S.W.I.F.T.

Society for Worldwide Interbank Financial Telecommunication.

General Information

LIST OF S. W. I. F. T. MEMBER BANKS

(as at June 12, 1975)

AUSTRIA

Allgemeine Sparkasse in Linz • Bank für Arbeit und Wirtschaft, AG • Bank für Kärnten • Bank für Tirol und Vorarlberg, AG • Bankhaus Carl Spängler & Co. • Bankhaus Schoeller & Co. • Creditanstalt-Bankverein • Dornbirner Sparkasse • Erste Oesterreichische Spar-Casse • Genossenschaftliche Zentralbank • Girozentrale und Bank der Oesterreichischen Sparkassen • Karnter Sparkasse • Oberbank, Bank für Oberösterreich und Salzburg • Oberösterreichische Raiffeisen-Zentralkasse • Oesterreichische Länderbank • Oesterreichische Volksbanken • Raiffeisenverband Kärnten • Raiffeisenverband Salzburg • Raffeisen-Zentralkasse Niederösterreich-Wien • Raiffeisen Zentralkasse Steiermark • Raiffeisen Zentralkasse Tirol • Salzburger Sparkasse • Sparkasse der Stadt Innsbruck • Steiermärkische Bank, GmbH • Steiermärkische Sparkasse in Graz • Villacher Sparkasse • Zentralsparkasse der Gemeinde Wien

BELGIUM

Banque de Bruxelles • Banque de Paris et des Pays-Bas • Banque du Benelux • Caisse Générale d'Epargne et de Retraite • Kredietbank • Société Française de Banque et de Dépôts • Société Générale de Banque

CANADA

Bank of Montreal • The Bank of Nova Scotia • Canadian Imperial Bank of Commerce • The Royal Bank of Canada • The Toronto-Dominion Bank

DENMARK

Amagerbanken • Andelsbanken • Den Danske Landmandsbank • Den Danske Provinsbank • Egnsbank Nord • Faellesbanken for Danmarks Sparekasser • Jyske Bank • Kjobenhavns Handelsbank • Midtbank • Privatbanken • Sjaellandske Bank • Svendborg Bank • Sydbank • Varde Bank • Vendelbobanken

FINLAND

Helsingfors Aktiebank • Kansallis-Osake-Pankki • Nordiska Föreningsbanken • Säästöpankkien Keskus-Osake-Pankki • Suomen Pankki

FRANCE

Banque Commerciale pour l'Europe du Nord (EUROBANK) • Banque de France • Banque de Paris et des Pays-Bas • Banque de l'Union Européenne • Banque de Suez et de l'Union des Mines • Banque Dupont • Banque Française du Commerce Extérieur • Banque Hervet • Banque Jordaan • Banque Louis Dreyfus • Banque Nationale de Paris • Banque Régionale de l'Ain • Banque Scalbert • Banque Transatlantique • Caisse Centrale des Banques Populaires • Caisse des Dépôts et Consignations • Caisse Nationale de Crédit Agricole • Crédit Commercial de France • Crédit du Nord et Union Parisienne (Union Bancaire) • Crédit Industriel d'Alsace et de Lorraine • Crédit Industriel de Normandie • Crédit Industriel de l'Ouest • Crédit Industriel et Commercial • Crédit Lyonnais • Société Bordelaise de Crédit Industriel et Commercial • Société Générale • Société Générale Alsacienne de Banque • Société Lyonnaise de Dépôts et de Crédit Industriel • Société Nancéienne et Varin-Bernier • Union de Banques à Paris

GERMANY

Badische Bank • Badische Kommunale Landesbank Girozentrale • Bayerische Hypotheken- und Wechsel-Bank • Bayerische Landesbank Girozentrale • Bayerische Vereinsbank • Joh. Berenberg, Gossler & Co. • Berliner Bank • Berliner Handels-Gesellschaft-Frankfurter Bank • Bremer Landesbank • Commerzbank • Deutsche Bank • Deutsche Bundesbank • Deutsche Genossenschaftskasse • Deutsche Girozentrale - Deutsche Kommunalbank • Die Sparkasse in Bremen • Dresdner Bank • Effectenbank-Warburg • Frankfurter Sparkasse Von 1822 • Girokasse Öffentliche Bank und Sparkasse Stuttgart • Hamburger Sparkasse • Hamburgische Landesbank Girozentrale • Hessische Landesbank Girozentrale • Investitions- und Handelsbank • Kreissparkasse Köln • Landesbank Rheinland-Pfalz Girozentrale • Landesbank Saar Girozentrale • Landesbank Schleswig-Holstein Girozentrale • Nassauische Sparkasse • Norddeutsche Landesbank Girozentrale • Sal. Oppenheim Jr. & Cie • Saarländische Kreditbank • Sparkasse Bonn • Sparkasse der Stadt Hagen • Sparkasse der Stadt Köln • Stadtsparkasse Augsburg • Stadtsparkasse Frankfurt am Main • Stadtsparkasse Hannover • Stadtsparkasse Mannheim • Stadtsparkasse Wuppertal • Südwestdeutsche Genossenschafts-Zentralbank • C.G. Trinkaus & Burkhardt • Vereins- und Westbank • M.M. Warburg-Brinckmann, Wirtz & Co. • Westdeutsche Genossenschafts-Zentralbank • Westdeutsche Landesbank Girozentrale • Württembergische Bank • Württembergische Landeskommunalbank Girozentrale

Continued on inside of back cover

FOREWORD

by Carl Reuterskiöld, General Manager

The S.W.I.F.T. organisation is the culmination of a range of studies initiated in 1969 with the aim of providing an improved international payments system.

In general, banks have tended to concentrate the bulk of their data processing resources towards the automation of current and saving/deposit account applications. Computerized interbank services have also been implemented on a national basis, but international money transfers are still mainly carried out manually via mail (approximately 80 %) or telex (approximately 20 %).

In May 1973, some 240 of the largest European and North American banks set up the Society for Worldwide Interbank Financial Telecommunication (S.W.I.F.T.) with the aim to design, implement and operate an international financial telecommunication network. This will enable member banks to transmit between themselves international payments, statements and other messages associated with international banking. The use of the network will be more convenient and reliable than present methods of communication, and will enable the banks to offer a better service to their customers.

Use of the system will also impose certain standards for procedures and message formats. This, coupled with the ability to transmit and receive messages in computer readable form, will facilitate the automation of the banks' international payment business. The problem of account reconciliation will also be eased as the system can be used for the frequent transmission of statements.

S.W.I.F.T. is a step forward to improve the communications between internationally corresponding banks. The lengthy pipelines and slow response times of paper- and mail-based systems are no longer considered adequate. Much of the paper produced by the banks is already computer generated, and on receipt at the destination bank the same information has to be transferred from the paper to that bank's computer system.

It is a fact that the speed of transmission of information is not directly related to the speed with which money is made available. The latter is determined by individual bank policy and is indicated by the value date, an integral part of the message.

With the advent of S.W.I.F.T., the member bank has the problem of interfacing one system with another. I appreciate that many international payments have, of course, not yet completed their journey having arrived via S.W.I.F.T. at the destination correspondant bank's terminal. For example, they may need to continue to a branch of that bank to reach the account of the ultimate beneficiary. With the development of the S.W.I.F.T. Interface Device (described elsewhere in this brochure) and the flexibility of the proposed address structure, the required interface should be within reach of most banks.

S.W.I.F.T.'s basic role of international payment processing for member banks is capable of tremendous expansion in a variety of directions, for example, the international spread of the network, the variety of message types which can be accommodated, etc.

NETWORK DESCRIPTION

The Network, in its first phase, will cover most of Western Europe and North America. It will be a two centre financial transaction control system, the banks connecting their terminals via programmable concentrators in each country.

As messages will be temporarily stored at the switching centres, users will be able to input transactions whether the receiver's terminal is available for reception or not; this also allows the connection of terminals operating at different speeds and using different line protocols.

Although each switching centre features fully duplicated computer configurations, a two-centre design is used for increased security should one centre become unavailable through natural catastrophe, industrial action or sabotage; each configuration will have enough capacity to handle the entire traffic load.

Communication between the switches and concentrators is carried over high speed leased telephone lines operating at 9,600 bits per second.

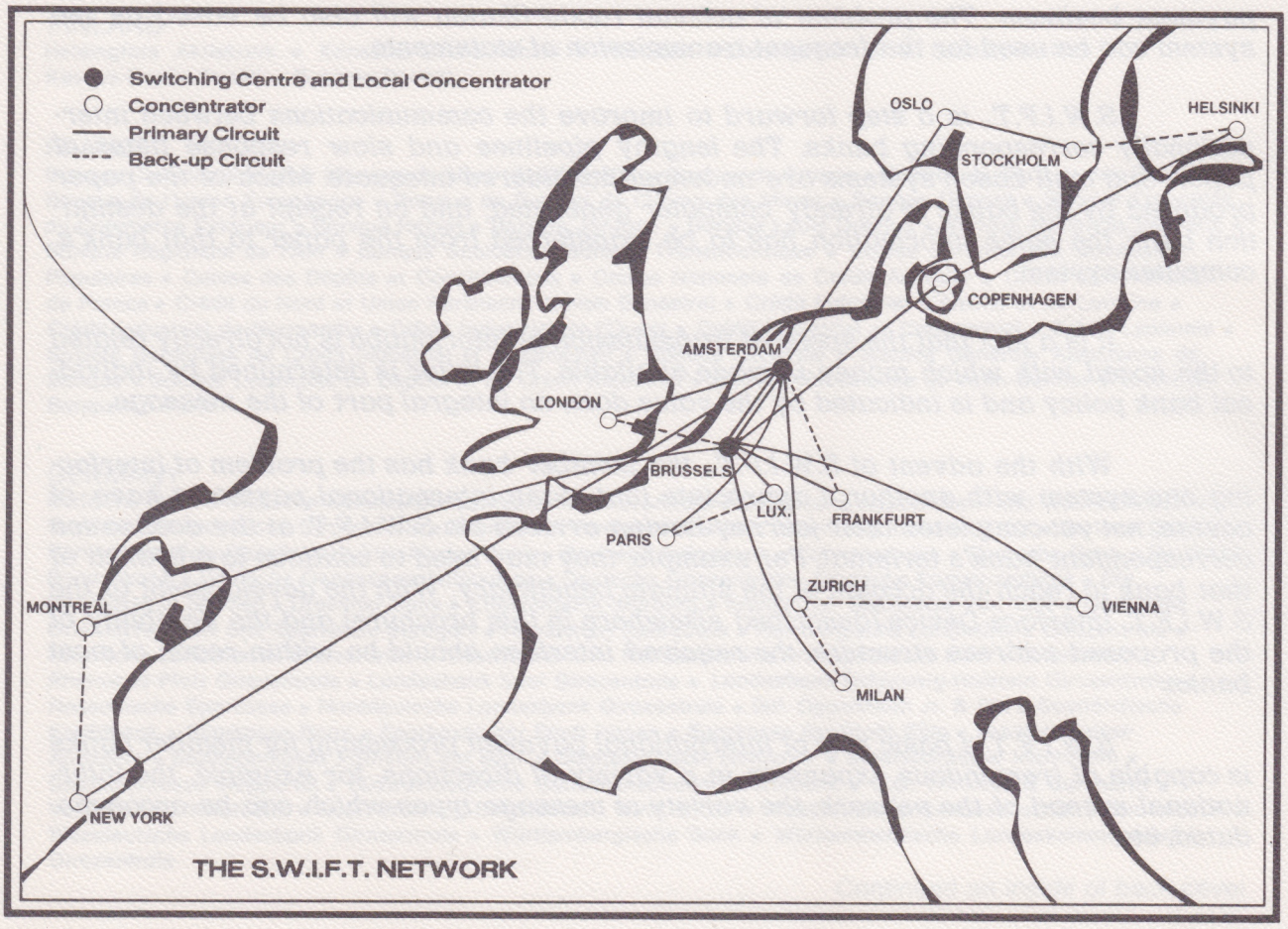
Back up is ensured by permanent reserve circuits from each concentrator processor.

All terminals connected to the network must conform to one of the standard interfaces specified by S. W. I. F. T. These allow for the connection of three classes of terminals :

— computer based terminals, including the connection of mainframe computers, intelligent terminals, terminal controllers and private or national banking networks
— low speed teleprinters
— telex.

Teleprinters and computer based terminals can be connected to the national concentrators by dedicated lines or the public switched telephone network subject to approval by the local telecommunications authorities.

The design of the network allows for geographical expansion to other countries and continents by the addition of further national concentrator processors and switching centres.



THE S.W.I.F.T. NETWORK

THE SERVICE

S. W. I. F. T. will provide its users with a communication service for the transmission of international banking messages presently sent by mail, telex or cable. One of S. W. I. F. T.'s prime objectives is to facilitate the automation of foreign banking departments; transactions will therefore be transmitted in a standardized form to allow pre- and post-processing by computers.

Message Text Standards have been designed and, when the system becomes operational, users will be able to transmit all types of customer and bank transfers, as well as confirmation of foreign exchange deals, statements and associated messages; Standards to cover other areas such as documentary collections will be incorporated at a later stage (see Exhibit 1).

All S. W. I. F. T. messages are formatted, consisting of an envelope, containing routing and system information, and the text. For each message type, a format is defined specifying a number of fields, the presence of which may be mandatory or optional. Field contents are governed by rules laid down in the Message Text Standards. Exhibit 2 shows a Payment Order formatted according to S. W. I. F. T. Standards; on the example chosen, the "Sender's Correspondent Bank" is an optional field as it implies reimbursement through a third bank which is not always necessary. Each field is preceded by a field tag and is written according to a specified format. Messages are validated by the switching centres in order to ensure that they are free of format errors; invalid messages will not be transmitted and an error diagnostic will be returned to the sender. Assistance will be available to telex and teleprinter users in the form of expansion of field tags and codes in national language upon reception.
Several levels of priority will be available to users, defer-

CATEGORY	MESSAGE GROUP
Customer Transfers	Customer Transfers
Bank Transfers	Bank Transfers Advice to receive
Foreign Exchange	Foreign Exchange Fixed Loan/Deposit Call/Notice Loan/Deposit Interest Payment
Special Messages	Confirmation of Debit Confirmation of Credit Statements Safety/Warning Messages

EXHIBIT 1 : S. W. I. F. T. Messages

For each category exists also a group of Common Messages :
Request for cancellation
Queries
Answers
Free Format

Message categories to be incorporated will cover :
Documentary Collections
Securities
Letters of Credit

red, normal and urgent. Assuming sufficient terminal output capacity, expected delivery times will be within 8 hours, 10 minutes and 1 minute respectively; normal and urgent priorities will be implemented at system cut over. All messages will be acknowledged upon correct receipt by the switching centre. In the case of urgent messages, a delivery notification will be issued to the originator upon delivery of the message, indicating the time of delivery. If an urgent message has not been delivered within five minutes of input to the system, a warning message will be transmitted to the sender indicating the length of the queue, in minutes of transmission time, awaiting delivery or the reason for non-delivery (e.g. terminal failure); as it will not be possible to cancel a message in the system, delayed urgent messages will be marked when delivery is eventually made.

Access to the system will be controlled for security reasons. A terminal must be "logged-in" before it may transmit messages. The log-in procedure will contain a pass word and a sequential component unique to each terminal. Terminals may be logged-in for message input, output, or both, and separately for each priority. It is thus possible to log-in a terminal, for instance over a bank holiday, for the reception of urgent messages only. The use of a terminal is terminated by the operator by means of a log-out message. Under special circumstances, such as detection of a circuit failure, a terminal can be logged-out by the switching centre for security reasons.

To ensure message accountability, all messages input to the system will be numbered sequentially and the system will check for continuity. Similarly, the system will assign an Output Sequence Number to all messages output. Input and Output Sequence Numbers are independent of one another for each terminal. All messages will be allocated a System Reference Number at the switch which will serve as a common means of identification to both sender and receiver.

For identification purposes, each bank's terminal(s) will be assigned one or more S. W. I. F. T. terminal addresses. When a user has several terminals, he can define to which of these the system must deliver messages according to priority and/or message category. For instance, a bank may specify that foreign exchange messages are to be delivered to a different terminal than payment messages.

Messages input into the system may contain up to ten destination addresses and a copy of the message will be delivered to each address. In addition, the capability will exist whereby up to 20 destinations can be implied by a single group address, to be specified by the user.

Should a bank, in case of line or terminal failure, be unable to accept its destined traffic, it may nominate another S. W. I. F. T. destination (e.g. its head office) to receive messages on its behalf. This alternate routing is selective to the extent that only messages of specific categories and/or priorities can be requested for re-routing. Those messages not so specified will remain stored until the original destination can receive them.

All messages transmitted by the network will be available for retrieval by the originating or destination terminal only for a period of ten days after delivery.

Georges Dubois asks the Banque Normale, Brussels, to transfer $ 500.000 to John Smith, customer of the Country Bank, London.

The reimbursement will be done through the General Bank in New York.

The bank codes are :

Banque Normale	BNOR
Country Bank	CYBA

S. W. I. F. T. Message :

BNORBEBB 200456 100 CYBAGBLL	Sender's terminal address-Input Sequence Number Message type Receiver's bank address — Header
20:23232	Transaction Reference Number
32A:750217USM500000,	Value date, Currency code, Amount
50:DUBOIS G. AVE. DE L'OISEAU BLANC 82 B - 1030 BRUSSELS	Ordering customer
53D:GENERAL BANK NEW STREET 104 NEW YORK 10015	Sender's correspondent bank
59:/20671908 SMITH J. OLD STREET 3 LONDON EC2P 2AJ	Beneficiary customer
70:INVOICE N° 1234 DATED 1975-01-23	Details of payment

EXHIBIT 2 : Example of payment message in S.W.I.F.T. format and as sent presently

BANQUE NORMALE

SIEGE ADMINISTRATIF

Télégr.: ..... Compte Ch. Post. .....
Télex ..... Reg. Com.: .....
Téléphone ..... Extension N° .....

Le 1975-02-13 Réf.: 23232

ORDRE DE PAIEMENT / PAYMENT ORDER
ZAHLUNGS AUFTRAG / ORDINE DI PAGAMENTO

Nous vous prions de verser ... sans frais pour nous
Please pay ..... without any charges to us
Wir bitten Sie zu vergüten ... ohne Spesen für uns
Vi preghiamo di versare ..... senza spese per noi

Dev.	Montant	
$	500.000	Val. 1975-02-17

en lettres / in words / in Worten / in lettere

FivehundredthousandusdollarsXXXXXXXXXXX

Cover has been remitted to you through
GENERAL BANK, NEW YORK

Vos dévoués/Yours truly/Hochachtungsvoll/Distinti saluti
BANQUE NORMALE

1

Donneur d'ordre/By order of/Auftraggeber/Ordinante — 1

Cpte N°

DUBOIS GEORGES
Avenue de l'Oiseau Blanc, 82
B-1030 BRUSSELS

Ordre du
Order dated
Auftrag vom
Ordine del

Motif du paiement/Details of payment/Zahlungsgrund/Motivo del pagamento

Invoice n° 1234 dated 1975-01-23

Bénéficiaire / Beneficiary / Begünstigter / Beneficiario

SMITH John A/C 20671908
Old Street, 3
LONDON EC2P 2AJ

Son compte auprès de/In his account with/auf sein Konto bei/suo conto presso

COUNTRY BANK, LONDON

Banque chargée de l'ordre/Paying bank/Beauftragte Bank/Banco incaricata

COUNTRY BANK, LONDON

Compte Reimbursement Konto Conto — Vostro

THE SYSTEM

INTRODUCTION

The S. W. I. F. T. Centres and National Concentrators are being supplied by Burroughs Corporation. The selection of the supplier was made over an extended period, in two phases.

A preliminary request for tender was sent in 1972 to over 30 vendors. Fifteen valid proposals were submitted and, upon initial evaluation, a short list of four suppliers were selected.

These four suppliers were then invited to submit more detailed proposals for the S. W. I. F. T. system during 1973. The final selection was based on a weighted model, which provided several levels of considering the desirability of the system. The first level considered the supplier's capability and support, the implementation plan and contract, and the proposed system. Lower levels considered capability, reliability and expansibility, and differentiated between switches and concentrators, capacity and functions, throughput and network control, etc.

The elements of the model were weighted, and modified as necessary to assess possible changes. The evaluation of supplier proposals took place during the latter part of 1973, and the early part of 1974. This period included visits to suppliers, discussions, and ultimately contract negotiations. These resulted in the selection of Burroughs as S. W. I. F. T. supplier in March 1974, with final contracts being signed following the joint preparation of a detailed Systems Requirement Specification and Statement of Work, in August 1974.

THE SYSTEM

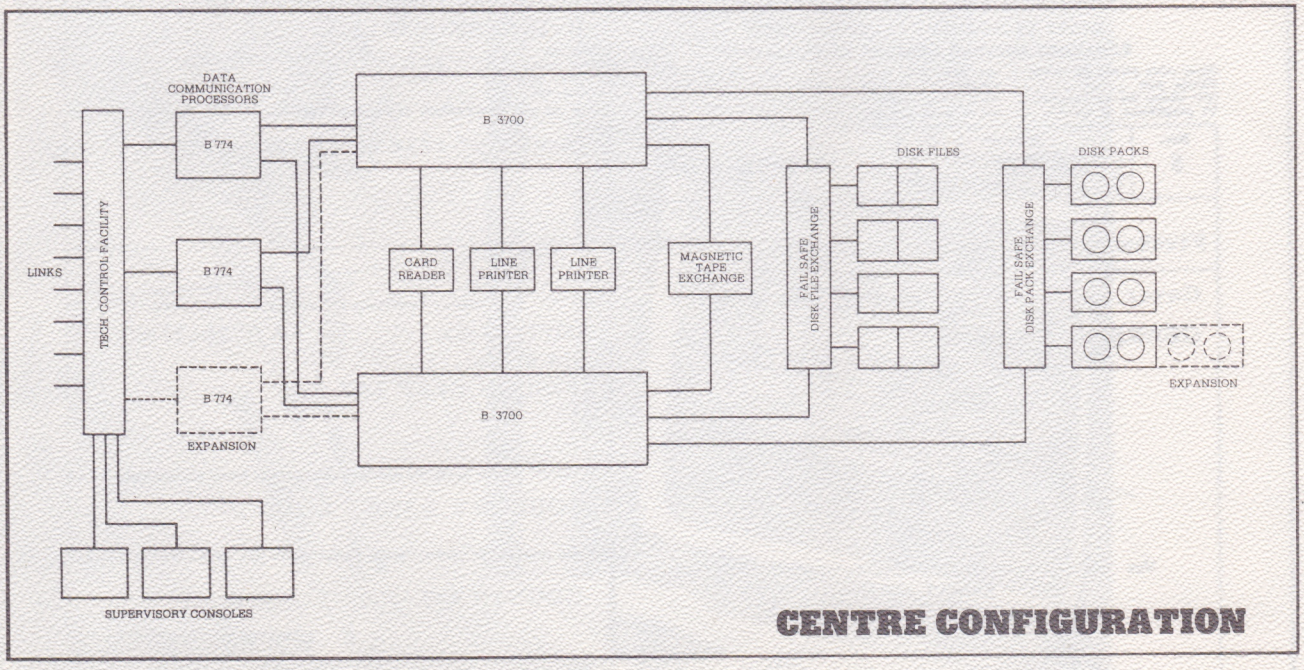
The System comprises Burroughs B 3700 central Computer Systems with B 774 Front-End Processors.
They will provide the following basic capabilities :

- Receipt and transmission of messages
- Message validating and acknowledgement
- Message accountability and security
- Message routing and delivery control
- On-line and historic message storage
- Network Control and re-configuration
- Data recovery and diagnostics.

The B 774 Data Communications Processors provide the communication line interfacing function; the B 3700 Processors provide the processing function.

This distribution of functions in the Centre provides for maximum message transactions with high system availability. No single equipment failure can cause the Centre to fail and there are many multiple failures which still permit either total capability or at least continued operation at a reduced ability. Each Data Communication Processor communicates with either Centre Processor. Each Processor communicates with the entire peripheral message storage sub-system (disk packs, head-per-track disk files, and magnetic tape clusters) through peripheral exchanges. This flexibility provides full redundancy with a minimum of equipment, thereby affording a most cost-effective system.

The B 774 Data Communication Processors are members of the Burroughs B 700 family of standard products and represent fourth generation technology in a proven standard product line. The B 3700 Processors are in the Burroughs Medium System family of computer systems (B 2700, 3700, 4700 and B 4790). These processors are all program-compatible so that messages switching application programs for B 3700 can be used without any changes or reprogramming in the higher capacity B 4790 systems when traffic volumes (or additional new applications) warrant system expansion.



CENTRE CONFIGURATION

The data storage devices, disk packs, disk files and magnetic tape clusters are all from Burroughs current product line and represent various levels of capacity, access time and back-up capability, as needed to meet the S. W. I.F. T. operational requirements. The additional peripherals, card reader and printers fulfil the additional input and output requirements associated with the ancillary functions of the Centre.

Even if message processing and equipment recovery functions are "automatic", there is always the need to have the capability for human direction and modification of system operation. The man/machine interface is supplied by Supervisory Consoles, based on Visual Display Units together with a small printer.

Both Centres are configured for fail-soft operation : one B 3700 Central Processor and one Data Communications Processor will handle "live" messages, while the other will be in standby condition, and may be used for batch procedures, e.g. invoicing, statistics, etc.

Communication processors and peripherals such as disk drives and magnetic tape drives are connected through exchanges so that messages can readily be passed to or from either system. If any one major unit fails, a back-up unit is available to carry out its function. Each processor will monitor the other on a regular basis to ensure that the "live" system is fully operational.

Each switch will control a designated group of concentrators and their associated terminals. A B 3700 system functions as an "entry switch" for messages from its own concentrators and as an "exit switch" for messages sent to these concentrators. For messages destined for terminals connected to another switch, the B 3700 functions as a "transit switch".

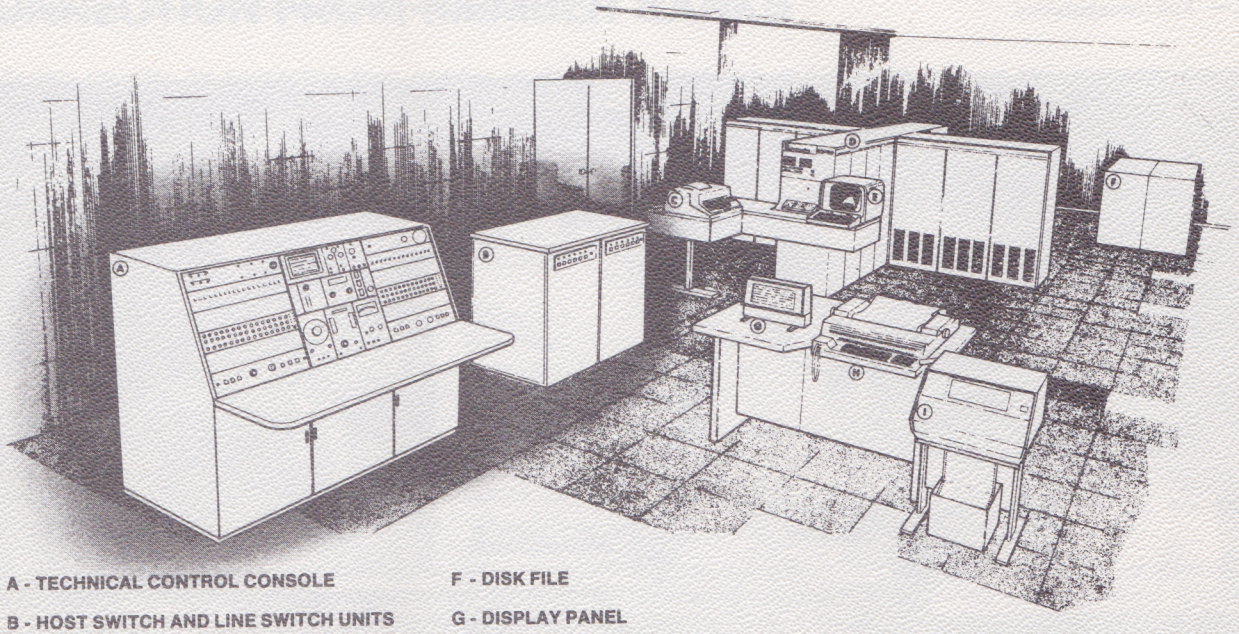
The Centre first controls the validity of the incoming message and stores copies on the live file and the retrieval file. It then issues an acknowledgement to the originating terminal. Even if the message fails the validation check, it will be recorded and the originating terminal operator will be given appropriate error information.

The routing is then carried out with messages being routed to multiple addresses in some cases. The messages will be queued for output on the basis of message category and/or message priority status. After delivery, the concentrator will acknowledge the message to the exit Centre. If the message cannot be delivered the Centre is notified together with the reason.

Facilities are provided to member banks to enquire as to the status of terminals and message queues.

Messages are stored for retrieval on the disk pack drives. Two days' messages are on line with retrieval within a few seconds. Messages up to 10 days old are on other disk packs which will be loaded as required to provide longer term retrieval facilities.

The system uses both hardware and software to provide security for the system. Terminals have to carry out a comprehensive log-in procedure. Software checks will be utilized to enable enquiries from authorized enquirers. Full encryption will be used between concentrators and switches and from switch-to-switch.



A - TECHNICAL CONTROL CONSOLE
B - HOST SWITCH AND LINE SWITCH UNITS
C - SUPERVISORY PRINTER
D - B 3700 MAIN FRAME
E - VISUAL DISPLAY UNIT
F - DISK FILE
G - DISPLAY PANEL
H - TERMINAL COMPUTER
I - LINE PRINTER

A typical Centre Layout

NATIONAL CONCENTRATORS

The B 775 Concentrators are similar to the B 774 Data Communications Processors, and provide the increased line connectivity required. They are 4th generation, micro-programmed processors, permitting greatest flexibility for terminal connectivity. These Concentrators will readily accommodate new terminals, as they become available in the future. The concentrators are members of the Burroughs B 700 range of minicomputers.

When used as Systems and Communications processors, as in the S. W. I. F. T. network, they bear the B 770 series designation. Other versions of the B 770 are already in use or planned in Banks or other organisations on commercial or financial applications for remote job entry, and as concentrators and terminal controllers.

In addition to providing for the terminal interfaces, the Concentrator relays messages to the Switches in an efficient manner. Concentrators will normally operate unattended. The Software/Firmware programs are designed to monitor and validate the performance, and to check line adapter operation. Programs will be loaded remotely from the Switching centre.

For enhanced reliability no electro-mechanical peripherals are included in the concentrator configuration.

Environmental and support conditions will also be monitored remotely.

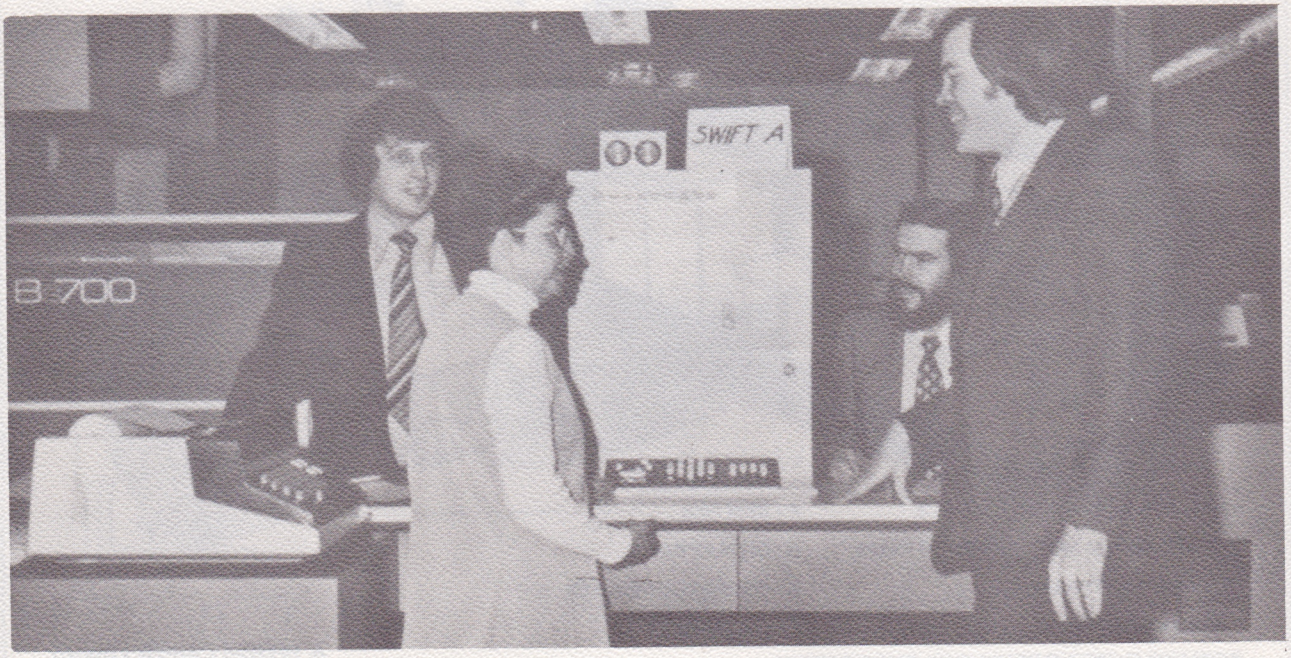
NETWORK COORDINATION

The system philosophy for S. W. I. F. T. provides a hardware, software, and supervisory capability for flexible control of the network while minimizing disruption of service to the subscribing banks. Considerable analysis of the various fallback modes of operation available to the S. W. I. F. T. Network has been made with message accountability and message security requirements paramount in the system considerations. Ease of switchover was of next importance in design implementation. S. W. I. F. T.'s ability to sustain undegraded service is a critical consideration. The experience gained in systems recovery, message security and accountability, and response control of military networks, were factors in the analysis and design of the S. W. I. F. T. System.

LINE CONTROL PROCEDURES

Burroughs has selected the High Level Data Link Control procedure to provide standardized line control. This procedure is expected to be adopted by the International Standards Organization as the standard international procedure. The advantages of the procedure include :

- Code independence
- Full transparency
- Unique synchronization
- Full checking of data and commands
- High efficiency in full duplex mode on channels with long propagation delays.
- No long-term mode switching.
- Capability to accept later controls and responses



S.W.I.F.T. staff on location at test-bed in Paoli.

TEST SYSTEM

A S. W. I. F. T. Network test configuration, including three processors and several concentrators, is installed at Burroughs' Paoli, Pennsylvania facilities. This is being used for software engineering activities, system testing, network operation and simulation. Terminals and S. W. I. F. T. Interface Devices (S.I.D.'s) will be added to complete the test installation.

The System will also be used for check-out of the concentrators prior to delivery to the sites in each S. W. I. F. T. country.

The use of this test configuration will provide an additional dimension of certainty to the project, ensuring that the Burroughs system will totally satisfy S. W. I. F. T. Network user needs.

During the conduct of software engineering activities at Burroughs in the U.S.A., S. W. I. F. T. site surveys and liaison activities are being conducted by the Burroughs Message Switching Group in Europe. The liaison includes close contact with P.T.T. authorities in all S. W. I. F. T. countries to ensure that the equipment Burroughs delivers will be compatible with individual P.T.T. requirements of each country.

Detailed acceptance tests will be carried out at Paoli prior to acceptance of equipment to S. W. I. F. T. sites in Europe, to ensure that the system meets all the specified hardware and software prerometers.

The Belgium and Netherlands Processors and Concentrators will be delivered and installed early in 1976.

These concentrators will be connected to terminals for a period of testing and operator training. Following successful completion of further acceptance tests, in Europe, the system cutover to live operation begins, during which the system will be closely monitored and controlled to develop confidence.

Once the Belgium and Netherlands elements of the S. W. I. F. T. Network have become live, each succeeding Concentrator will undergo a formal acceptance test identical to that performed on those installed in the centres.

SYSTEM EXPANSION

The Centres can be readily expanded to cope with increased traffic volumes.

The B 4700 and B 4790 systems are larger and faster systems than the B 3700 and are completely program compatible with the B 3700, so that no additional programming costs will occur to S. W. I. F. T. member banks when it is necessary to upgrade the system. The B 4700 and B 4790 series are available in alternative models, providing for growth rates much greater than those used in systems evaluation.

In addition to the expansion of the central system by means of more powerful processors, it can be extended by addition of further Data Communication Processors, to provide greater connectivity or throughput, and by adding disk pack drives and/or head-per-track disk drives for increased message or program storage. The mainframe memory can also be increased if required.

NETWORK

The network itself can be expanded to include more concentrators per centre, and multiple centres can be linked to provide almost unlimited connectivity expansion.

CONNECTION FROM MEMBER BANKS

The System provides for connection from member banks via telex, teleprinter, and computer-based terminals.

At first sight, the use of telex or teleprinter appeared most practical for "low volume" banks, with computer terminals being used by larger banks. Closer evaluation has indicated that telex/teleprinter operation has some significant drawbacks, and that there are both system and economic benefits for even low volume members in using a computer based terminal.

The main drawbacks of telex, and teleprinter operation are lack of security, greater difficulty for operating, speed of entering messages, transmission and reception, and printing. The S. W. I. F. T. message formats are strictly controlled : the use of an intelligent device to guide an operator on entry (to insert certain predetermined fields if desired) and to check the message before transmission to S. W. I. F. T. can prevent unnecessary rejection of messages containing errors, and the necessary subsequent re-entry of these messages. The assistance of message format "masks" on VDU's, or printed guide-lines on a printing terminal can materially affect the speed and accuracy of operator entry. Together with the automatic functions such as entry of sequence numbers, and faster transmission and printing, one or two computer based terminals can do the work of two to four teleprinters with potential saving in operator costs.

Those banks currently using one or two telex machines will probably elect to start with free standing computer terminals, with one or two keyboards. Later, as message traffic grows, they will most likely wish to add more terminals and possibly other peripherals. Medium size banks will require a terminal controller initially. They may wish to add magnetic tape, and a direct link to their computer system, at an early stage, in all probability together with enhanced peripherals for local or back up operation.

Large banks, with a high volume of messages, will no doubt wish to have magnetic tape transmission facilities from the outset. They will certainly wish to consider a direct main frame link, and will have multiple VDU's/ Keyboards for message entry, authorization, etc.

The last two groups may well wish to extend their message processing capability, by providing a full switching system between bank branches, and/or by providing message transfer facilities to non-S. W. I. F. T. countries/banks.

THE S. W. I. F. T. INTERFACE DEVICE (S. I. D.)

The S. W. I. F. T. Interface Device (S.I.D.) is a terminal system developed by S. W. I. F. T. to minimize the effort required to interface to and use the S. W. I. F. T. network. It is becoming apparent that a considerable number of users will elect to acquire this equipment.

Flexible in conception, the S.I.D. system is designed around a range of standardized modules, a module being a functional combination of hardware and software. Banks can combine these modules to best suit their operational requirements.

Central to all configurations (see Exhibit) is the Nucleus , incorporating the basic line and message protocol function as well as a routing function to peripherals or terminals. It also maintains a journal which keeps a record of all messages transmitted and received. One or several modules are added to the Nucleus to provide a stand-alone, ready for use working configuration and provision is available throughout for the interfacing of additional user written application programs.

The terminal controller module provides assistance with message preparation, according to the S. W. I. F. T. standards, on local and remote video displays and teleprinters. Once completed, a message can be either transmitted directly or stored for subsequent checking and authorization by a supervisor. Received messages are output on a printer and data can be logged on magnetic media as input to data processing applications. For low volume users, an inexpensive "Mini-S.I.D." is available featuring a scaled-down Nucleus and a terminal controller module with one input/output device.

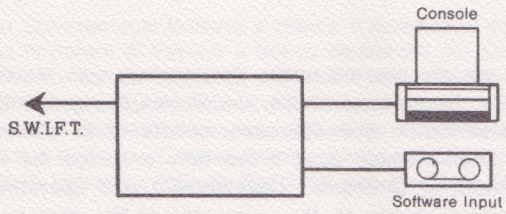
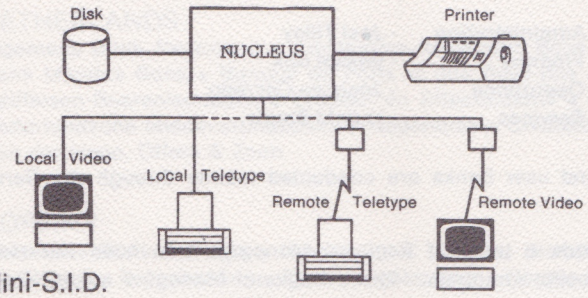
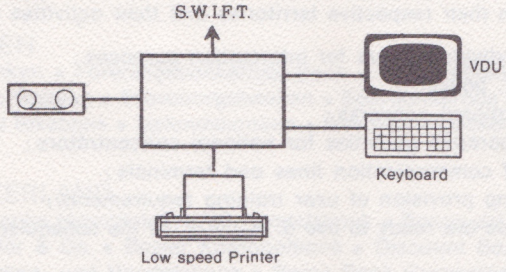
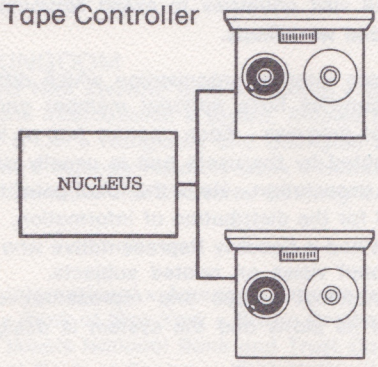
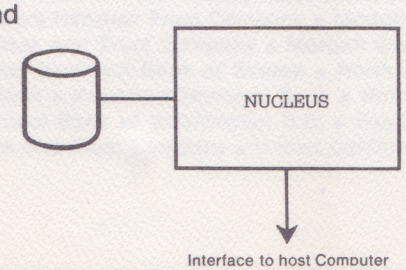
The Magnetic Tape Controller module enables users to prepare batches of messages on their main data processing installation and transmit them off-line. The standard S.I.D. software assumes that the messages conform to S. W. I. F. T. standards, but a conversion program can be incorporated to avoid modifying mainframe programs.

Finally, the Front-end module will act as an interface processor to a host computer and will be able to either transmit and receive messages directly or buffer the messages on disc and act on demand.

As mentioned, several modules can be added to the Nucleus; it is, for instance, possible to combine the magnetic tape module for transmission of normal messages, with the terminal controller module for input of urgent ones.

The S.I.D. software is developed and tested directly under S. W. I. F. T.'s supervision and three manufacturers have been selected for hardware supply.

S.I.D. Module and related functions.

Module	Functions
Nucleus  	- S. W. I. F. T line communication protocol - start-up/close down - Log-in/Log-out - sequence number allocation/checking - envelope formatting - message acknowledgement control - error reporting - journal - message routing
Terminal Controller  	Nucleus + - data entry to include message validation and hold for authorization option - output on printer and/or at terminals
Mini-S.I.D.  	- data entry to include message validation and hold for authorization option - output on printer
Magnetic Tape Controller  	Nucleus + - batch control for user Magnetic Tapes
Front-End  	Nucleus + - interface to host computer over terminal or channel interface according to manufacturer - temporary storage (buffering) on disc or tape

THE S. W. I. F. T. ORGANISATION

S. W. I. F. T. is a co-operative society created under Belgian law and registered in Brussels. It is wholly owned by the member banks, the shares being distributed at present according to anticipated traffic and ultimately according to actual traffic transmitted via the network. Each member pays a one-time entrance fee which is determined annually by the Board of Directors. Development and operating costs will be recovered through a basic charge to the originator of the message, such charges being approved by the General Assembly annually.

The S. W. I. F. T. Executive is headed by the General Manager, Carl Reuterskiöld, who has reporting to him four Divisional Directors directly responsible for :

Administration	- Joel Tilley
Finance	- Bessel Kok
Operations	- Jacques Cerveau
Services	- Harold Steele

Relations with member and user banks are conducted mainly through the Services Division.

The Services Director leads a team of Regional Managers who have the responsibility of liaison with specific countries. These Regional Managers spend a considerable part of their time in their respective territories and their activities include :

- visiting groups and individual users for information purposes ;
- explaining S. W. I. F. T. policy ;
- aiding in design of national networks ;
- coordinating site preparation activities for national concentrators ;
- advising on choice of communication lines and terminals ;
- assessing and ensuring provision of user training requirements ;
- ensuring their countries are ready to use S. W. I. F. T. at the scheduled date.

In support of the Regional Managers there is a team based in Brussels who prepare instruction material and will visit countries to assist National User Groups with educational courses, seminars and workshops.

Each S. W. I. F. T. country has its own internal organisation which differs according to national requirements. Most countries have national member and user groups who meet regularly to review current progress. Each country has at least one User Group Representative who is nominated by the users and is usually an employee of a member bank or national banking association. He is the focal point for S. W. I. F. T. liaison with members and users and for the distribution of information. Each country also has a Standards Representative and a Security Representative who are consulted by S. W. I. F. T. in determining national views on related subjects.
Through co-operation with these national groups and representatives S. W. I. F. T. ensures that its users are aware of its plans and the system is designed to users' requirements.

LIST OF S. W. I. F. T. MEMBER BANKS

Continued

ITALY

Banca Commerciale Italiana • Banca d'America e d'Italia • Banca d'Italia • Banca Morgan Vonwiller • Banca Mutua Popolare di Verona • Banca Nazionale del Lavoro • Banca Nazionale dell'Agricoltura • Banca Popolare di Novara • Banca Sannitica • Banca Toscana • Banco Ambrosiano • Banco di Napoli • Banco di Roma • Banco di Santo Spirito • Banco di Sicilia • Cassa di Risparmio delle Provincie Lombarde • Cassa di Risparmio di Firenze • Cassa di Risparmio di Genova e Imperia • Cassa di Risparmio di Torino • Cassa di Risparmio di Verona Vicenza e Belluno • Credito Commerciale • Credito Italiano • Credito Romagnolo • Credito Varesino • Istituto Bancario Italiano • Istituto Bancario San Paolo di Torino • Monte dei Paschi di Siena

LUXEMBURG

Banque Générale du Luxembourg • Banque Internationale à Luxembourg • Caisse d'Epargne de l'Etat • Kredietbank S.A. Luxembourgeoise

NETHERLANDS

Algemene Bank Nederland • Amsterdam-Rotterdam Bank • Bank der Bondsspaarbanken • Bank Mees & Hope • Bank Mendes Gans • Banque de Paris et des Pays-Bas • Banque de Suez Nederland • Coöperatieve Raiffeisen-Boerenleenbank • Crediet- en Effectenbank • De Nederlandsche Bank • F. van Lanschot, Bankiers • Nederlandsche Middenstandsbank • Nederlandse Credietbank • Pierson, Heldring & Pierson • Slavenburg's Bank • Van der Hoop, Offers & Zoon

NORWAY

Andresens Bank • Bergens Kreditbank • Bergens Privatbank • Christiania Bank og Kreditkasse • Den norske Creditbank • Fellesbanken • Forretningsbanken • Norges Bank • Oslo og Akerhus Sparebank

SWEDEN

Götabanken • Föreningsbankernas Bank • Ostgötabanken • PK-Banken • Skandinaviska Enskilda Banken • Skanska Banken • Skaraborgsbanken • Sparbankernas Bank • Sundsvallsbanken • Svenska Handelsbanken • Sveriges Riksbank • Uplandsbanken • Wermlandsbanken

SWITZERLAND

Aargauische Hypotheken- und Handelsbank • Banca del Gottardo • Bank Leu • Banque Cantonale Vaudoise • Julius Bär & Co. • Basler Kantonalbank • Discount Bank (Overseas) • Kantonalbank von Bern • Schweizerische Hypotheken- und Handelsbank • Swiss Bank Corporation • Swiss Credit Bank • Swiss Volksbank • Union Bank of Switzerland • Zürcher Kantonalbank

UNITED KINGDOM

Australia and New Zealand Banking Group • Bank of England • Bank of New South Wales • Bank of Scotland • Barclays Bank International • Brown, Shipley & Co. • Clydesdale Bank • Coutts & Co. • Hambros Bank Ltd. • Hill Samuel & Co. • Hongkong and Shanghai Banking Corporation • Lloyds Bank • Lloyds Bank International • Midland Bank • Moscow Narodny Bank • National Westminster Bank • The Royal Bank of Scotland • Scandinavian Bank Ltd. • Standard and Chartered Banking Group • Williams & Glyn's Bank • Yorkshire Bank

U.S.A.

Allied Bank International • American Express International Banking Corporation • Bankers Trust Company • Bank of America • Bank of New York • Brown Brothers Harriman & Co. • The Chase Manhattan Bank • Chemical Bank • Continental Illinois National Bank and Trust Company of Chicago • European-American Banking Corporation • First National Bank of Boston • First National Bank of Chicago • First National Bank of Minneapolis • First National City Bank • First Pennsylvania Bank • Harris Trust and Savings Bank • Irving Trust Company • Manufacturers Hanover Trust Company • Manufacturers National Bank of Detroit • Marine Midland Bank • Mellon National Bank and Trust Company • Morgan Guaranty Trust Company of New York • National Bank of Detroit • The National Shawmut Bank of Boston • North Carolina National Bank • Northern Trust Company • Philadelphia National Bank • Provident National Bank • Rainier International Bank • Republic National Bank of Dallas • The Riggs National Bank of Washington D.C. • Seattle First National Bank • Security Pacific National Bank • State Street Bank and Trust Company • United California Bank • Wells Fargo Bank

S.W.I.F.T.

Society for Worldwide Interbank Financial Telecommunication s. c.
W. T. C. Tower 1 Bte 18
Boulevard E. Jacqmain, 162
1000 Brussels (Belgium)
Telephone 02/219.42.90
Telex 26532 SWIBRU

Produced in collaboration with Burroughs

Burroughs

Burroughs Place
Detroit, Michigan 48232, U.S.A.

F 20 160 *June 1975*

NZ 4845 ... J. BAUDRY FILS - PARIS