Interchange".

ii) Tape owner identification.

iii) Recipient's identification.

iv) Serial Number of tape.

v) Generation Number of tape file.

vi) Reel sequence number in format 1 of 1, 2 of 4 etc.

vii) Date tape file produced.

viii) Recording standard used:-

9 PE 1600 r.p.i.
9 NRZI 800 r.p.i.
7 NRZI 556 r.p.i.

or other, as appropriate, eg. 6250 r.p.i.

ix) Preferred method of return:

C - Collection
P - Post

x) Collection point, if applicable.

### 2.5.2 Labelling of Storage Containers

Each tape container must be affixed with a label showing the identity of the owner.

### 2.5.3 Labelling of Transport Cases

The name and address of the sender and the recipient must be affixed to the transport case.

## 2.6 Control Report

Where the data being transmitted includes tax invoices, a control report, as required by HM Customs and Excise and as specified in Section C of this manual, must accompany each tape.

## 3. RECORDING REQUIREMENTS

### 3.1 Character Representation

#### 3.1.1 Character Set

The allowable data character set is restricted to:-

a)

| | | | | | |
|---|---|---|---|---|---|
| Blank Space | | Ampersand | & | Asterisk | * |
| Open Bracket | ( | Close Bracket | ) | Comma | , |
| Hyphen | - | Full stop | . | Solidus | / |
| Percent | % | | | | |

b) The numerals Zero to 9

c) The upper case alphabet A to Z

The following characters are reserved for control purposes within the formatting techniques:

| | | | | | |
|---|---|---|---|---|---|
| Apostrophe | ' | Plus sign | + | Colon | : |
| Equals | = | Padding Character (up-arrow/ circumflex) | | | |

#### 3.1.2 Character Code

The coded representation of each allowable character will be normally ASCII but it is recognised that EBCDIC may be preferable for some exchanges. The coded representation of each allowable character is given in figure E.1.

**Figure E.1**

## CHARACTER REPRESENTATION

| | ASCII | | EBCDIC | |
|---|---|---|---|---|
| CHARACTER | HEXADECIMAL | BINARY | HEXADECIMAL | BINARY |
| A | 41 | 0100 0001 | C1 | 1100 0001 |
| B | 42 | 0100 0010 | C2 | 1100 0010 |
| C | 43 | 0100 0011 | C3 | 1100 0011 |
| D | 44 | 0100 0100 | C4 | 1100 0100 |
| E | 45 | 0100 0101 | C5 | 1100 0101 |
| F | 46 | 0100 0110 | C6 | 1100 0110 |
| G | 47 | 0100 0111 | C7 | 1100 0111 |
| H | 48 | 0100 1000 | C8 | 1100 1000 |
| I | 49 | 0100 1001 | C9 | 1100 1001 |
| J | 4A | 0100 1010 | D1 | 1101 0001 |
| K | 4B | 0100 1011 | D2 | 1101 0010 |
| L | 4C | 0100 1100 | D3 | 1101 0011 |
| M | 4D | 0100 1101 | D4 | 1101 0100 |
| N | 4E | 0100 1110 | D5 | 1101 0101 |
| O | 4F | 0100 1111 | D6 | 1101 0110 |
| P | 50 | 0101 0000 | D7 | 1101 0111 |
| Q | 51 | 0101 0001 | D8 | 1101 1000 |
| R | 52 | 0101 0010 | D9 | 1101 1001 |
| S | 53 | 0101 0011 | E2 | 1110 0010 |
| T | 54 | 0101 0100 | E3 | 1110 0011 |
| U | 55 | 0101 0101 | E4 | 1110 0100 |
| V | 56 | 0101 0110 | E5 | 1110 0101 |
| W | 57 | 0101 0111 | E6 | 1110 0110 |
| X | 58 | 0101 1000 | E7 | 1110 0111 |
| Y | 59 | 0101 1001 | E8 | 1110 1000 |
| Z | 5A | 0101 1010 | E9 | 1110 1001 |

**Figure E.1 (Contd.)**

| | ASCII | | EBCDIC | |
|---|---|---|---|---|
| CHARACTER | HEXADECIMAL | BINARY | HEXADECIMAL | BINARY |
| 0 | 30 | 0011 0000 | F0 | 1111 0000 |
| 1 | 31 | 0011 0001 | F1 | 1111 0001 |
| 2 | 32 | 0011 0010 | F2 | 1111 0010 |
| 3 | 33 | 0011 0011 | F3 | 1111 0011 |
| 4 | 34 | 0011 0100 | F4 | 1111 0100 |
| 5 | 35 | 0011 0101 | F5 | 1111 0101 |
| 6 | 36 | 0011 0110 | F6 | 1111 0110 |
| 7 | 37 | 0011 0111 | F7 | 1111 0111 |
| 8 | 38 | 0011 1000 | F8 | 1111 1000 |
| 9 | 39 | 0011 1001 | F9 | 1111 1001 |
| Blank Space | 20 | 0010 0000 | 40 | 0100 0000 |
| Ampersand & | 26 | 0010 0110 | 50 | 0101 0000 |
| Asterisk * | 2A | 0010 1010 | 5C | 0101 1100 |
| Open Bracket ( | 28 | 0010 1000 | 4D | 0100 1101 |
| Close Bracket ) | 29 | 0010 1001 | 5D | 0101 1101 |
| Comma , | 2C | 0010 1100 | 6B | 0110 1011 |
| Hyphen - | 2D | 0010 1101 | 60 | 0110 0000 |
| Full Stop . | 2E | 0010 1110 | 4B | 0100 1011 |
| Solidus / | 2F | 0010 1111 | 61 | 0110 0001 |
| Percent % | 25 | 0010 0101 | 6C | 0110 1100 |
| Question Mark ? | 3F | 0011 1111 | 6F | 0110 1111 |
| (release character) | | | | |
| Apostrophe ' | 27 | 0010 0111 | 7D | 0111 1101 |
| Plus Sign + | 2B | 0010 1011 | 4E | 0100 1110 |
| Colon : | 3A | 0011 1010 | 7A | 0111 1010 |
| Equals = | 3D | 0011 1101 | 7E | 0111 1110 |
| Padding Character (up-arrow/circumflex) | 5E | 0101 1110 | 5F | 0101 1111 |

### 3.2 Recording Method/Packing Density

For 9-track Phase Encoded (PE) recording a packing density of 1600 r.p.i. is required.

For 9-track Non-return-to-zero (NRZI) recording a packing density of 800 r.p.i. is required.

For 7-track Non-return-to-zero (NRZI) recording a packing density of 556 r.p.i. is required.

### 3.3 Parity

For 9-track recording, odd parity is required, and the parity track must be track 4.

For 7-track recording, odd parity is required, and the parity must be track 7.

### 3.4 Relationship of Tracks and Bits

#### 3.4.1 Extended Coded Character Representation

The 7-bit coded characters must be extended to fill the 8 data bit positions of the 9-track magnetic tape environment by inserting a bit with the value 0 (zero) in the most significant position; ie.

| | |
|---|---|
| Environment No. | 8 7 6 5 4 3 2 1 |
| Bit No. | 0 7 6 5 4 3 2 1 |

Where 0 is the inserted bit with the value zero.

#### 3.4.2 9-track Tape Bits/Tracks Relationship

The relationship between the tracks on the tape and the bits of the extended coded representation of the characters must be as follows:-

| | |
|---|---|
| Track No. | 9 8 7 6 5 4 3 2 1 |
| Extended Bit No. | 4 2 8 7 6 P 5 1 3 |

(P = Parity Bit)

#### 3.4.3 7-track Tape Bits/Tracks Relationship

The 7-bit coded characters must be recorded within one row on the tape, omitting bit 6. The relationship between the tracks on tape and the remaining bits of the characters must be as follows:-

| | |
|---|---|
| Track No. | 7 6 5 4 3 2 1 |
| Bit No. | P 7 5 4 3 2 1 |

(P = Parity Bit)

## 3.5 Tape Marks

### 3.5.1 9-track PE Recording

The PE tape mark is a special control block consisting of 64 to 256 flux transitions at 3200 FTPI (flux transitions per inch) (126 per mm) in tracks 2, 5 and 8. Tracks 3, 6 and 9 must be erased and tracks 1, 4 and 7, in any combination may be erased or recorded in the manner required for tracks 2, 5 and 8. A tape mark must be preceded and followed by a 3.5 inch (88.9 mm) interlock gap.

### 3.5.2 9-track NRZI Recording

The NRZI tape mark is a single-row control block consisting of 'one' bits in tracks 2, 3 and 8 of the tape.

### 3.5.3 7-track NRZI Recording

The 7-track NRZI tape mark should consist of a single row control block accompanied by a longitudinal check row, represented by the combination 0011111, including parity which is in the most significant position.

Other control blocks may be arranged by agreement between sender and recipient.

## 3.6 Phase Encoded Method of Recording

### 3.6.1 Identification Burst

The PE method of recording must be identified by a burst of recording at the BOT marker. This burst consists of 1600 flux transitions per inch (FTPI) (63 per mm) on track 4 with erasure on all other tracks. The burst must start at least 1.7 inches (43.2 mm) before the hub end of the BOT marker and continue past the hub end, ending at least 0.5 inches (12.7 mm) before the first block.

### 3.6.2 Block Standards

The data portion of all blocks must be preceded by a preamble and followed by a postamble. A preamble consists of 41 rows of which the first 40 contain bits set at zero in all tracks and the last contains bits set at one in all tracks. The postamble also consists of 41 rows but in this case the first row contains bits set at one in all tracks and the last 40 rows contain bits set at zero in all tracks.

## 3.7 Inter-Block Gaps

### 3.7.1 9-track Recording

a) **Initial Gap (Load Point Gap)**

The gap between the hub end of the BOT marker and the beginning of the first block must be a minimum of 3 inches and a maximum of 25 feet.

b) **Other Gaps**

The inter-block gaps have a nominal length of 0.6 inches, minimum of 0.5 inches, maximum 25 feet and the tape must be erased in this gap.

### 3.7.2 7-track Recording

The inter-block gap must be a nominal 0.75 inches, minimum 0.687 inches, maximum 1.00 inch.

## 3.8 Other Recording Methods

As other recording methods are developed and become accepted in common use, eg. recording at a packing density of 6250 r.p.i., the equivalent recording standards, itemised in the preceding sub-sections, will be adopted, as defined by the relevant BSI and/or ISO standards.

## 3.9 Block Length

### 3.9.1 Standard Label Records

Standard header and trailer labels (as defined in BS 4732) must each be 80-character blocks exclusive of padding characters.

### 3.9.2 Data Blocks

The preferred block length for data blocks is 2048 data rows. Where the preferred block length cannot be achieved because of hardware restrictions in the recording configuration, the block length must be agreed between the interchange parties.

Data blocks must be of fixed length within a single file.

### 3.9.3 Padding

Whenever a magnetic tape is recorded by a word-orientated computer it may become necessary to extend a block to a multiple of the word length of the computer. Blocks must be padded out to the desired length by use of the padding character (upwards arrow/circumflex - binary 1011110).

Padding characters must not be used in the following positions:-

I) Before the first field of a Header or Trailer Label.

ii) Within or between fields of a Header or Trailer Label.

iii) Before the first data character in a data block.

iv) Between data characters in a data block.

Where padding characters are necessary in a Label Record, each label need only be padded to the next multiple of the word length of the computer.

For data blocks not of the preferred length (2048 characters) the blocking factor should be such that padding characters are necessary only in the final data block.

# 4. FILE REQUIREMENTS

## 4.1 Structure of Magnetic Tape Files

### 4.1.1 Single Reel Files

The only conventional standard label record **mandatory** on all tapes is the Volume Header Label (VOL 1) which must be the first block on each reel of tape. Thus for a single-reel file; the following format applies:-

| | | |
|---|---|---|
| VOL 1 | - | Volume Header Label |
| *Tape Mark | | |
| Data Block 1 | - | ) |
| Date Block 2 | - | ) |
| > | ) | |
| < | ) | Interchange data |
| > | ) | |
| < | ) | |
| Data Block n | - | ) |
| *Tape Mark | | |
| *Tape Mark | | |

Optional conventional file control labels may be included in addition to the mandatory Volume Header Label on a single-reel file, as follows:-

| | | |
|---|---|---|
| VOL 1 | - | Volume Header Label |
| HDR 1 | - | First File Header Label |
| HDR 2 | - | Second File Header Label |
| *Tape Mark | | |
| Data Block 1 | ) | |
| Data Block 2 | ) | |
| > | ) | |
| < | ) | |
| > | ) | |
| < | ) | |
| Data Block n | ) | |
| *Tape Mark | | |
| EOF 1 | - | File Trailer Label |
| *Tape Mark | | |
| *Tape Mark | | |

If HDR 2 label is used, it must be preceded by HDR 1 label.

### 4.1.2 Multi-Reel Files

Where a multi-reel file is generated, the Volume Header Label (VOL 1) and the First File Header Label (HDR 1) are mandatory, as is a trailer label - Volume Trailer Label (EOV 1) on all reels except the last, and File Trailer Label (EOF 1) on the last reel. Multi-reel files are formatted as follows:-

a) All reels except the last.

| | | |
|---|---|---|
| VOL 1 | - | Volume Header Label |
| HDR 1 | - | First File Header Label |
| HDR 2 | - | Second File Header Label |
| *Tape Mark | | (optional) |
| Data Block | | |
| > | | |
| < | | |
| Data Block | | |
| *Tape Mark | | |
| EOV 1 | - | Volume Trailer Label |
| *Tape Mark | | |
| *Tape Mark | | |

b) Last Reel.

| | | |
|---|---|---|
| VOL 1 | - | Volume Header Label |
| HDR 1 | - | First File Header Label |
| HDR 2 | - | Second File Header Label |
| *Tape Mark | | (optional) |
| Data Block | | |
| > | | |
| < | | |
| > | | |
| < | | |
| Data Block | | |
| *Tape Mark | | |
| EOF 1 | - | File Trailer Label |
| *Tape Mark | | |
| *Tape Mark | | |

If HDR 2 label is used, it must be preceded by HDR 1 label.

## 4.2 Contents of Tape Labels

### 4.2.1 Volume Header Label (VOL 1) - Mandatory

| | Field Name | Character Position | Length in Characters | Contents |
|---|---|---|---|---|
| 1. | Label Identifier | 1 - 3 | 3 | VOL |
| 2. | Label Number | 4 | 1 | 1 |
| 3. | Tape Serial No. | 5 - 10 | 6 | Permanently assigned identifier of tape vol. |
| 4. | Accessibility | 11 | 1 | Blank space or zero |
| 5. | Reserved for future use | 12 - 31 | 20 | Blank spaces |
| 6. | Reserved for future use | 32 - 37 | 6 | Blank spaces |
| 7. | Owner Identification | 38 - 51 | 14 | To be agreed between interchange parties |
| 8. | Reserved for future use | 52 - 79 | 28 | Blank spaces |
| 9. | Accessibility | 80 | 1 | Blank space or 1 |

### 4.2.2 First File Header Label (HDR 1) - Mandatory on Multi-reel Files

| | Field Name | Character Position | Length in Characters | Contents |
|---|---|---|---|---|
| 1. | Label Identifier | 1 - 3 | 3 | HDR |
| 2. | Label Number | 4 | 1 | 1 |
| 3. | File Identifier | 5 - 21 | 17 ) | Alphanumeric identifier, |
| | | | ) | constant for all HDR 1 |
| 4. | Set Identification | 22 - 27 | 6 ) | labels within file set |
| 5. | File Section Number | 28 - 31 | 4 | '0001' on first reel incremented by 1 for each subsequent reel of multi-reel file |
| 6. | File Sequence Number | 32 - 35 | 4 | '0001' (numeric) |
| 7. | Generation Number | 36 - 39 | 4 | Numeric value |
| 8. | Generation Version No. | 40 - 41 | 2 | Numeric value |
| 9. | Creation Date | 42 - 47 | 6 | Format ␣YYDDD<br>␣ = blank space<br>YY = last 2 digits of year<br>DDD = day (001-366) within year |
| 10. | Expiration Date | 48 - 53 | 6 | Format as above |
| 11. | Accessibility | 54 | 1 | Blank space or zero |
| 12. | Block Count | 55 - 60 | 6 | Zeros |
| 13. | System Code | 61 - 73 | 13 | Any alphanumeric characters |
| 14. | Reserved for future use | 74 - 80 | 7 | Blank spaces |

### 4.2.3 Second File Header Label (HDR 2) - Optional

| | Field Name | Character Position | Length in Characters | Contents |
|---|---|---|---|---|
| 1. | Label Identifier | 1 - 3 | 3 | HDR |
| 2. | Label Number | 4 | 1 | 2 |
| 3. | Record Format | 5 | 1 | F (Fixed Length) |
| 4. | Block Length | 6 - 10 | 5 | 2048 (unless otherwise agreed between inter-change parties) |
| 5. | Record Length | 11 - 15 | 5 | 2048 |
| 6. | Reserved for operating | 16 - 50 | 35 | Any alphanumeric characters |
| 7. | Buffer offset | 51 - 52 | 2 | Zeros |
| 8. | Reserved for future use | 53 - 80 | 28 | |

### 4.2.4 File Trailer Label (EOF 1) - Mandatory for Multi-reel Files

| | Field Name | Character Position | Length in Characters | Contents |
|---|---|---|---|---|
| 1. | Label Identifier | 1 - 3 | 3 | EOF |
| 2. | Label Number | 4 | 1 | 1 |
| 3. ) to ) 11. ) ) | Same as corresponding fields in HDR 1 label | 5 - 54 | 50 | Same as contents for corresponding fields in in HDR 1 label |
| 12. | Block Count | 55 - 60 | 6 | Number of data blocks since preceding HDR label group |
| 13. ) 14. ) | As in HDR 1 Label | 61 - 80 | 20 | As for HDR 1 label |

### 4.2.5 Volume Trailer Label (EOV 1) - Mandatory for Multi-reel Files

| | Field Name | Character Position | Length in Characters | Contents |
|---|---|---|---|---|
| 1. | Label Identifier | 1 - 3 | 3 | EOV |
| 2. | Label Number | 4 | 1 | 1 |
| 3. ) to ) 11. ) ) | Same as corresponding fields in HDR 1 label | 5 - 54 | 50 | Same as contents for corresponding fields in in HDR 1 label |
| 12. | Block Count | 55 - 60 | 6 | Number of data blocks since preceding HDR label group |
| 13. ) 14. ) | As in HDR 1 Label | 61 - 80 | 20 | As for HDR 1 label |

## 4.3 Contents of Data Blocks

### 4.3.1 Data Blocks

Data Blocks will normally be 2048 characters long. The data contained within the data blocks will be laid out according to the ANA TRADACOMS Standards specified in this manual.

### 4.3.2 Data Insertion into Magnetic Tape Data Blocks

#### 4.3.2.1 Magnetic Tape Data Handling

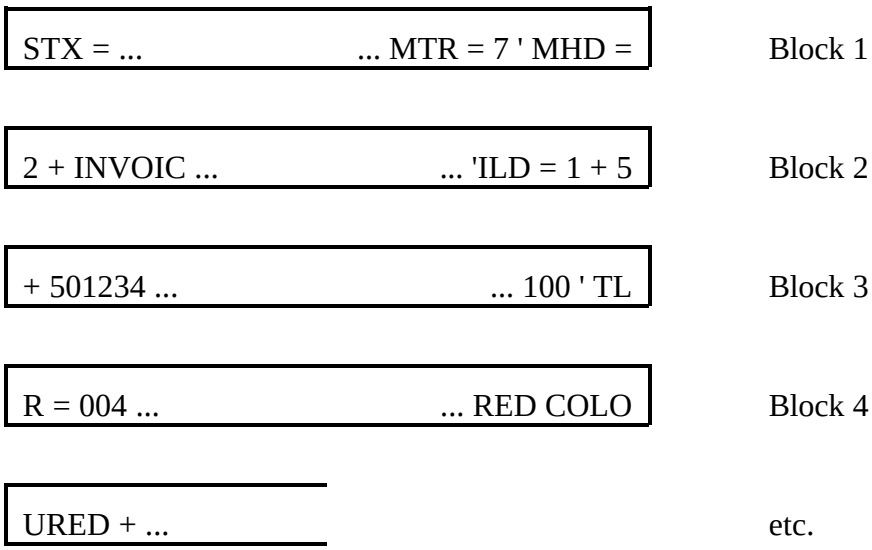
For magnetic tape data handling purposes, data will appear as fixed length unblocked records. Block and record length counts are not required.

#### 4.3.2.2 TRADACOMS Standard Data Elements

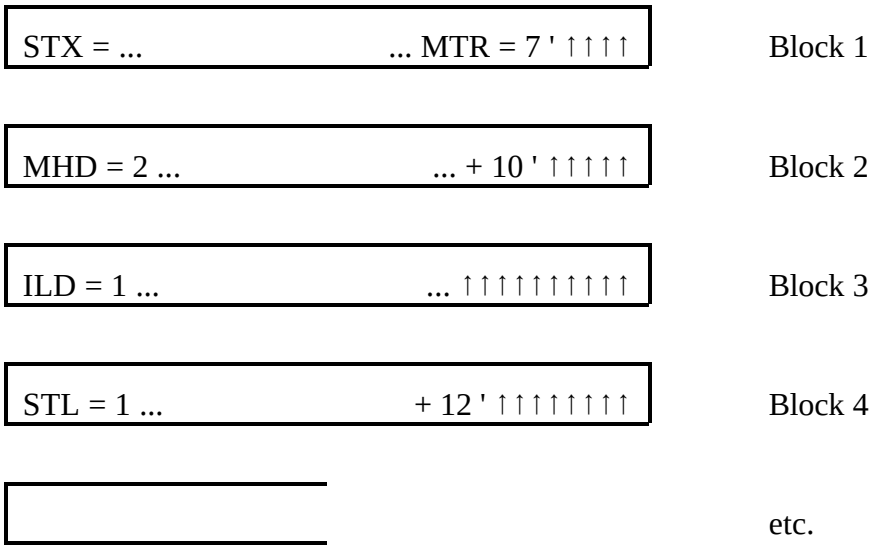
A TRADACOMS Standard data element, segment or message does not necessarily have to be contained completely within a physical block on magnetic tape, ie. associated parts of a message may span one or more blocks.

Alternatively, an installation producing a tape may find it easier to pad-out to the end of each tape block after the last complete segment which will fit into that block.

eg.



or


STX = ... ... MTR = 7 ' ↑↑↑↑
Block 1
MHD = 2 ... ... + 10 ' ↑↑↑↑↑
Block 2
ILD = 1 ... ... ↑↑↑↑↑↑↑↑↑↑
Block 3
STL = 1 ... + 12 ' ↑↑↑↑↑↑↑↑
Block 4
etc.

## 5. BIBLIOGRAPHY

British Standards institution publications (ISO equivalent publications in brackets):-

BS 3968 7-track magnetic tape for data interchange recorded at 200 r.p.i. (ISO 1864)

BS 4503 Specification for 9-track magnetic tape for date interchange

Part 1: Tape recorded at 31.5 rows per millimetre (800 rows per inch) NRZI

Part 2: Tape recorded at 63 rows per millimetre (1600 rows per inch) phase encoded

BS 4730 United Kingdom 7-bit data code (ISO-7 UK) (ISO 646, ISO 4027)

BS 4732 Magnetic tape labelling and file structure for data interchange (ISO/R 1001)

BS 4783 Recommendations for the care and transportation of magnetic tape.

ISO 7372 Trade Data Element Directory.

SITPRO publication:-

Computers in International Trade and Transport - Data Standards.

**SECTION F: SPECIALISED FILE FORMATS**

CONTENTS

## SECTION F: SPECIALISED FILE FORMATS

The following industry sectors have developed messages in conjunction with the ANA using UNGTDI and TRADACOMS standards. The ANA works with recognised industry groups to ensure that specific message formats are widely applicable and reflect industry needs.

It is recognised that these messages are more sector-specific than those published in the TRADACOMS manual (Volumes 2 and 3). They have been supported because the industries involved have special needs outside the scope of the main TRADACOMS message set. These industries are also typified by the large volumes of transactional data which needs to be sent on a regular basis. Rather than incorporate these real data requirements into the cross-sector messages, which would make them longer and more complex, or providing Data Narrative or Registered Text Codes to represent the data, a more elegant solution was to provide tailored messages. These industry-specific messages have incorporated existing segments and data elements where possible.

The use of these messages by other industries which have similar requirements (eg supply and return) is not prohibited.

### 1. NEWSTRADE

| | | |
|---|---|---|
| Issues File | - | Allows the publisher or distributor of a newspaper or periodical to communicate the details of these publications to customers. Each issue of a newspaper or magazine is a new product. They are commonly sold over a fixed time period, so the file carries notification of the dates on which each issue may be ordered, go on sale or be claimed as unsold. As for all TRADACOMS standards, the file encourages the use of the EAN numbering system for products and locations. |
| Claims File | - | Allows the NEWSTRADE wholesaler to make claims for credit against unsold copies of newspapers or magazines, where these have been supplied on a sale or return basis. The wholesaler may collate claims for all the retail outlets to which they distribute these products. |
| Claims Acknowledgement File | - | Acknowledges the Claims File. This provides details of the quantities of each issue which have been accepted for credit and those which have been rejected, and those which have been rejected, with reasons. This is a draft file. |
| Supply and Returns File | - | Allows the communication of the quantities of products which have been supplied to and returned from each retail outlet. This is a draft file. |

The NEWSTRADE industry EDI group is NewPET

Contact: Dave Blackett, NewPET,
c/o SM, 6 Leigham Court Road,
Streatham, London, SW16 2PG

## 2. BOOK TRADE

| | | |
|---|---|---|
| Book Order File | - | This file is based on the Order File. It carries the specific bibliographic information which applies to the book trade, such as title, author, publisher and edition. |
| Price and Availability Updates Files | - | This is a master file which provides details of the availability of individual BOOKTRADE products. Again it carries the bibliographic data relevant to this sector. This is a draft file under trial. |

The Book Trade EDI group is BIC

Contact: Brian Green, Book Industry Communication
39 - 41 North Road
London N7 9DP

## 3. HOMESHOPPING

| | | |
|---|---|---|
| Homeshopping Order File | - | This file is based on the Order File but it carries additional data required by homeshopping (catalogue) retailers. This includes return address and carrier details. |

Contact the ANA for further information.

## 4. TEXTILES

| | | |
|---|---|---|
| Dye Instruction File | - | This file carries specific instructions from a customer to a dyer or finisher of garments, hosiery or cloth which has been originally supplied by the customer. The information carried includes specific dyeing and quality data as well as delivery data and prices. The file may also be used to notify the transfer of stock to the dyer or finisher. The use of standard codes is incorporated wherever possible. This file is currently under revision. |

The textile industry EDI group is EDITEX

Contact: Peter Reed
EDITEX Chairman
Coats Viyella plc
Bullbridge, Ambergate
Derbyshire DE5 2EY

## 5. INDUSTRY USAGE OF TRADACOMS MESSAGES

The industry group for the book trade and NEWSTRADE mentioned above also provide guidance on implementation of the standards for their particular sectors. Another industry group which provides such help is the FLEETNET community for auto leasing firms. Users wishing to trade electronically in this sector may contact:

Rod Mountney
FLEETNET Standards Officer
CSC Computer Sciences Ltd
c/o Autoglass, P O Box 50,
Clifton House, Goldington Road,
Bedford, MK40 3YP