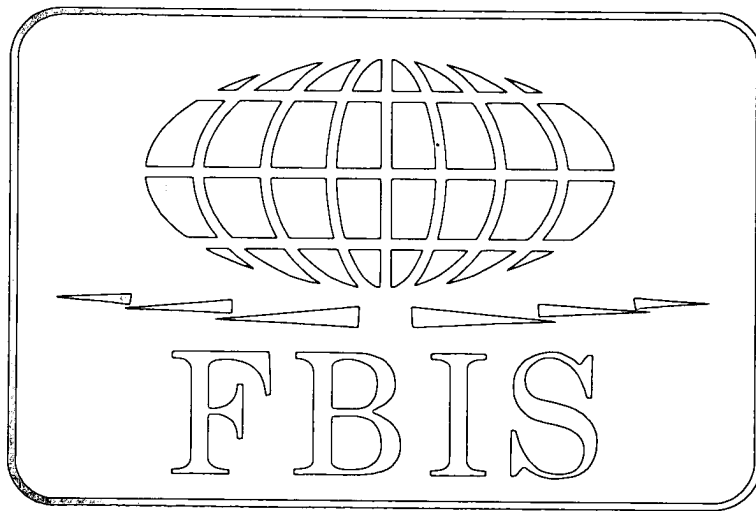


**FBIS MODERNIZATION PROGRAM  
CONCEPT DEFINITION STUDY  
SYSTEM SPECIFICATION**



PREPARED FOR  
**Foreign Broadcast Information Service**

Xerox Special Information Systems  
Pasadena, California 91109

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**FBIS MODERNIZATION PROGRAM  
CONCEPT DEFINITION PHASE  
SYSTEM SPECIFICATION**

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**XSIS REPORT 6080-2**

**OCTOBER 30, 1984**

**Prepared for**

**FOREIGN BROADCAST INFORMATION SERVICE**

**UNDER CONTRACT 84X\*927800\*000**

**Xerox Special Information Systems  
250 North Halstead Street  
Pasadena, California**

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Scope

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**SECTION 1**

**SCOPE**

This document presents a System Specification for the modernized FBIS system at the concept definition level by defining system performance and design requirements. Section 2 contains system requirements derived from the FBIS Modernization Requirements document during the Phase 2 conceptual design effort. The Section begins with architectural requirements. Succeeding sections present requirements developed for the major functional groups: Collection Control, Bureau Monitor/Editor Operations, Bureau Data Base Operations, Bureau Communications, Headquarters Processing and Composition, Headquarters Data Base Operations and Head-

quarters Communications. Section 3 is devoted to a series of Verification Matrices; these matrices are organized according to the functional grouping of Section 2. Each matrix displays a series of section numbers from the Modernization Requirement, an abbreviated descriptive reference to each requirement listed, and a response indicating the compliance of the system design with the requirement cited. In some cases, the feature of the system meeting the requirement is described. In other cases, where a particular feature of the system is being addressed, the response indicates whether or not the feature meets the requirement.

## Requirements

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## SECTION 2

### REQUIREMENTS

#### 2.1 ARCHITECTURE

This section defines the system-architecture level performance and design requirements. The FBIS Modernization Requirements result in the following architectural criteria that must be satisfied by the system design:

##### Reliability/ fault tolerance:

- Distributed processing capabilities
- Resource uniformity
- Fault detection, isolation
- Communications loss susceptibility

##### Nodal constraints and computing capabilities

- Geographical location
- Operating environment
- Availability of computing hardware and software
- Type of processing

##### Performance:

- Data access commonality
- Data and program storage

- Resource demands
- Architectural characteristics
- Communications delays

##### Changeability

- Localized changes. It should be possible to scale individual applications independently of others. That is, the system vectors should be orthogonal.

##### Survivability

- Decentralized control and data base

##### Implementability (deployability)

- Available building blocks and commercial products

##### Testability

- Individually and meaningfully testable
- Autonomous (complete) functions
- Loose coupling to other entities

##### Maintainability

- Accessibility
- Testing

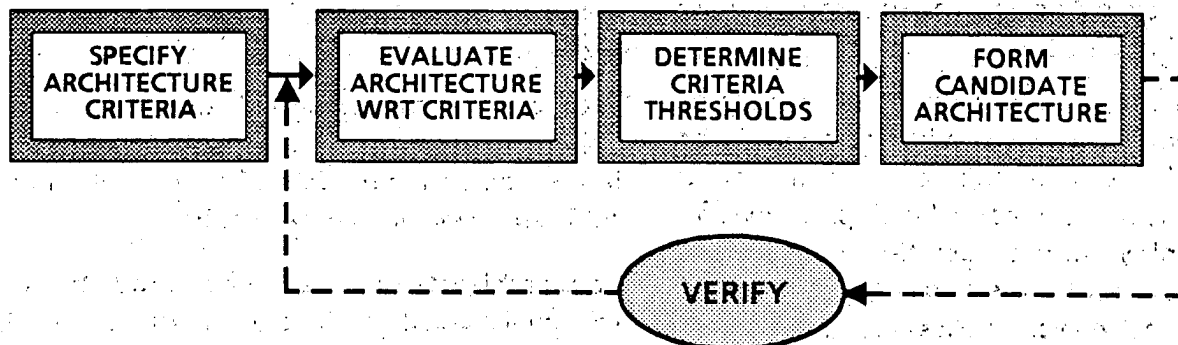


Figure 2-1. Architecture Design Phases

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- Repair limitations
- Service/maintenance availability

## 2.1.1 Reliability and Fault Tolerance

The system architecture must provide continuous availability for the overall system to satisfy the FBIS mission. In the event of hardware, software, or communications failure, the architecture must continue to support the time-critical FBIS activities, albeit with slightly degraded function and throughput.

The architecture must distribute critical processes and data among multiple devices to ensure availability in the event of device failure. The architecture must avoid single point dependence and must tolerate fault occurrences in one or more of the hardware, software, or communications resources.

To improve system availability the architecture should strive for resource uniformity to enable rapid substitution in the field.

Fault detection and isolation should be easy and rapid and supported by automation.

The architecture should provide for alternate communication paths in the event of failure in the primary path.

## 2.1.2 Nodal Constraints and Computing Capabilities

The architecture must accommodate the geographical distribution of FBIS Bureau and Headquarters networks in a connected internet as shown in Figure 2-2.

The equipment operating environment is equivalent to office conditions around the world. Size, weight, and power requirements must satisfy needs of normal desk placement for user displays and associated workstation processors. Architecture must make provision for multinational power supplies around the world.

Architecture must focus on publishing requirements as the principal type of processing and provide the necessary ancillary support networks and processing to facilitate the publishing mission.

## 2.1.3 Performance

The architecture must accommodate the publishing of about 700,000 words per day and it must be possible to scale individual applications independently of others. The throughput capacity must be extensible in economic units and be added without disruption to an operating network.

Tables in following sections provide specific numbers of workstations and servers in each location to satisfy the throughput requirements.

The architecture must satisfy the need for data access commonality among applications by means of standard document interchange formats and databases. The database management must handle the storage and retrieval of all permanent data. Data must be stored for twenty years at Headquarters. The storage capacity resources must be economically extensible up to at least 12.5 Gigabytes over five years and 50 Gigabytes over twenty years.

The architecture must accommodate a wide fluctuation in resource demands during normal and emergency operation and must provide sufficient parallelism to maintain prompt response to user requests. The DBMS must accommodate at least 35 concurrent search and/or retrieval operations.

Architectural characteristics of the design must display redundancy and the ability to sustain a level of function in the face of equipment failure sufficient to maintain the site's mission.

The architecture must accommodate the communication delays inherent in Autodin, DOS



## Requirements

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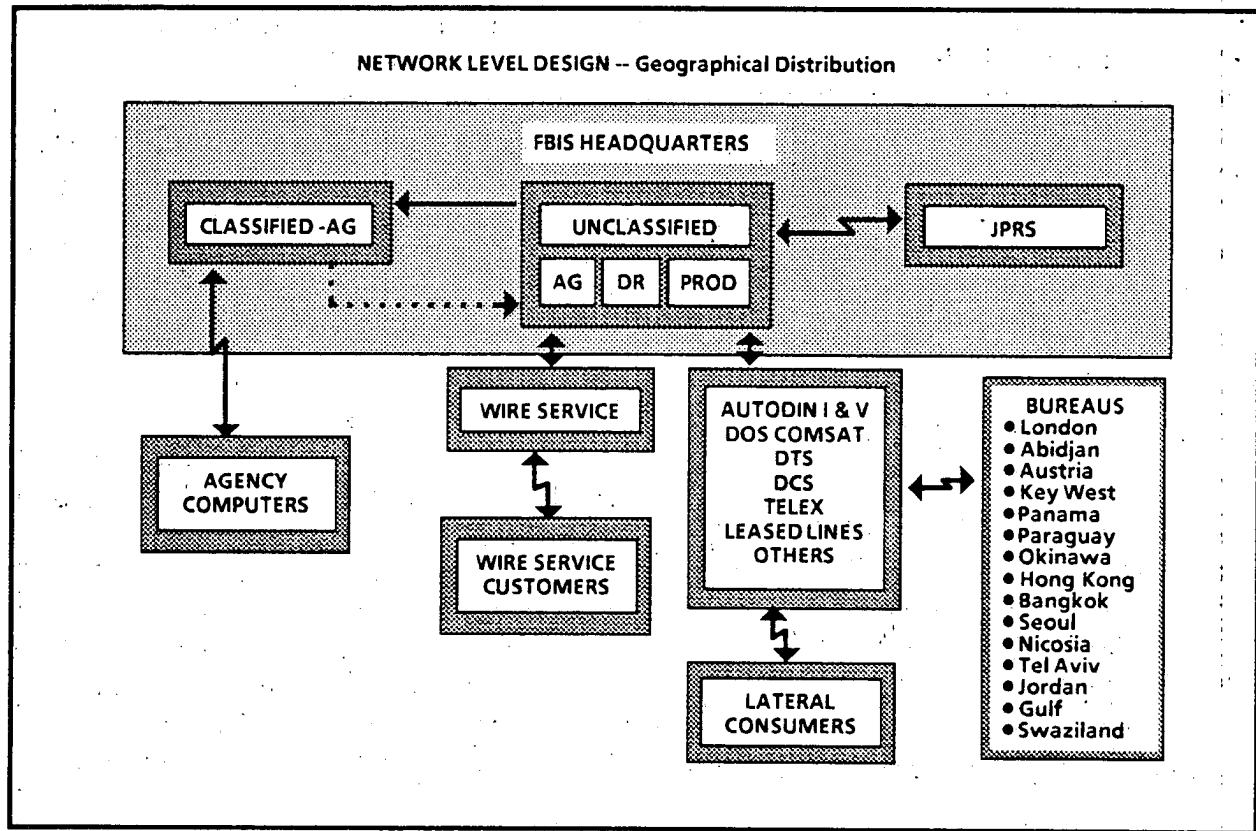


Figure 2-2. Principal Components of Global Internet

COMSAT, DTS, DCS, Telex, and other common carrier services used by the FBIS.

#### 2.1.4 Changeability

The architecture must localize changes to enable modification, enhancement and extensibility of any part of the network independently of other parts.

#### 2.1.5 Survivability

The architecture must decentralize the control and database sufficiently to ensure survivability of the overall system in the event of catastrophe at any one site.

#### 2.1.6 Implementability (deployability)

The architecture must use available building blocks and commercial products so far as possible.

#### 2.1.7 Testability

The architecture must facilitate individual and meaningful testing of the system components and of complete networks with minimal disruption. System functions should be autonomous and loosely coupled to other entities.

#### 2.1.8 Maintainability

The architecture must facilitate maintenance around the world. Service and maintenance facilities must be available for the building blocks used in the system. Also, to enable rapid and effective service, the system must have convenient accessibility and testing features and must be repairable in economic units.

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## 2.1.9 Distributed Processing Approach

In order to satisfy the architecture criteria, the system should employ a distributed processing approach with a world-wide internetwork of connected local area networks each with its own complement of workstations and servers. Figure 2-3 shows a typical distributed system of computers communicating via their own input/output channels and a local area network.

Workstations, servers, services and the local area network are more fully described in the sections below.

### 2.1.10 Workstations

A workstation consists of a computer devoted to to one user at a time, a typewriter-like keyboard, a display screen or other output device, some storage for programs and documents, and a connection to a local network.

One of the family of network-citizen workstations created by Xerox is the Dandelion

processor and display running the Star software. This is an especially effective multi-function workstation with a multiple window capability which enables the user to communicate with many services at one time. Its efficient user interface makes network resources such as mail, print and file appear as desktop resources on the display. The Xerox 8014 workstations with Star software and composition software are specified. Workstations may easily be configured (and reconfigured) for any of several languages.

### 2.1.11 Servers and Services

A server is a system element that supplies one or more shared network resources to Xerox network citizens. Each Xerox network installation includes at least one server dedicated to the support of one or more of the Xerox services. *Server* refers to the hardware; *service* refers to the software providing a particular shared resource. Many workstations can use and share the services running on a single server.

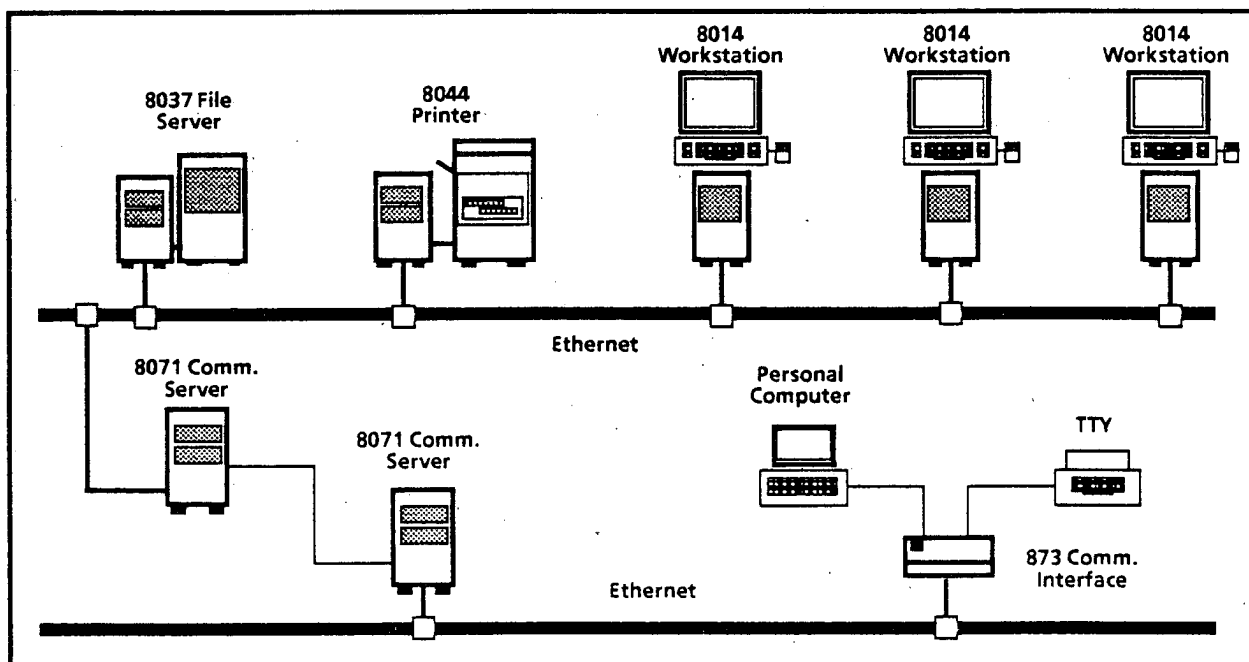


Figure 2-3. Block Diagram of a Typical Distributed System

## Requirements

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Servers can perform many tasks at one time for many workstation users.

A network service is the software that makes a shared resource available to network citizens. This resource could be a peripheral, such as a printer or large database system, or it could be an element of a distributed support mechanism, such as a directory, mail, or compatibility service. Services usually do not initiate action but are always available to answer requests over the network from clients who wish to use their capabilities. A client may be a user at a workstation (for example, sending a document to be printed), or another service (a File Service checking with the Clearinghouse Service to determine a user's access rights to file drawer). The requesting client can be on the same or a different network so long as the request follows the protocols appropriate for the service.

## 2.1.12 Local Area Network

The Xerox local area network (LAN) is called Ethernet and is based on a coaxial cable. This is an industry standard network (IEEE 802.3 standard for CSMA/CD protocols) that carries packets of information to equipment at 10 million bits per second. This high speed network, provides a flexible, low cost connection between individual workstations and shared servers within an establishment or through multiple interconnected Ethernets (an internetwork). An internetwork (internet) is the composite of interconnected networks in which all elements attached to any of the networks can communicate with any other element attached to the network.

## 2.1.13 Clearinghouse Service

The Clearinghouse Service (CHS) helps provide the foundation for the other network services. It is not needed on all servers, but all networks must have access to at least one Clearinghouse. It forms a network community, comprised of people, services, servers and resources that are

managed by the services. All these network entities must be named and registered in the Clearinghouse, providing a system-wide directory of the network. Through the Clearinghouse, all other services find the information needed to answer requests, such as where a user's mailbox is located for mail distribution, freeing the user from memorizing complex pathnames. The Clearinghouse also authenticates users when they access network resources, providing network security.

As the network grows, additional Clearinghouses can easily be added to the system. Multiple Clearinghouses and their databases comprise a single, distributed system, wherein Clearinghouses automatically communicate to maintain accurate information about all network resources. Each Clearinghouse Service maintains a database composed of the organization and one or more domains. Objects are registered in a domain and domains are registered in the organization. Database replication allows duplication of domains on multiple servers which provides continued reliability and availability of the database in the event of hardware, software, and communications failures.

## 2.1.14 Mail Service

The Mail Service (MS) provides an electronic post office which offers almost instant communication between network users. Messages consisting of plain text notes or complex documents containing graphics can be sent to any registered user. The MS requires a File Service for backing up its database.

## 2.1.15 External Mail Gateway Service

The External Mail Gateway Service enables mail exchange between internets while preventing other forms of interaction (for example, file access) between the internets involved. Modified External Mail Gateways will be used for connection to Autodin and for one-way computer-to-computer connection from the

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unclassified FBIS HQ system to the classified HQ system.

## 2.1.16 File Service

The File Service (FS) provides large volume storage of documents and folders for multiple users on the network. Users can share information efficiently through this storage facility. File services will provide storage for in-process documents in the FBIS System. In the Headquarters systems, Xerox 8037 File Servers will be used and in the Bureaus File Services will coreside with the Mail Services on Mail Servers.

## 2.1.17 Print Service

The Print Service (PS) provides a network resource for obtaining printed output of documents for multiple users. Electronic (laser) and facsimile printers associated with PS can produce documents with graphic illustrations, equations, multiple fonts, and text with exacting detail. A modification to PS will enable output to APS-5 phototypesetters. Xerox 8046 Print Servers with 42 Megabyte disk drives will be used everywhere except where Japanese and Chinese fonts are needed; these require Xerox 8047 Print Servers with 80 Megabyte drives.

## 2.1.18 External Communication Service

The External Communication Service (ECS) supports information exchange between Xerox network devices and non-Xerox devices. The ECS enables networked workstations to access mainframe computers through terminal emulation. It is capable of interpreting foreign (non-Xerox) protocols so that information can flow between the network and the foreign device. Xerox 873 Communication Interface Units connect to the communication lines.

## 2.1.19 Asynchronous Communication Protocol

Asynchronous Communication Protocol works with the External Communication Service to support emulation sessions in which the workstation emulates a VT100 or standard TTY-

type terminal. With the emulation protocol on the server and emulation software on the workstation, workstation users can interact with remote hosts. VT100 emulation will be used for much of the interaction with Digital Equipment Corporation VAX servers running database functions.

## 2.1.20 Interactive Terminal Service

The Interactive Terminal Service (ITS) enables users of remote personal computers and teletype terminals to access the Network Mail and File Services. The ITS requires External Communication Service with Asynchronous Communication Protocol activated in order to access these services.

## 2.1.21 Internetwork Routing Service

The Internetwork Routing Service (IRS) interconnects Ethernets to form a larger single network called an internetwork. This larger network unites users, workstations, services, and servers, allowing the all the resources on the networks to be shared using the same conventions regardless of their location.

## 2.1.22 Remote Batch Service

Remote Batch Service (RBS) provides document interchange and file transfer facilities with devices that require the IBM Binary Synchronous (BSC) data transmission protocol. This protocol is used by the IBM 2770, 2780, and 3780 remote batch terminals, and is often emulated by other major data processing and word processing devices. RBS uses the File Service for storage of documents received from remote devices. Modifications to the RBS will be used to implement the FBIS "News Service" to capture press agency copy.

## 2.1.23 Server Monitor Service

The Server Monitor Service (SMS) keeps track of one or more servers on the Ethernet or internet. At established intervals, it connects to the designated server and generates a log about that

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server's performance. SMS requires the use of a File Service for backup of this log.

**2.1.24 Database Service**

The Database Service runs on Digital Equipment Corporation (DEC) VAX machines and supports several different database management systems (DBMS) depending on whether it is deployed at Bureau or HQ locations. At HQ locations the Database Service also requires Datafusion Corporation hardware devices. The DBMS software used is:

	Headquarters	Bureaus
DEC Rdb	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Battelle BASIS	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Datafusion	<input checked="" type="checkbox"/>	<input type="checkbox"/>

**2.1.25 Network Level Systems Architecture**

The geographical internet architecture enables information interchange among multiple geographically separated networks such as the FBIS Bureaus, Headquarters, Lateral Consumers, Wire Service Customers and Agency computers. Figure 2.1 shows a schematic diagram of the geographical distribution of the principal components of FBIS internet:

The Headquarters internet consists of three principal networks:

1. Headquarters unclassified network which includes:
  - Analysis Group
  - Daily Report
  - Part of Production Group
2. Headquarters classified network for the Analysis Group.
3. JPRS network.

A one-way-only Mail Gateway connects the *unclassified* HQ network to the *classified* HQ network via a fiber-optic link. An Internetwork

Routing Service connects the *unclassified* HQ network to the JPRS network.

A classified interface connects the HQ *classified* network with Agency computers.

A Communication Interface Unit (873) connects to the existing Wire Service lines for traffic to Wire Service Customers.

A modified Mail Gateway connects the HQ internet with the Autodin switches at Fort Detrick and Andrews AFB.

Bureaus connect via Autodin I & IV, DoS COMSAT, DTS, DCS, Telex, and leased lines to the HQ internet.

**2.1.26 Node Level Systems Architecture**

The node level systems architecture describes distribution among multiple computers (such as workstations and servers) colocated in a single processing facility, communicating through their own I/O channels and local area network (LAN). The systems architecture for the following networks is described:

- Generic Bureau System
- Headquarters Unclassified System
- Headquarters Classified System
- JPRS System.

**2.1.27 Generic Bureau Systems Architecture**

The Bureau systems architecture uses distributed processing and resource uniformity as a fundamental philosophy to enable easy scaling of each Bureau's individual network installation to satisfy its specific size and function requirements. Figure 2-4 diagrams a generic bureau network. The architecture uses standard-product 8000NS workstations and servers from Xerox plus standard-product VAX servers and from Digital Equipment Corporation (DEC). Database software from DEC (VAX Rdb) and Battelle (BASIS) provides for access to permanent data. Special Bureau needs require some

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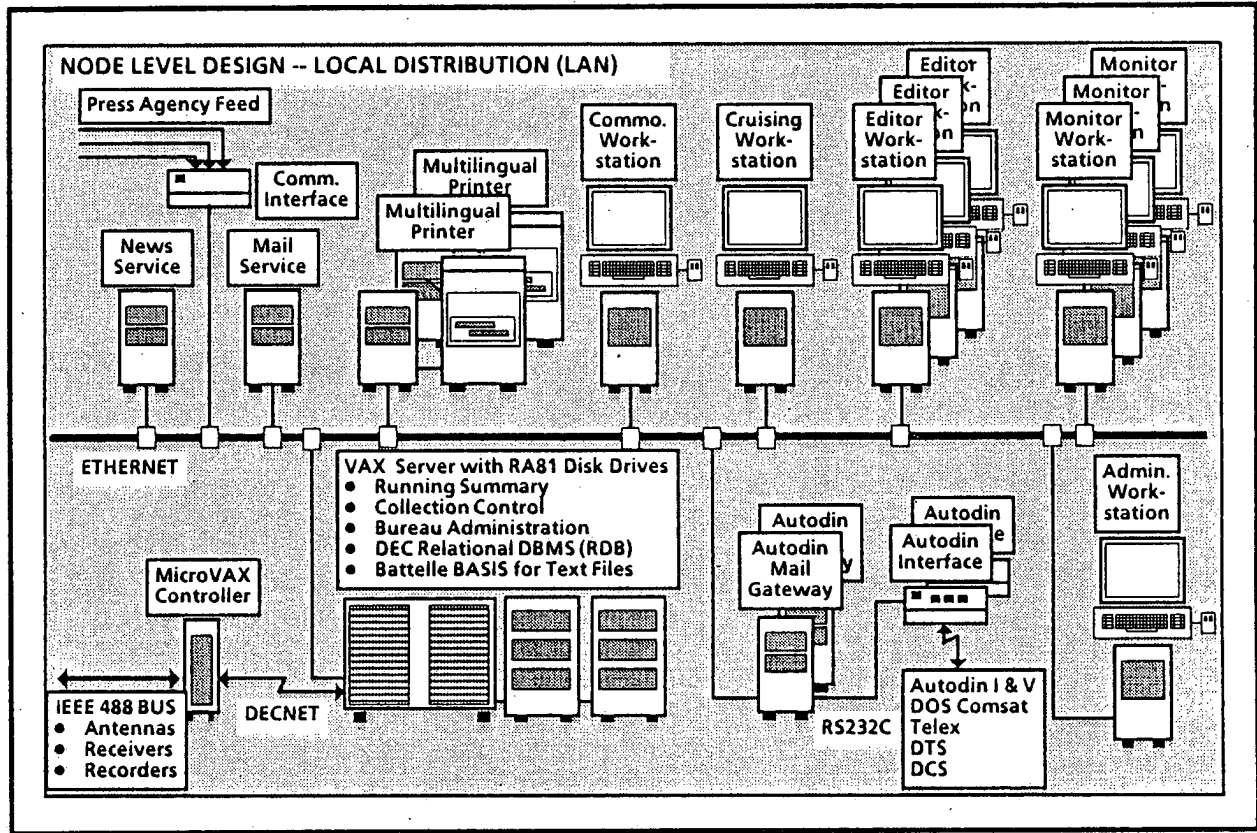


Figure 2-4 Generic Bureau Systems Architecture

customization of the standard software but no hardware development is needed.

**2.1.28 Headquarters Unclassified Systems Architecture**

The Headquarters Unclassified System architecture uses the same distributed architecture and equipment as is used for the Bureaus. In addition, a distributed high-performance database management system from Datafusion Corporation enables rapid access to all permanent data and enables economic extension of the database. Figure 2-5 diagrams the HQ unclassified systems architecture showing the services and Figure 2-6 shows the workstations.

The HQ Unclassified System connects via a standard Internetwork Routing Service (IRS) to

the JPRS system and via a one-way modified Mail Gateway service to the HQ Classified System.

**2.1.29 Headquarters Classified Systems Architecture**

Because security needs require *one-way-only* computer-to-computer communications between unclassified and classified networks, it is necessary to replicate the unclassified FBIS database in a classified environment. This requires a separate classified installation that provides all functions offered by the unclassified system, except for communication to unclassified systems.

Incoming unclassified material that ends up in the database and incoming messages destined for mailboxes on the HQ Classified System are transmitted to the Classified System via a

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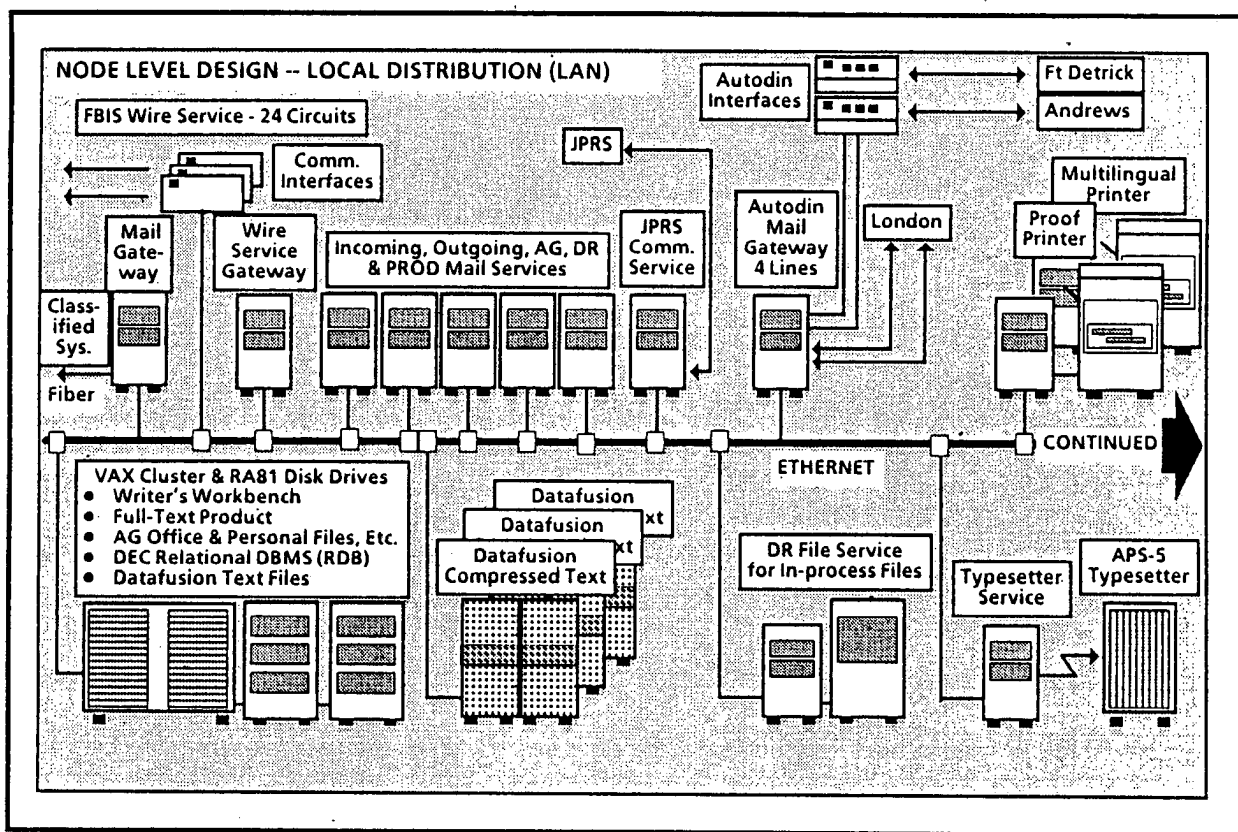


Figure 2-5. Headquarters Unclassified Systems Architecture -- Services

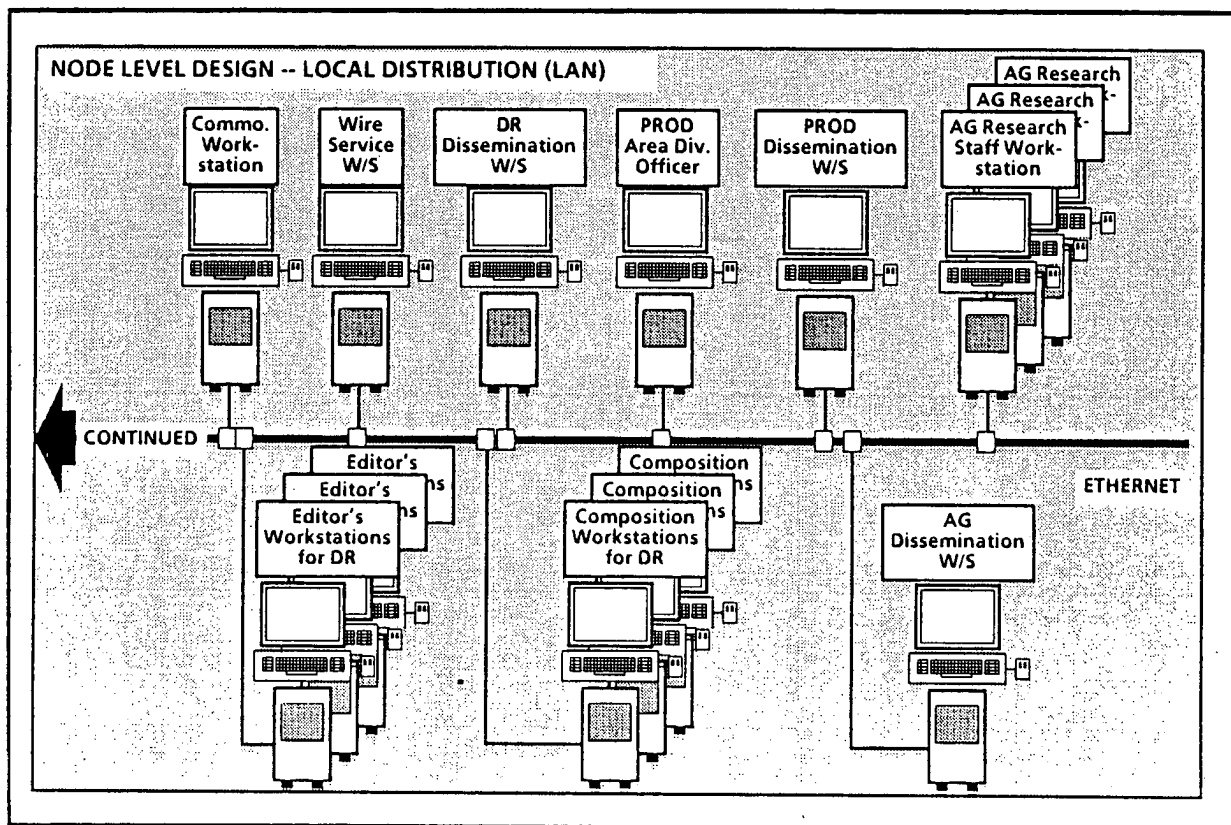


Figure 2-6. Headquarters Unclassified Systems Architecture - Workstations

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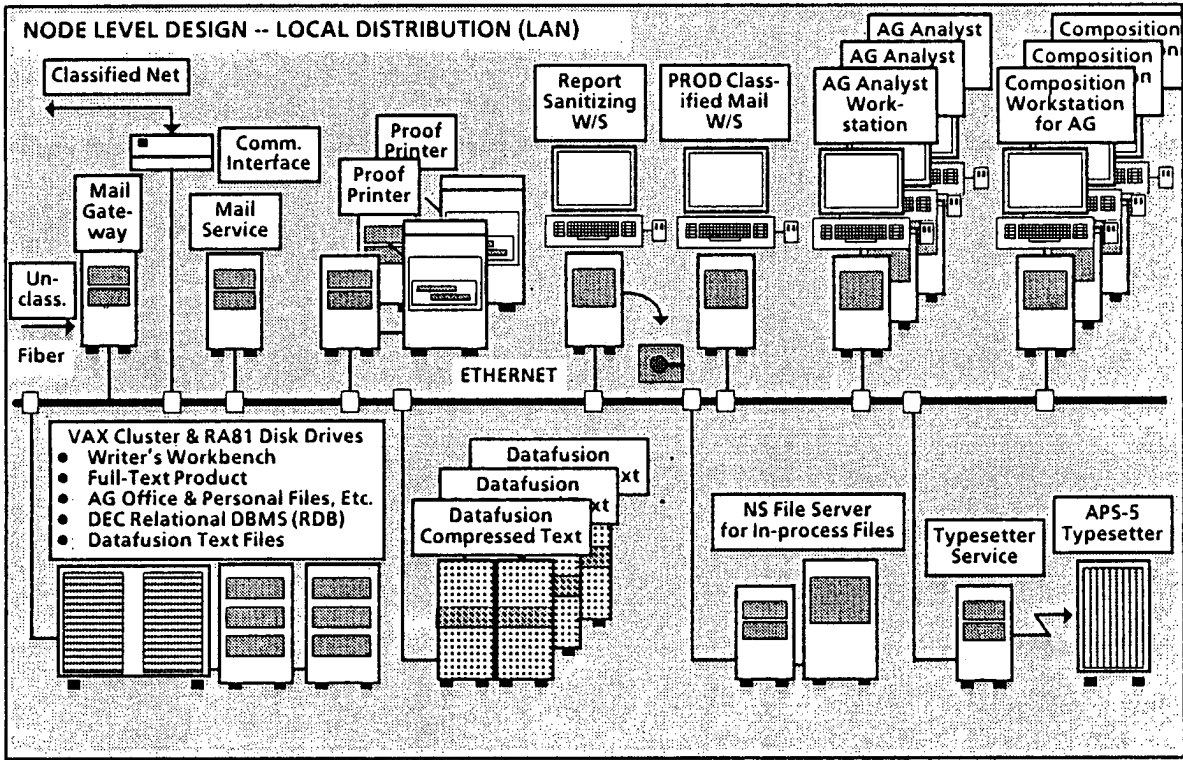


Figure 2-7. Headquarters Classified Systems Architecture

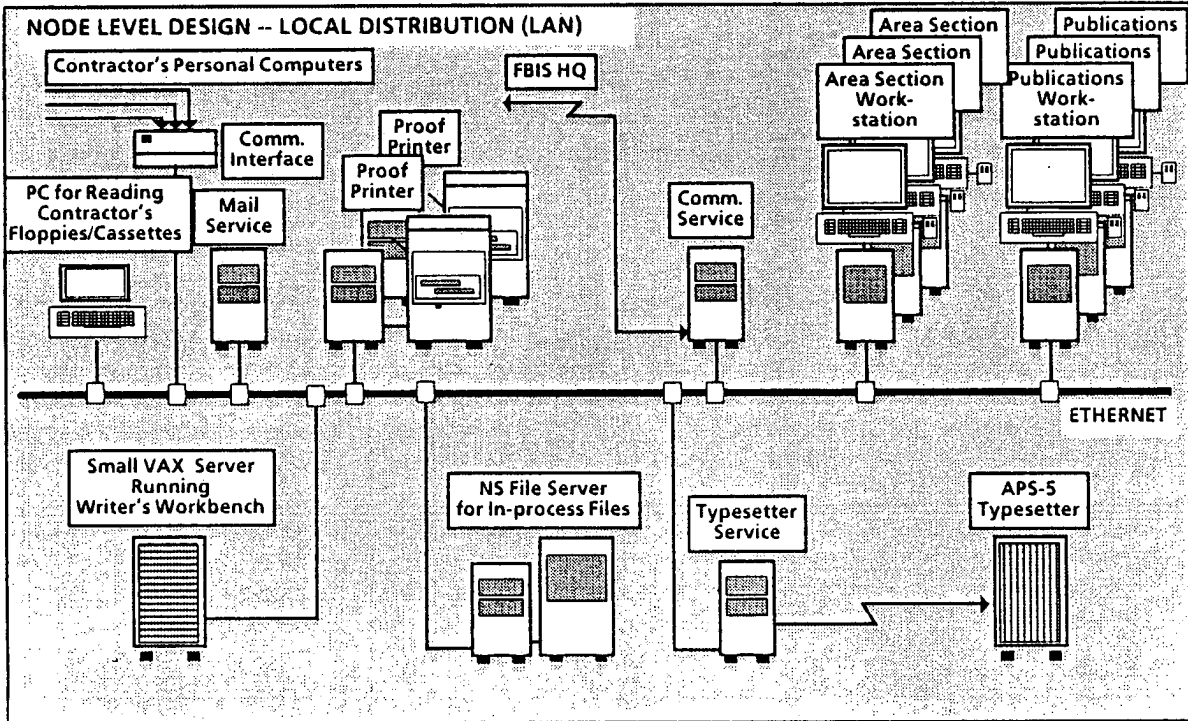


Figure 2-8. JPRS Systems Architecture



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modified Mail Gateway and one-way-only fiber-optic link. Sanitized documents can be written to flexible disk media for transfer in the other direction to the unclassified network.

A classified communications interface is used for communications with Agency computers. TEMPEST-compliant units are used for the Xerox workstations and servers; shielded enclosures are needed for the DEC VAX and Datafusion servers. Figure 2-7 shows the Headquarters Classified Systems Architecture.

**2.1.30 JPRS Systems Architecture**

The JPRS network also uses the distributed processing architecture employed for the other Headquarters networks. JPRS may be located remotely and tied into the HQ Unclassified network as shown in Figure 2-8, or colocated when convenient, with the other HQ networks. Independent contractors may communicate with JPRS via the Interactive Terminal Service (ITS) or via flexible diskettes. A networked IBM PC has been supplied for interfacing with the floppy diskettes.

**2.2 COLLECTION CONTROL****2.2.1 Function**

The function of the Collection Control Subsystem is to provide Boardman File-driven computer control of:

- antenna selection for Monitor (HF and TV) and Press Agency (RTTY and Hellschreiber/Fax) receivers
- HF receiver selection and parameter control
- TV tuner selection
- receiver/tuner output switching to the desired Monitor
- receiver output switching to the desired recorder
- recorder start and stop times

- receiver output switching to the desired demod (RTTY) or Hellschreiber/Fax unit
- Monitor display and receiver parameter modification
- entry of all operations into the bureau DBMS

**2.2.2 Subsystem Specification**

Subsystem features shall include:

- true matrix switching so that any source, such as receiver output, could be connected to any input, such as Monitor position or recorder
- coaxial switches for all RF lines with low crosstalk, low VSWR and high reliability
- modularity of the switching assemblies so that different bureau sizes and the need for extensibility can be accommodated
- IEEE-488 Bus interface for all switch assemblies
- IEEE-488 Bus interface for all HF receivers to include facility for full-range remote control of all front-panel parameters
- provision on all audio recorders for recording time code to provide search capability and remote control of start and stop
- provision on all audio recorders for automatic start of second cassette prior to expiration of first cassette
- a micro/minicomputer capability to control all switches and receivers on a real-time basis, a terminal for set-up and manual over-ride and a network connection to the bureau DBMS computer for schedule retrieval and data base entry

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Subsystem sizing will vary substantially among the different bureaus but must satisfy the following general guidelines:

- antenna switch assemblies must provide input for the total number of antennas plus multicoupler connections and provide outputs for the total number of receivers/tuners plus Monitor positions, plus spares
- receiver output switch assemblies must provide input for the total number of receiver/tuner outputs and provide outputs for the total number of Monitor positions plus recorders plus fax positions plus RTTY demods
- the numbers of receivers and recorders is obviously determined by the number of monitor positions and schedule
- the Boardman computer configuration is based on the number of switch assemblies, receivers and recorders and the network connection to the bureau computer

## 2.3 BUREAU MONITOR/EDITOR OPERATIONS

Processing at the Field Bureaus takes place using distributed workstations tied together by a variety of specialized network services. Incoming Press Agency traffic, whether received by landline or RTTY, is captured by communications interface ports and stored on a "News Service," which places the items in directories, and produces tables of contents. Incoming traffic over the Bureau communications system is received by means of an "Autodin Mail Gateway" and stored in appropriate mailboxes on a Mail Service. Tables of contents are produced in this case, also. Outgoing traffic over the Bureau communications system is also handled by the "Autodin Mail Gateway", under the control of a workstation. At regular intervals, all traffic is archived in the DBMS, and printed to

be available for read-in. Running summaries of live speeches are handled with the aid of a service running on the DBMS host.

The workstations used by the monitors, editors, communications operators, and administrative personnel are essentially identical, providing text processing, message handling, and terminal emulation functionality in a variety of independently operable and co-existent screen displays (commonly known as 'windows'). Some workstations will have additional software capabilities, as described in other sections of this System Specification: All interfaces to other equipment are provided by means of Network Services. Work in process moves from monitor to editor to communications operator using the Mail Service. Edited documents, containing Edit Traces, move from editor to monitor using the Mail Service. Documents, messages, and communications traffic can be printed at any time for review and discussion.

Printers have the capability of printing vernacular Press Agency traffic, where this is captured in character-coded form. Workstations are able to display vernacular Press Agency traffic, but are not required to be able to edit it.

The Verification Matrices in Section 3 show how this configuration meets the requirements of Sections 2.3 and 2.4 of the 'FBIS Modernization Requirements', Doc. No. SDS-002A, 24 August 1984.

The numbers of workstations, servers, and communications interface ports to be provided at each Field Bureau are shown in Table 2-1. The workstation numbers are taken directly from the FBIS Modernization Requirements. The other numbers were developed using the following rules of thumb:

- One printer for every eight workstations, plus one spare; add one if Press Agency traffic is over 500K words/day.
- One Autodin Mail Gateway, plus one spare.

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Table 2-1. Field Bureau Network Sizes

Bureau	Editorial Workstations	Admin. Workstations	Multi-Lingual Printers	Autodin Mail Gateways	Mail/"News" Servers	Comm. Inter-face Ports
Bolo Point, Okinawa	36	8	6	2	3	13
Abidjan, Ivory Coast	13	2	3	2	2	7
Amman, Jordan	11	3	3	2	2	7
Asuncion, Paraguay	14	2	5	2	3	6
Bangkok, Thailand	29	4	5	2	2	8
Hong Kong, China	32	3	5	2	2	2
Key West, U.S.A.	6	2	2	2	2	3
London, England				2		
Field Bureau	16	6	4		2	?
Press Monitoring Unit	22	1	5		2	?
Manama, Bahrain	15	2	3	2	2	4
Mbabane, Swaziland	11	2	3	2	2	1
Nicosia, Cyprus	18	2	4	2	2	3
Panama City, Panama	19	4	5	2	3	7
Seoul, Korea	16	2	3	2	2	2
Tel Aviv, Israel	14	3	3	2	2	4
Vienna Austria	31	3	5	2	2	6
Total	303	49	64	30	35	N/A

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- One News/Mail Service plus one spare; add one if Press Agency traffic is over 500K words/day.
- Communications interface ports are for Press Agency feeds; these ports are available in groups of four; Mail Gateways have their own Communications ports.

## 2.4 BUREAU DATA BASE OPERATIONS

Bureau data bases fall into two broad categories based on the type of data and the methods of retrieval:

**Structured Data** include such things as personnel, payroll, inventory, subscriptions, cruising files and the like. Modern methods for storing and accessing structured data use relational databases and fourth generation languages.

**Unstructured or Loosely Structured Textual Data** include such things as press agency, message traffic and program summaries. The retrieval requirements for accessing unstructured data are very different from the requirements for accessing structured data. There are two approaches to the storage and retrieval of such data: software based solutions and hardware based solutions.

There are also some broad guidelines that affect the DBMS selection process:

**Commonality between bureaus** is desirable to accommodate the rotation of personnel and to minimize the expenses of training.

**Low hardware risk** is particularly desirable at the bureaus because of the remote nature of many of the bureaus. Hardware maintenance on esoteric text search hardware or obscure computers would be very difficult to guarantee.

**Low software risk** is desirable because of the cost (both in dollars and "downtime") of fixing errors in the software. This expense is magnified because of the remote location of many of the bureaus.

**Ease of use** is particularly desirable at the bureaus because of their remote nature. Online help at the workstation is required.

The system will use two software packages to satisfy the data base requirements; one a relational data base and one a text oriented data base product. The textual data bases will be highly segmented. Each press service will have its own data base, as will incoming and outgoing messages. The structured data bases will also be segmented by category.

The query and reporting requirements will be satisfied by the query and report utilities that come with the two data base packages. Common "front end" or "user interface" software will be written so that the two packages present a common user interface.

Estimates of the storage requirements for each field bureau are included in Table 2-2.

## 2.5 BUREAU COMMUNICATIONS

### 2.5.1 Function

The function of the Bureau Communications Subsystem is to provide:

- distribution of publishable traffic to Headquarters, other bureaus and lateral consumers,
- two-way message traffic support between all bureaus, lateral consumers and Headquarters,
- protocol support for Autodin (Modes I & V), DTS, DCS, DOS COMSAT and Telex communications links,
- support for four levels of precedence and queue handling,
- error checking, logging and filing,

## Requirements

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Table 2-2. Storage Requirements

Field Bureau	Data base requirement after 5 years in Megabytes
Nicosia	180
Panama	580
Seoul	100
Tel Aviv	100
Austria	400
Hong Kong	300
Key West	125
London	1,000
Gulf	120
Swaziland	100
Okinawa	625
Abidjan	200
Jordan	150
Paragua	350
Bangkok	120

- automatic distribution of incoming traffic and automatic formatting of outgoing traffic,
- automatic entry of all traffic and logs in the local DBMS,
- support for commo operator checking and addressing, traffic stream alteration, message query and/or retrieval and system diagnosis.

**2.5.2 Subsystem Specification**

Subsystem features shall include:

- an Autodin interface from the Autodin Mail Gateway to external communica-

tions links capable of supporting the above specified protocols,

- provision for the Autodin Interface unit to be down-loaded with different protocol software from the Autodin Mail Gateway,
- a Commo Workstation with special icons/windows on the local network capable of supporting the above specified commo functions,
- a stand-alone Autodin Mail Gateway capable of supporting the remainder of the Sec. 2.5.1 functions.

Subsystem sizing will be essentially the same for the different bureaus (other than to satisfy special logistical maintenance situations) and must satisfy the following general guidelines:

- two Autodin Interface units; one operational and one "hot" backup,
- two Autodin Mail Gateway units; one operational and one "hot" backup,
- two Commo Workstations; one operational and one for backup, temporary overload conditions and query purposes.

**2.6 HEADQUARTERS UNCLASSIFIED PROCESSING AND COMPOSITION**

Unclassified processing at Headquarters takes place using distributed workstations tied together by a variety of specialized network services. Incoming traffic over the Bureau communications system is received by means of an "Autodin Mail Gateway" and stored in appropriate mailboxes on a Mail Service. Tables of contents are produced for items in this incoming traffic. Outgoing traffic over the Bureau communications system is also handled by the "Autodin Mail Gateway", under the control of a workstation. Outgoing traffic for the FBIS Wire Service is handled using a similar,

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though simpler, "FBIS Wire Service Gateway", under the control of a workstation. At regular intervals, all traffic is archived in the DBMS, and printed to be available for read-in. Traffic passes from the Unclassified system to the Classified system by means of a 'one-way' Mail Gateway.

The workstations used by the editors, analysts, research staff, document officers, and publications personnel are essentially identical, providing text processing and composition, message handling, and terminal emulation functionality, in a variety of independently operable and co-existent screen displays (commonly known as 'windows'). Some workstations will have additional software capabilities to provide for the creation and editing of multi-lingual documents; these workstations may not have text composition capability. Other workstations will have additional software capabilities, as described in other sections of this System Specification. All interfaces to other equipment are provided by means of Network Services.

Work in process moves through the copy flow using the Mail Service. Edited documents, containing Edit Traces, move from editor to editor using the Mail Service. Documents, messages, and communications traffic can be printed at any time for review and discussion. Printers have the capability of printing multi-lingual documents, where this is needed. File Services provide document management for completed report sections going through the composition process. Final output of composed documents takes place using a "Typesetter" Print Service.

The Verification Matrices in Section 3 show how this configuration meets the requirements of Sections 1.2, 1.7 and 1.8 of the 'FBIS Modernization Requirements', Doc. No. SDS-002A, 24 August 1984.

The numbers of workstations, servers, and communications interface ports to be provided for each group on the Headquarters Unclassified

system are shown in the Table. 2-3. The workstation numbers are taken largely from the 'FBIS Baseline Description', Doc. No. SDS-001A, 18 July 1984. The other numbers were developed using the following rules of thumb:

- One printer for every ten workstations, plus one spare; outside of Production Group, printers are not necessarily multi-lingual; the total includes two "Typesetter" Print Servers.
- One Autodin Mail Gateway, plus one spare for Operations; one FBIS Wire Service Gateway and one spare for Operations; one-way Mail gateway to Classified system.
- File Services can coexist with Mail Services; separation is for capacity reasons; File Service storage is for material in progress only; the Communications Service to JPRS coexists with other services at each end.

Communications interface ports are for Wire Service feeds and Independent Contractor links; these ports are available in groups of four; Mail Gateways have their own Communications ports.

## 2.7 HEADQUARTERS CLASSIFIED PROCESSING AND COMPOSITION

Classified processing at Headquarters takes place using distributed workstations tied together by a variety of specialized network services. Incoming traffic is received by means of a 'one-way' Mail Gateway carrying traffic from the Unclassified system to the Classified system, and stored in appropriate mailboxes on a Mail Service. Tables of contents are produced for items in this incoming traffic. Outgoing traffic to the Bureau communications system is handled by shared workstations on the Unclassified net. At regular intervals, all traffic is archived in the DBMS, and printed to be available for read-in.

The workstations used by the analysts, research staff, and publications personnel are essentially identical, providing text processing and

Table 2-3. Headquarters Unclassified System Network Size

FBIS HQ Organization	Editorial Workstations	Multi-Lingual Workstations	Multi-Lingual Printers	Special Mail Gateways	Mail/File Servers	Comm. Interface Ports
Operations Group			7	4		
Wire Service	6				2	?
Daily Report	44				2	
MOD	10					
Production Group						
Area Division		150	15		2	
JPRS	40	30	8		2	?
Analysis Group				2	1	
Analysts	3					
Research Staff	13		2			
Liaison & Requirements Branch	5		1		1	
Total	121	180	33	6	10	N/A

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composition, message handling, and terminal emulation functionality, in a variety of independently operable and co-existent screen displays (commonly known as 'windows'). Some workstations will have additional software capabilities, as described in other sections of this System Specification. All interfaces to other equipment are provided by means of Network Services.

Work in process moves from user to user using the Mail Service. Edited documents, containing Edit Traces, move from user to user using the Mail Service. Documents, messages, and communications traffic can be printed at any time for review and discussion. File Services provide document management for completed report sections going through the composition process. Final output of composed documents takes place using a "Typesetter" Print Service. Facilities are provided for sanitizing completed documents, and effecting a floppy disk transfer of the sanitized documents to the Unclassified system.

The Verification Matrices in Section 3 show how this configuration meets the requirements of Sections 1.2, 1.7 and 1.8 of the 'FBIS Modernization Requirements', Doc. No. SDS-002A, 24 August 1984.

The numbers of workstations, servers, and communications interface ports to be provided for each group on the Headquarters Classified system are shown in the Table 2-4. The workstation numbers are taken largely from the 'FBIS Baseline Description', Doc. No. SDS-001A, 18 July 1984. The other numbers were developed using the following rules of thumb:

- Classified workstations are provided to Production Group Document Officers on a shared basis for classified message traffic handling; Production Group text processing and Contract Service Order manipulation take place on the Unclassified system, since all material (such as Daily Report overflow)

must be forwarded to the Unclassified environment at JPRS

- One printer for every ten workstations, plus one spare; the total includes a "Typesetter" Print Server.
- A one-way Mail gateway from the Unclassified system.
- File Services can coexist with Mail Services; separation is for capacity reasons; File Service storage is for material in progress only.
- Communications interface ports are for Classified message traffic; these ports are available in groups of four.

## 2.8 HEADQUARTERS DATA BASE OPERATIONS

Headquarters data bases fall into two broad categories based on the type of data and the methods of retrieval:

Structured Data include such things as personnel, payroll, inventory, subscriptions, cruising files and the like. Modern methods for storing and accessing structured data use relational databases and fourth generation languages.

Unstructured or Loosely Structured Textual Data include such things as Daily and JPRS Reports. PASKEY is an example of a loosely structured textual data base. The retrieval requirements for accessing unstructured data are very different from the types of retrieval requirements needed to access structured data. There are two approaches to the storage and retrieval of such data: software based solutions and hardware based solutions.

There are also some broad guidelines that effect the DBMS selection process:

Commonality with the bureaus is desirable to accommodate the rotation of personnel and the expenses of training.



Table 2-4. Headquarters Classified System Network Size

FBIS HQ Organization	Editorial Workstations	Multi-Lingual Workstations	Printers	Special Mail Gateways	Mail/File Servers	Comm. Inter-face Ports
Operations Group						
Wire Service						
Daily Report						
MOD						
Production Group						
Area Division	9					
JPRS						
Analysis Group						
Analysts	35		5	2	2	1?
Research Staff						
Liaison & Requirements Branch	5		1			
Total	49	0	6	2	2	N/A

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Requirements

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Ease of use is desirable to promote system use and to ease the training requirements. Online help at the workstation is required.

There is also the consideration of security. The entire product data base must exist on both a classified and an unclassified system. This is required even though the product data base is unclassified because it is possible to make classified queries against the product data base. Since the product data base overwhelms the rest of the data, two identical systems are specified; one will be unclassified and the other classified. One system will be unclassified and the other will be classified. Other than the Tempest requirements, the two systems will be the same. The rest of this discussion will describe the headquarters data base system as if it were one system even though it is two identical systems.

The system will use a relational data base on a general purpose computer to satisfy the requirements for structured data. The system will use a specialized text search machine to satisfy the textual data requirements. The text search machine is a computer with specialized hardware that is optimized to do text searches on a data base.

The query and reporting requirements for the structured data will be satisfied by the query and report utilities that are provided by the relational data base system.

The query and reporting requirements for the textual data will be satisfied by a combination of existing software from the manufacturer of the text search machine and custom software developed for the FBIS program.

Common "front end" or "user interface" software will be written so that the two data base systems present a common user interface. This common user interface will be as similar to the bureau interfaces as is practical.

Estimates of the storage requirements for the headquarters systems are very rough, but are

about 10 Gigabytes for the first five years. There is virtually no difference between the classified and unclassified requirements. The extra analysis reports that appear only on the classified system are more than balanced by the structured data that appears only on the unclassified system.

Almost all the storage requirements are for textual data. An important consideration in dealing with textual data is the "overhead" storage requirements. The use of text search machines distributes that "overhead" to external processors.

The text search processors will store compressed versions of the textual data where the compression ratio will be about ninety percent. That means that FBIS needs text search processor storage capacity of about one Gigabyte. Each text search processor can store close to 0.5 Gigabytes of data, that that means two text search processors are required.

## 2.9 HEADQUARTERS COMMUNICATIONS

### 2.9.1 Function

The function of the Headquarters Communications Subsystem is to provide:

- support for Wire Service editing and distribution to consumers,
- two-way message traffic support between all bureaus, lateral consumers and Headquarters,
- protocol support for Autodin (Modes I & V), DTS, DCS, DOS COMSAT and Telex communications links,
- support for four levels of precedence and queue handling,
- error checking, logging and filing,
- automatic distribution of incoming traffic and automatic formatting of outgoing traffic,
- automatic entry of all traffic and logs in the local DBMS,

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- support for commo operator checking and addressing, traffic stream alteration, message query and/or retrieval and system diagnosis,
- facility for two-way communications with Independent Contractors via telephone lines using modems and through the use of floppy diskettes.
- Wire Service workstations for editing and distribution control,
- a PC with floppy diskette drive and modem for Independent Contractor communications,
- a stand-alone Autodin Mail Gateway capable of supporting the remainder of the Sec. 2.9.1 functions.

**2.9.2 Subsystem Specification**

Subsystem features shall include:

- an Autodin interface from the Autodin Mail Gateway to external communications links capable of supporting the above specified protocols,
- provision for the Autodin Interface unit to be down-loaded with different protocol software from the Autodin Mail Gateway,
- a Commo Workstation with special icons/windows on the local network capable of supporting the above specified commo functions,
- three Autodin Interface units; two operational and one "hot" backup,
- two Autodin Mail Gateway units; one operational and one "hot" backup,
- two Wire Service Gateway units; one operational and one "hot" backup,
- three Commo Workstations; two operational and one for backup, temporary overload conditions and query purposes,
- six Wire Service Editorial workstations,
- two PCs at JPRS; both operational for peak loads.

Subsystem sizing must satisfy the following guidelines:

**XEROX****SECTION 3****VERIFICATION MATRIX**

Section 3 presents a series of verification matrices corresponding to the subsections of Section 2 of this volume. Each matrix lists and identifies the appropriate section of the FBIS

Modernization Requirements document, SDS-002A, 24 August 1984, and indicates for each entry how the proposed design meets the requirements.

**3.1 COLLECTION CONTROL**

<b>2.2.1.1 Automation of radio reception Requirements</b>	
<b>2.2.1.1.2.1 Selection of:</b>	
receiver	Computer-controlled matrix switches
frequency	Computer-controlled (IEEE-48)
antenna	Computer-controlled matrix switches
distribution	Computer-controlled matrix switches
display configuration	Boardman terminal & Monitor W/S
modify configuration	Boardman terminal & Monitor W/S
<b>2.2.1.1.2.2 Automatic frequency tracking</b>	Receiver AFC
<b>2.2.1.1.2.3 Provision for:</b>	
manual receiver turning	Boardman & Monitor W/S
manual antenna election	Boardman & Monitor W/S

<b>2.2.1.1.3 Recording and Playback Requirements</b>	
<b>2.2.1.1.3.1 Auto recording of:</b>	
source	Voice annotation
date	Time code on tape
start time	Time code on tape
stop time	Time code on tape
<b>2.2.1.1.3.2 Insertion of markers</b>	Time code on tape

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<b>2.2.1.1.4 Remote reception Requirements</b>	
Automatic selection of:	
receiver	Computer-controlled matrix switches
frequency	Computer-controlled (IEEE-488)
antenna	Computer-controlled matrix switches
broadcast	Computer-controlled matrix switches

<b>2.2.1.3 Television broadcast Requirements</b>	
2.2.1.3.2 Selection of:	
receiver	Computer-controlled matrix switches
frequency/channel	Computer-controlled matrix switches
antenna	Computer-controlled matrix switches
distribution	Computer-controlled matrix switches
display configuration	Boardman terminal & Monitor W/S
modify configuration	Boardman terminal
manual receiver tuning	Boardman and Monitor
manual antenna selection	Boardman
recording	Boardman-auto & Monitor-manual

<b>2.2.2 Cruising Requirements</b>	
2.2.2.1 Automated support:	
independence	Parallel to Boardman operation
coverage	Complete
2.2.2.1.3 Automated entry of:	
date	Network service
time	Network service
frequency	MW/HF - computer readout (IEEE-488) TV - cruiser entry to W/S
antenna	Cruiser entry to W/S
signal strength	Cruiser entry to W/S

## Verification Matrix

**XEROX****3.2 BUREAU MONITOR/EDITOR OPERATIONS**

Processing Requirements	Xerox 8000 NS products and their successors
2.3.1 Display goals:	
2.3.1.1 Display of files	8000 Workstation
2.3.1.2 Simultaneous display of more than two files	8000 Workstation
2.3.2 Intercommunication goals	
2.3.2.1 Viewing running summary	8000 Workstation + software development on "host"
2.3.2.2 Communication between terminals	8000 Workstation + 8000 Mail Service
2.3.3 Access control goals:	
2.3.3.1 Control user permissions	8000 Network/System Administration
2.3.3.2 Limit authority	8000 Network/System Administration
2.3.3.3 Prevent simultaneous alteration	8000 Network/System Administration
2.3.4 File manipulation goals:	
2.3.4.1 Annotations	8000 Workstation
2.3.4.2 Edit Trace	Software development for 8000 Workstation
2.3.5 Location and retrieval goals	
2.3.5.1 Broadcast	<i>Covered under Collection Automation</i>
2.3.5.2 Press agency	Software development for 8000 File/Mail Service
2.3.5.3 Data files	Procedures on 8000 Workstation and Mail Service

Publishable Traffic Dissemination	Xerox 8000 NS products and their successors
2.4.1 Dissemination Process	Software development for 8000 Mail Service
2.4.2 Volume and Subject Packages	8000 Network System Workstation/Mail
2.4.3 Address selection goals:	
2.4.3.1 Correlation of subject and recipient lists	8000 Workstation, using <i>expand</i> function
2.4.3.2 Automatic deletion of redundant addresses	Modifications to 8000 Mail Service (above) for automatic; manual on 8000 Workstation
2.4.3.3 On-screen manipulation of addresses	8000 Workstation
2.4.4 Precedence management:	
2.4.4.1 Four priorities	Modifications to 8000 Mail Service (above)
2.4.4.2 Intra-queue management	Modifications to 8000 Mail Service (above), with Remote System Administration on Workstation
2.4.4.3 Inter-queue management	Modifications to 8000 Mail Service (above), with Remote System Administration on Workstation



3.3 BUREAU DATA BASE OPERATIONS

1.4 Data Base Management Requirements	Xerox Approach	
	DEC's VAX Rdb/VMS	Battelle's BASIS
1.4.1.1 Data types:		
text (alphanumeric)	Yes	Yes
alpha	Yes	Yes
numeric	Yes	N/A
date	Yes	N/A
time	Yes	N/A
text representation (multi-lingual)	Yes	N/A
1.4.1.2 Data attributes:		
1.4.1.2.1 unlimited length	N/A	Yes
1.4.1.2.2 groups	Yes	N/A
1.4.1.2.3 more than 1 type of repeating group	Yes	N/A
1.4.1.2.4 mandatory elements	Yes	N/A

1.4 Data Base Management Requirements	Xerox Approach	
	DEC's VAX Rdb/VMS	Battelle's BASIS
1.4.3 updates by field name preserve relationships	Yes	N/A
1.4.4 Batch & interactive file maint.	Yes	N/A
1.4.5.1 add record	Yes	Yes
1.4.5.2 delete record	Yes	Yes
1.4.5.3 add field	Yes	N/A
1.4.5.4 change field	Yes	N/A
1.4.5.5 delete existing field	Yes	N/A
1.4.5.6 add new occurrence of group	Yes	N/A
1.4.6.1 multiple changes to a file based on conditional statement	Yes	N/A
1.4.6.2 automatic integrity check of updated records	Yes	N/A

N/A = Not Applicable

## Verification Matrix

**XEROX**

1.5 DBMS Retrieval Requirements	Xerox Approach	
	DEC's VAX Rdb/VMS	Battelle's BASIS
1.5.1 search with or without regard to logical relationships:		There are no logical relationships
1.5.1.1 within single file	Yes	Yes
1.5.1.2 between or among files	Yes	Yes
1.5.1.3 within single occurrence of a group	Yes	N/A
1.5.1.4 among groups	Yes	N/A
1.5.2 search operators:		
1.5.2.1 =	Yes	Yes
1.5.2.1 ≠	Yes	Yes
1.5.2.1 >	Yes	N/A
1.5.2.1 <	Yes	N/A
1.5.2.2 "<" and ">" combined	Yes	N/A

1.5 DBMS Retrieval Requirements	Xerox Approach	
	DEC's VAX Rdb/VMS	Battelle's BASIS
1.5.3 For text search:		
1.5.3.1 word delimiters are spaces, commas, periods, etc.	N/A	Yes
1.5.3.2 don't care character	N/A	Yes
1.5.3.3 prefix character	N/A	Yes
1.5.3.4 suffix character	N/A	Yes
1.5.3.5 don't care in conjunction with prefix and/or suffix	N/A	Yes
1.5.3.6 synonym table	N/A	Yes
1.5.3.7 word proximity search	N/A	Yes

N/A = Not Applicable



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1.5 DBMS Retrieval Requirements (cont.)	Xerox Approach	
	DEC's VAX Rdb/VMS	Battelle's BASIS
1.5.4 Boolean expressions:		
1.5.4.1 and	Yes	Yes
1.5.4.1 or	Yes	Yes
1.5.4.1 "m of n"	Yes	Yes
1.5.4.2 nesting booleans	Yes	Yes
1.5.4.2 multiple nesting in queries	Yes	Yes
1.5.5 saved hit files (as new data bases)	N/A	Yes
1.5.5.1 stored search queries:		
1.5.5.1 creating	Yes	Yes
1.5.5.1 storing	Yes	Yes
1.5.5.1 revising	Yes	Yes
1.5.5.2 real time display of # of hits	N/A	Yes
1.5.5.3 cancel search in operation	Yes	Yes

1.6 DBMS Report Generation Requirements	Xerox Approach	
	DEC's VAX Rdb/VMS	Battelle's BASIS
1.6.1 display data in either soft or hard copy mode	Yes	Yes
1.6.1 report on data base or hit files	N/A	Yes
1.6.1.1 prior to display/print perform major and minor sorts according to user specified data elements	Yes	N/A
1.6.1.2 stored output formats:		
1.6.1.2 capability to create	Yes	Yes
1.6.1.2 capability to store	Yes	Yes
1.6.1.2 capability to revise	Yes	Yes

N/A = Not Applicable

## Verification Matrix

**XEROX**

1.6 DBMS Report Generation Requirements	Xerox Approach	
	DEC's VAX Rdb/VMS	Battelle's BASIS
1.6.1.3 output format defs include:		
1.6.1.3 specific data elements	Yes	Yes
1.6.1.3 placement and width of data values	Yes	Yes
1.6.1.3 headers	Yes	Yes
1.6.1.3 footers	Yes	Yes
1.6.1.3 automatic page breaks	Yes	Yes
1.6.1.3 automatic page numbering	Yes	Yes
1.6.1.4 print/display:		
1.6.1.4 entire file	Yes	N/A
1.6.1.4 entire records	Yes	Yes
1.6.1.4 parts of records	Yes	Yes
1.6.1.5 permit user to specify device output destination	Yes	Yes
1.6.1.6 highlighting result of text search and $\pm n$ lines	N/A	Yes
1.6.1.7 print/display window around query matches	N/A	Yes
1.6.1.8 report manipulations:		
1.6.1.8 mathematical manipulations to both stored and derived values	Yes	N/A
1.6.1.8 incorporate results in graphics		
1.6.1.8 bar charts	Yes	N/A
1.6.1.8 pie charts	Yes	N/A
1.6.2 browse hit file:		
1.6.2.1 page forward & back	Yes	Yes
1.6.2.2 scroll up & down	Yes	Yes
1.6.2.3 skip pages & records	Yes	Yes
1.6.2.4 go to first/last/next record	Yes	Yes
1.6.3 Hold - save records for subsequent browsing	Yes	Yes

N/A = Not Applicable

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## 3.4 BUREAU COMMUNICATIONS

<b>2.6 Message traffic support Requirements</b>	
2.6.2 Interfaces	AUTODIN Mail Gateway & Interface
AUTODIN (I and V)	AUTODIN Mail Gateway & Interface
DTS	AUTODIN Mail Gateway & Interface
DCS	AUTODIN Mail Gateway & Interface
DOS COMSAT	AUTODIN Mail Gateway & Interface
Telex	AUTODIN Mail Gateway & Interface
2.6.3.1 Message retention	AUTODIN Mail Gateway & Interface
2.6.3.2 System overhead	Low, dedicated AUTODIN Mail Gateway
2.6.3.3. Format conformity	Yes
2.6.3.4 Auto logging	Yes
2.6.4 Precedence/priority handling	
2.6.4.1 Precedence order (4)	AUTODIN Mail Gateway
2.6.4.2 FIFO	AUTODIN Mail Gateway
2.6.4.3 Interruption	AUTODIN Mail Gateway
2.6.4.4 Change queue	AUTODIN Mail Gateway
2.6.4.5 Delete message	AUTODIN Mail Gateway
2.6.4.6 Dynamic alteration of message precedence	AUTODIN Mail Gateway
2.6.4.7 Auto alert of highest precedence message	AUTODIN Mail Gateway
2.6.5 Message integrity	
error checking	AUTODIN Mail Gateway
commo options	Commo workstation
2.6.6 Message addressing	
incoming to user's mailbox	AUTODIN Mail Gateway
incoming logged and filed	AUTODIN Mail Gateway
outgoing auto formatted	AUTODIN Mail Gateway
auto logged and filed	AUTODIN Mail Gateway

**XEROX****3.5 HEADQUARTERS PROCESSING AND COMPOSITON**

Processing Requirements	Xerox 8000 NS products and their successors
1.2.1 Processing:	
Selection of material	8000 Workstation
Translation management	8000 Workstation + 8000 Mail Service
Editing	See 1.7 below
Publishing	See 1.8 below
Storage	See Headquarters Data Base Operations
Retrieval and Processing	See Headquarters Data Base Operations
1.2.2 Display goals:	
1.2.2.1 Display of files	8000 Workstation
1.2.2.2 Simultaneous display of more than two files	8000 Workstation
1.2.2.3 Intercommunication goals	8000 Workstation + 8000 Mail Service
1.2.3 Access control goals:	
1.2.3.1 Control user permissions	8000 Network/System Administration
1.2.3.2 Limit authority	8000 Network/System Administration
1.2.3.3 Prevent simultaneous alteration	8000 Network/System Administration
1.2.4 File manipulation goals:	
1.2.4.1 Annotations	8000 Workstation
1.2.4.2 Edit Trace	Software development for 8000 Workstation
1.2.5 Processing scope:	
1.2.5.1 Text Processing	See 1.7 below
1.2.5.2 Data Bases	See Headquarters Data Base Operations
1.2.5.3 Message handling	See Headquarters Communications
1.2.5.4 Composition	See 1.8 below

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Text Processing Requirements	Xerox 8000 NS products and their successors
1.7.1. Headquarters vs. Bureaus	Xerox 8000 NS products and their successors
1.7.2 Basic Assumptions	
1.7.2.1-maintain file management, access, and control	8000 Network System/Composition System by Q1-86
1.7.2.2 simplicity of finding, reviewing, and routing copy	8000 Mail Service and Workstation
1.7.2.3 Directories:	
1.7.2.3.1 Sorting by attributes	Composition System by Q3-86
1.7.2.3.2 Reviewing by processing status	Composition System by Q3-86
1.7.2.3.3 Sorting by time or alphabetically	8000 File Service/Composition System by Q3-86
1.7.2.3.4 Search on text and attributes	Composition System by Q3-86
1.7.2.3.5 Versions of individual files	Composition System by Q3-86
1.7.3 Text manipulation:	
1.7.3.1 Word processing functionality	Multi-Lingual 8000 Workstation
1.7.3.2 Printer formatting	8000 Workstation
1.7.3.3 Generic composition coding	Composition System after Q1-87
1.7.3.4 Typographic composition coding	Composition System by Q1-86
1.7.3.5 Page, chapter, and book assignment	Composition System by Q3-86
1.7.3.6 Indices and TOCs	Composition System by Q3-86
1.7.4 Editing tools	
1.7.4.1 Spelling checker	8000 Workstation
1.7.4.2 Syntactical checker	Writer's Workbench Server in Batch mode
1.7.4.3 Multi-lingual reference aids	Multi-Lingual 8000 Workstation and Printer
1.7.4.4 Text and graphics	8000 Workstation/Composition System by Q3-86

## Verification Matrix

**XEROX**

Composition Requirements	Xerox 8000 NS products and their successors
1.8.1 Aesthetics and legibility of the printed product	Composition System by Q1-87
1.8.2 Composition requirements:	
1.8.2.1 Proof output	8000 Workstation/8000 Printer
1.8.2.2 H&J	Composition System by Q1-86
1.8.2.3 Book typography	Composition System by Q1-87
1.8.2.4 Accents, diacriticals	8000 Workstation
1.8.2.5 Book pagination	Composition System by Q3-86
1.8.2.6 Exploding generic coding	Composition System after Q1-87
1.8.2.7 Line art Halftones	Composition System by Q3-86 Composition System by Q1-87
1.8.2.8 APS-5 output	Software development for 8000 Print Service

**3.6 HEADQUARTERS DATA BASE OPERATIONS**

1.4 Data Base Management Requirements	Xerox Approach	
	DEC's VAX Rdb/VMS	Datafusion's TSP
1.4.1.1 Data types:		(all data is ASCII)
text (alphanumeric)	Yes	Yes
alpha	Yes	Yes
numeric	Yes	N/A
date	Yes	N/A
time	Yes	N/A
text representation (multi-lingual)	Yes	N/A
1.4.1.2 Data attributes:		
1.4.1.2.1 unlimited length	N/A	Yes
1.4.1.2.2 groups	Yes	N/A
1.4.1.2.3 more than 1 type of repeating group	Yes	N/A
1.4.1.2.4 mandatory elements	Yes	N/A

# XEROX

1.4 Data Base Management Requirements	Xerox Approach	
	DEC's VAX Rdb/VMS	Datafusion's TSP
1.4.3 updates by field name preserve relationships	Yes	N/A
1.4.4 Batch & interactive file maintenance	Yes	N/A
1.4.5.1 add record	Yes	Yes
1.4.5.2 delete record	Yes	Yes
1.4.5.3 add field	Yes	N/A
1.4.5.4 change field	Yes	N/A
1.4.5.5 delete existing field	Yes	N/A
1.4.5.6 add new occurrence of group	Yes	N/A
1.4.6.1 multiple changes to a file based on conditional statement	Yes	N/A
1.4.6.2 automatic integrity check of updated records	Yes	N/A

1.5 DBMS Retrieval Requirements	Xerox Approach	
	DEC's VAX Rdb/VMS	Datafusion's TSP
1.5.1 search with or without regard to logical relationships:		There are no logical relationships
1.5.1.1 within single file	Yes	Yes
1.5.1.2 between or among files	Yes	Yes
1.5.1.3 within single occurrence of a group	Yes	N/A
1.5.1.4 among groups	Yes	N/A
1.5.2 search operators:		
1.5.2.1 =	Yes	Yes
1.5.2.1 ≠	Yes	Yes
1.5.2.1 >	Yes	N/A
1.5.2.1 <	Yes	N/A
1.5.2.2 "<" and ">" combined	Yes	N/A

N/A = Not Applicable

## Verification Matrix

**XEROX**

1.5 DBMS Retrieval Requirements	Xerox Approach	
	DEC's VAX Rdb/VMS	Datafusion's TSP
1.5.3 For text search:		
1.5.3.1 word delimiters are spaces, commas, periods, etc.	N/A	Yes
1.5.3.2 don't care character	N/A	Application Software
1.5.3.3 prefix character	N/A	Application Software
1.5.3.4 suffix character	N/A	Application Software
1.5.3.5 don't care in conjunction with prefix and/or suffix	N/A	Application Software
1.5.3.6 synonym table	N/A	Almost no overhead because of parallel search
1.5.3.7 word proximity search	N/A	Yes
1.5.4 Boolean expressions:		
1.5.4.1 and	Yes	Yes
1.5.4.1 or	Yes	Yes
1.5.4.1 "m of n"	Yes	Yes
1.5.4.2 nesting booleans	Yes	Yes
1.5.4.2 multiple nesting in queries	Yes	Yes
1.5.5 saved hit files (as new data bases)	N/A	Application software
1.5.5.1 stored search queries:	Yes	Application software
1.5.5.1 creating	Yes	Application software
1.5.5.1 storing	Yes	Application software
1.5.5.1 revising	Yes	Application software
1.5.5.2 real time display of # of hits	N/A	Application software
1.5.5.3 cancel search in operation	Yes	Yes

N/A = Not Applicable



# XEROX

1.6 DBMS Report Generation Requirements	Xerox Approach	
	DEC's VAX Rdb/VMS	Datafusion's TSP
1.6.1 display data in either soft or hard copy mode	Yes	Yes
1.6.1 report on data base or hit files	N/A	Custom for Hit files
1.6.1.1 prior to display/print perform major and minor sorts according to user specified data elements	Yes	N/A
1.6.1.2 stored output formats:		
1.6.1.2 capability to create	Yes	A/S
1.6.1.2 capability to store	Yes	A/S
1.6.1.2 capability to revise	Yes	A/S
1.6.1.3 output format defs include:		
1.6.1.3 specific data elements	Yes	A/S
1.6.1.3 placement and width of data values	Yes	A/S
1.6.1.3 headers	Yes	A/S
1.6.1.3 footers	Yes	A/S
1.6.1.3 automatic page breaks	Yes	A/S
1.6.1.3 automatic page numbering	Yes	A/S
1.6.1.4 print/display:		
1.6.1.4 entire file	Yes	N/A
1.6.1.4 entire records	Yes	Yes
1.6.1.4 parts of records	Yes	Yes
1.6.1.5 permit user to specify device output destination	Yes	Yes
1.6.1.6 highlighting result of text search and $\pm$ n lines	N/A	Application software
1.6.1.7 print/display window around query matches	N/A	Application software
1.6.1.8 report manipulations:		
1.6.1.8 mathematical manipulations to both stored and derived values	Yes	N/A
1.6.1.8 incorporate results in graphics		
1.6.1.8 bar charts	Yes	N/A
1.6.1.8 pie charts	Yes	N/A

N/A = Not Applicable

A/S = Application software

## Verification Matrix

**XEROX**

1.6 DBMS Report Generation Requirements (cont.)	Xerox Approach	
	DEC's VAX Rdb/VMS	Datafusion's TSP
1.6.2 browse hit file:		
1.6.2.1 page forward & back	Yes	Application software
1.6.2.2 scroll up & down	Yes	Application software
1.6.2.3 skip pages & records	Yes	Application software
1.6.2.4 go to first/last/next record	Yes	Application software
1.6.3 Hold - save records for subsequent browsing	Yes	Application software

**3.7 HEADQUARTERS COMMUNICATIONS**

<b>1.3 Message processing &amp; dissemination Requirements</b>	
1.3.2 Field traffic support plus:	AUTODIN Mail Gateway
outgoing to WS Slot editor	AUTODIN Mail Gateway
"I & F" to Chief, WS	AUTODIN Mail Gateway
parallel dissemination	AUTODIN Mail Gateway
associate cross-referenced	AUTODIN Mail Gateway
1.3.3 Wire Service support incl.:	AUTODIN Mail Gateway
interface to consumers	Comm. Interface
continuous access (24/7)	AUTODIN Mail Gateway
auto insert (BOD/60/EOD)	AUTODIN Mail Gateway
transmission in queues	AUTODIN Mail Gateway
logging	AUTODIN Mail Gateway
permit interruption	AUTODIN Mail Gateway
change order of queue	AUTODIN Mail Gateway
delete item from queue	AUTODIN Mail Gateway
1.3.4 IC support	
telephone/MODEM	Yes, Comm. Interface
incoming floppies/cassettes	Yes, PC provided
OCR	Yes, input to Comm. Interface
rekeying	Yes, on workstations
outgoing floppies/cassettes	Yes, PC provided.
potential for FAX	Yes