FOREIGN BROADCAST INFORMATION SERVICE

CONCEPT DEFINITION PHASE

DESIGN REVIEW

OCTOBER 4-5, 1984

XEROX SPECIAL INFORMATION SYSTEMS

2. DC/SDS

Xerox Special Information Systems

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Xerox Special Information Systems

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DESIGN REVIEW TEAM

Bob Worlock	Program Manager
Max Bohlmann	System Engineer
Larry Hudson	Collection and Communication
Don Winter	Workstations and Network Services
Gil Grodsky	Data Base Management Systems
Bill Peters	Program Planning
Bill Norton	System Maintenance

Xerox Special Information Systems

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REVIEW AGENDA, FIRST DAY

Introduction	Bob Worlock
Overview of System Design	
System Architecture	Max Bohlmann
Collection Automation	Larry Hudson
Bureau Monitor/Editor Operations	Don Winter
Bureau Data Base Management	Gil Grodsky
Bureau Communications	Larry Hudson
Headquarters Processing & Composition	Don Winter
Headquarters Data Base Management	Gil Grodsky
Headquarters Communication	Larry Hudson

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REVIEW AGENDA, SECOND DAY

Design Rationale and Decision Process	
System Architecture	Max Bohlmann
Collection Automation	Larry Hudson
Bureau Monitor/Editor Operations	Don Winter
Bureau Data Base Management	Gil Grodsky
Bureau Communications	Larry Hudson
Headquarters Processing & Composition	Don Winter
Headquarters Data Base Management	Gil Grodsky
Headquarters Communication	Larry Hudson

REVIEW AGENDA, SECOND DAY (cont'd)

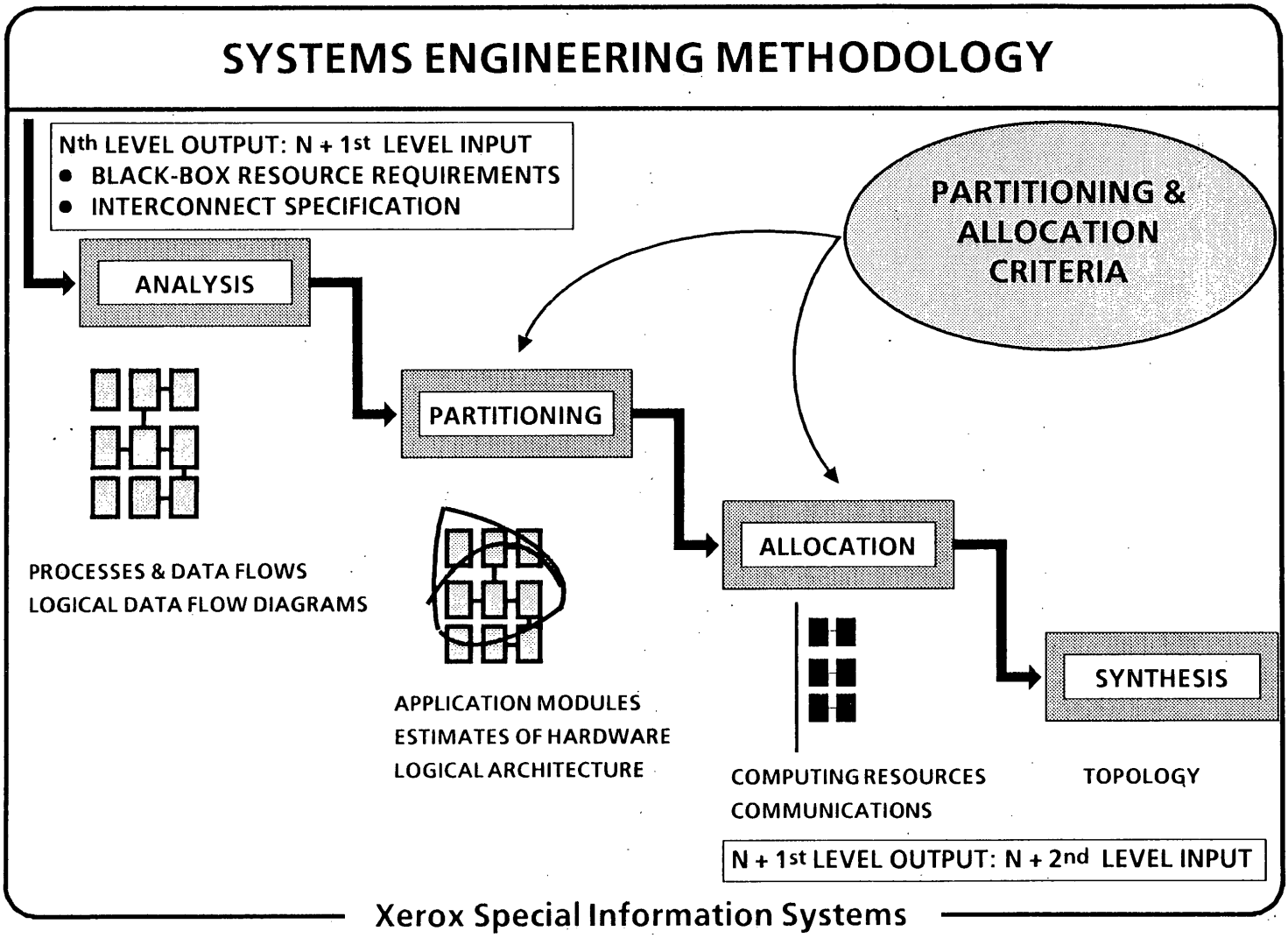
Security Impact on Design	Max Bohlmann
Program Plan and Schedule	Bill Peters
Approach to System Maintenance	Bill Norton
Phase 3 Activities	Bob Worlock
Wrap Up	Bob Worlock

SYSTEMS ARCHITECTURE

This section covers:

- Systems Architecture -- Distributed vs Centralized
- Network Level Architecture -- Geographical Distribution
- Node Level Architecture -- Local Area Distribution

SYSTEMS ENGINEERING METHODOLOGY



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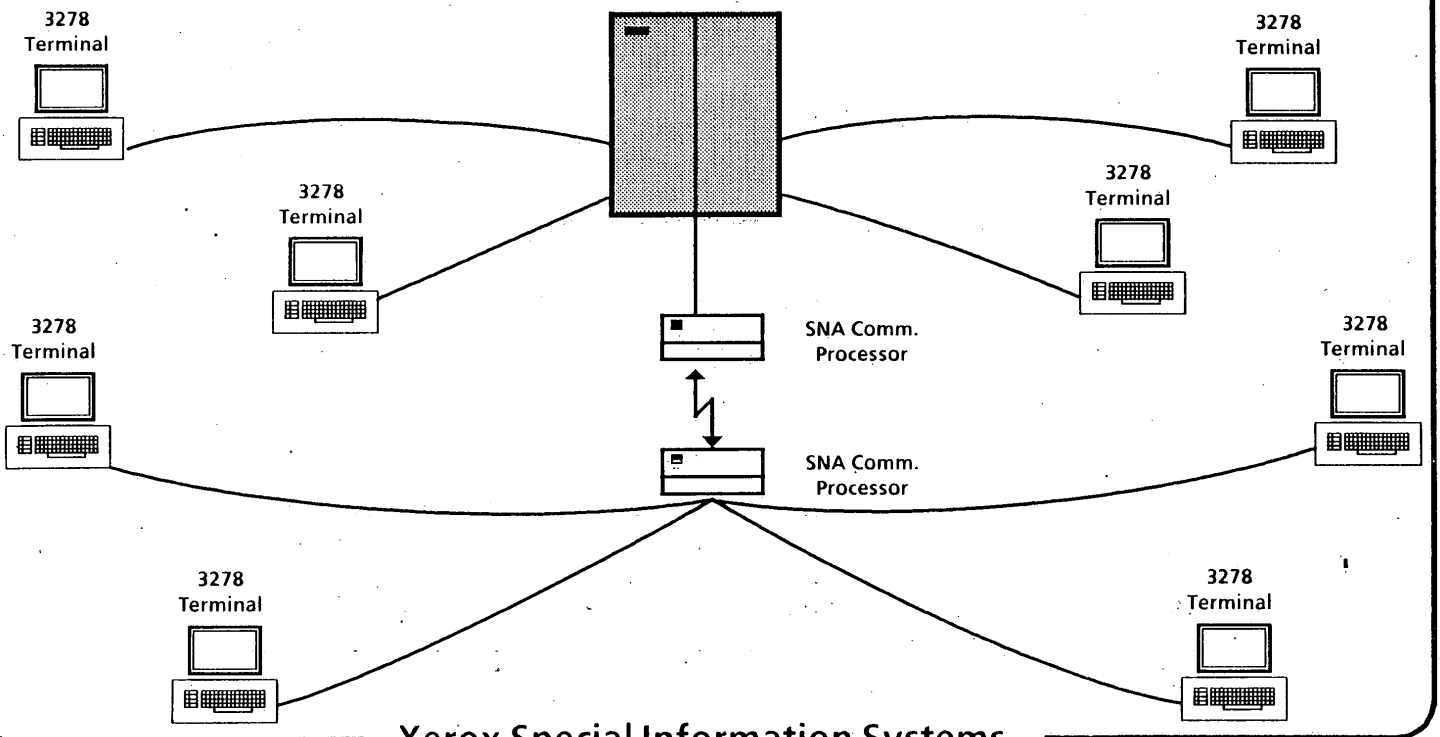
ARCHITECTURE -- CENTRALIZED vs DISTRIBUTED

CENTRALIZED :

- Mainframe runs most functions (e.g. IBM Mainframe)
- Accessed via local & remote terminals (e.g. IBM 3270 via SNA)



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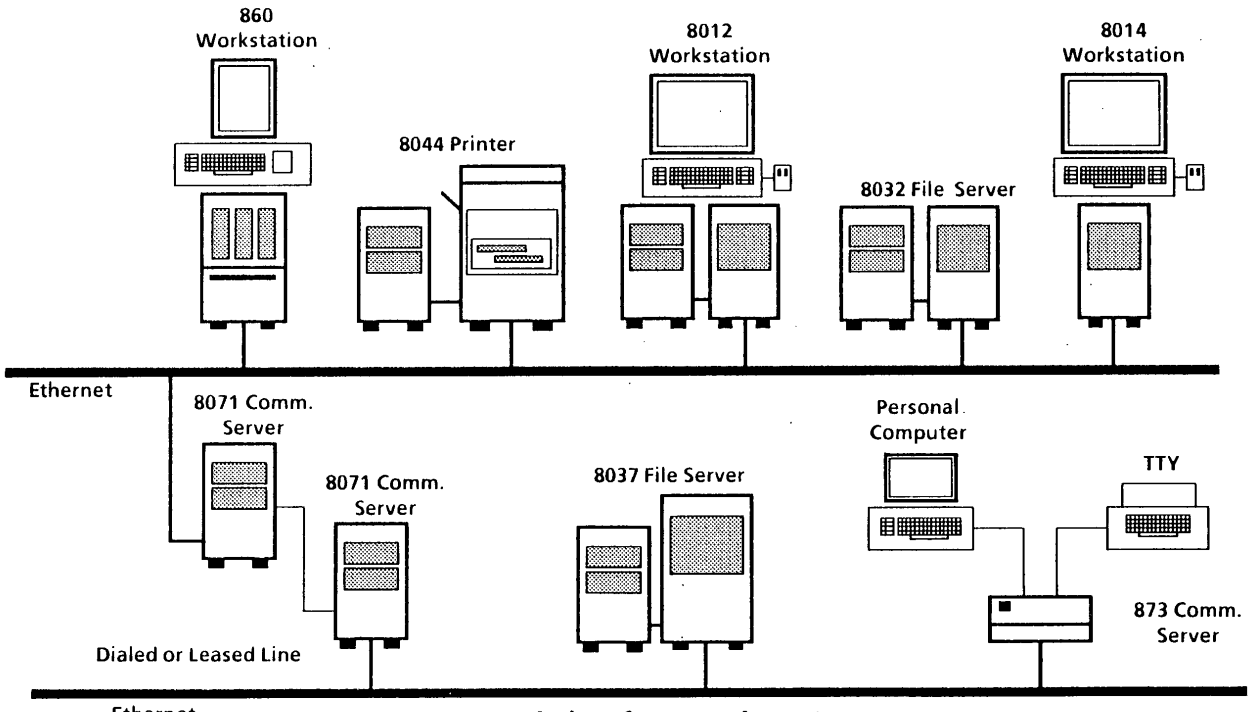
ARCHITECTURE -- CENTRALIZED vs DISTRIBUTED

DISTRIBUTED :

- Functions distributed among capable workstations & servers
- Accessed via local & remote workstations (e.g. Xerox 8000NS)



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CHARACTERISTICS OF DISTRIBUTED ARCHITECTURE

- Tasks (functions) distributed among many communicating processors of two generic types:
  - Workstations running client tasks for user interface.
  - Servers running services (e.g. printing, mailing, filing, communications gateways) for client processes.
- Parallel processing of independent tasks.
- High quality processing available at the point of use.
- Decentralized control and data access.
- Distributed system generally provides greater throughput than centralized system of the same cost.

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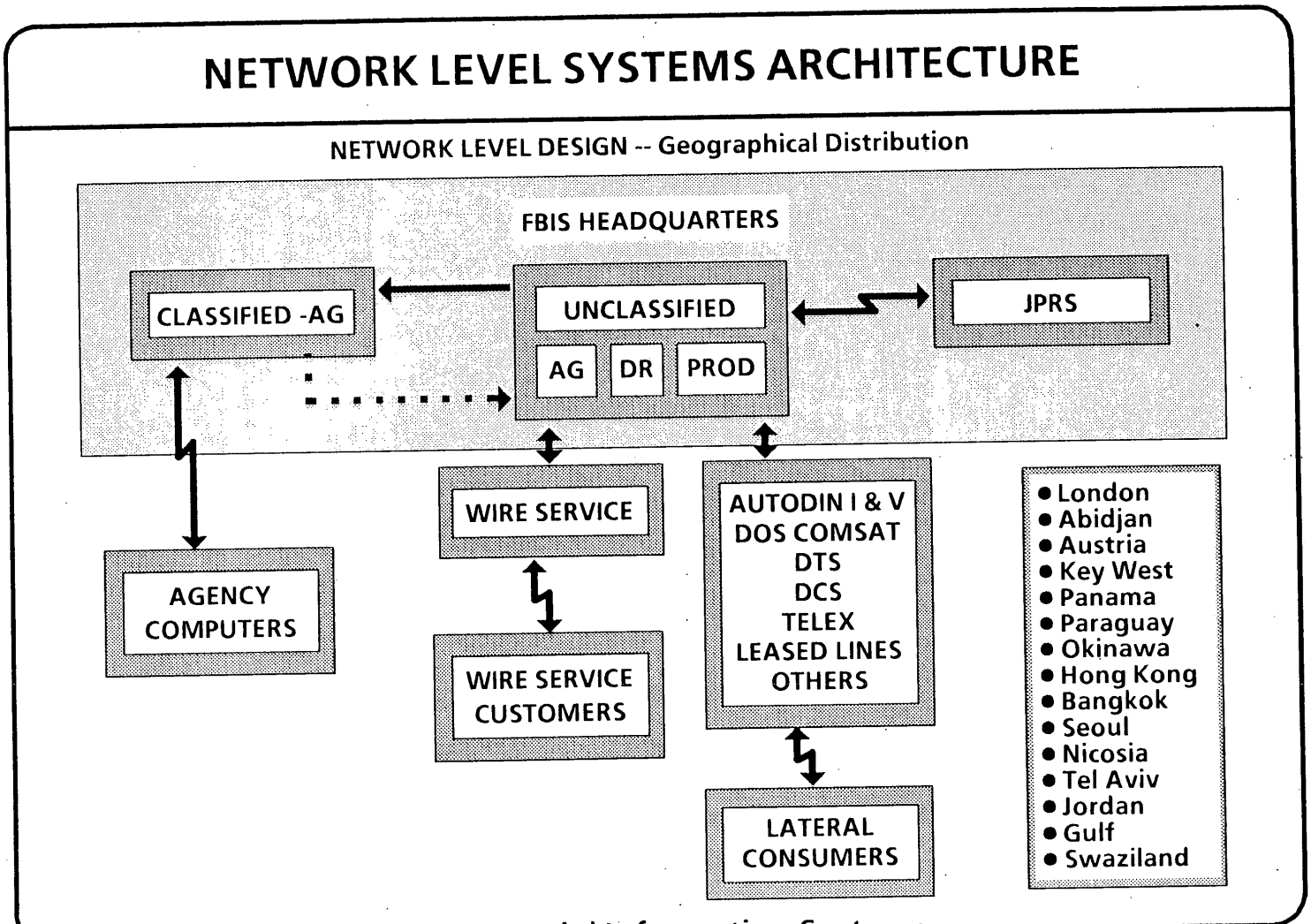
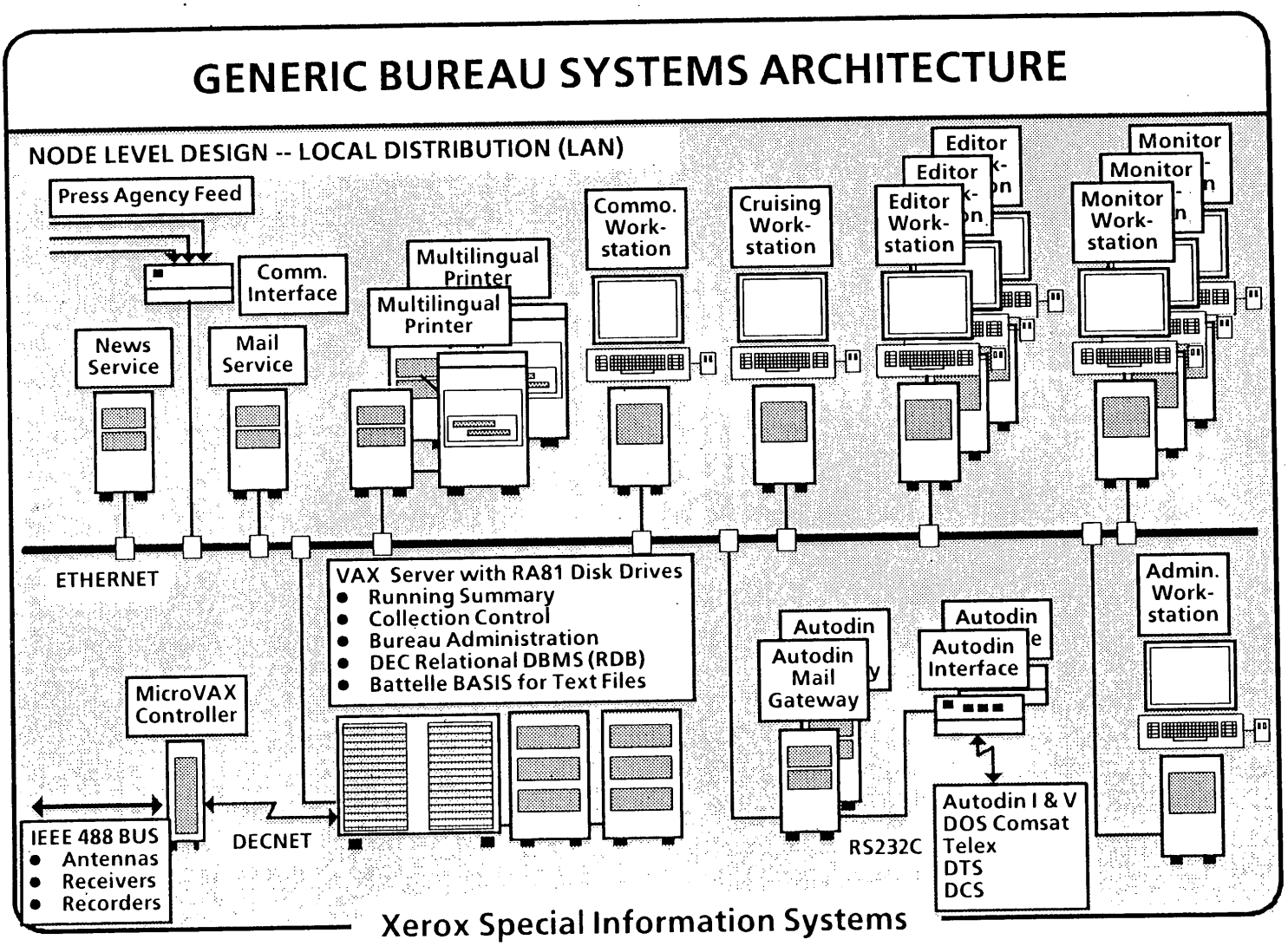
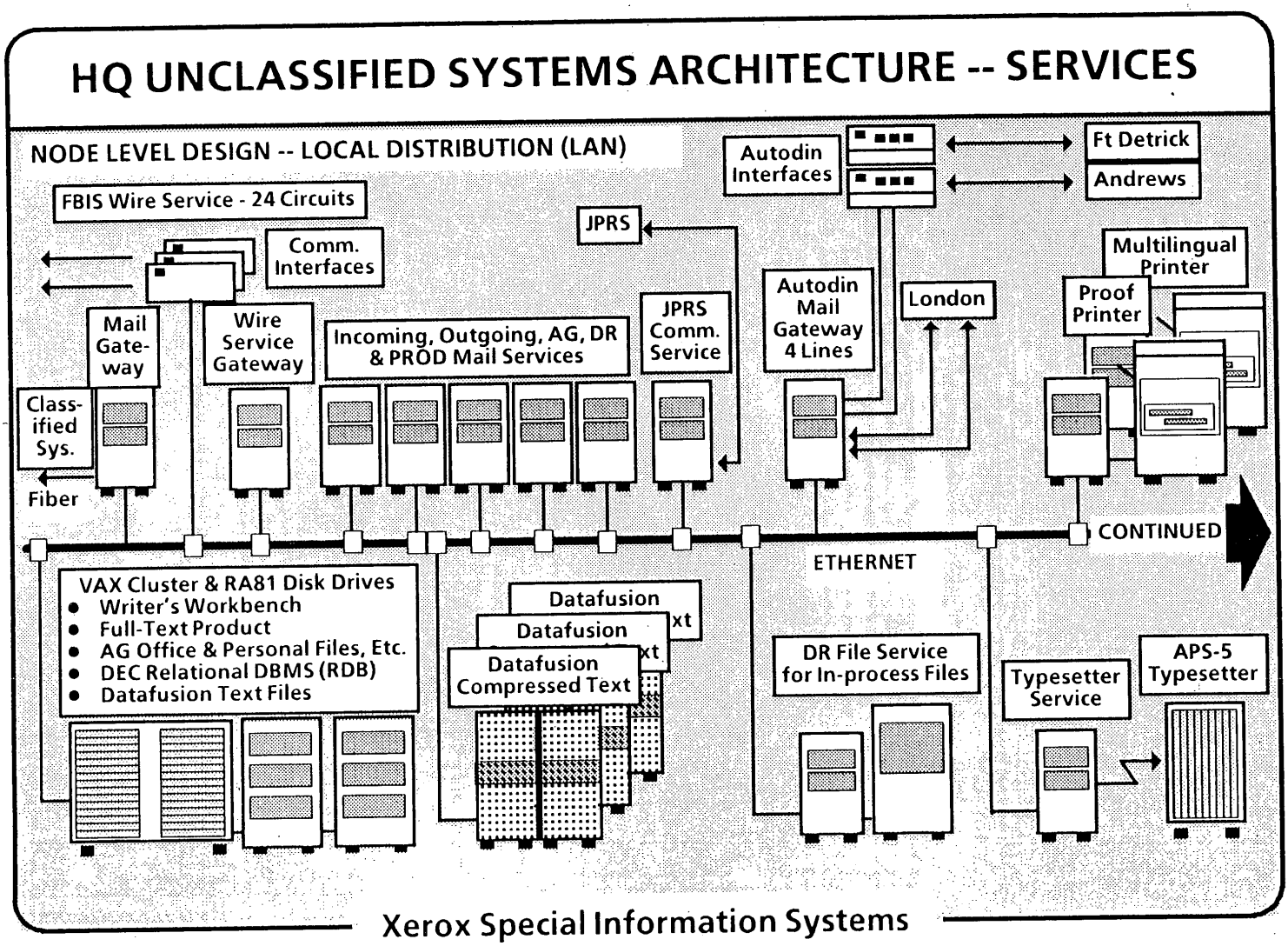
NETWORK LEVEL SYSTEMS ARCHITECTURE

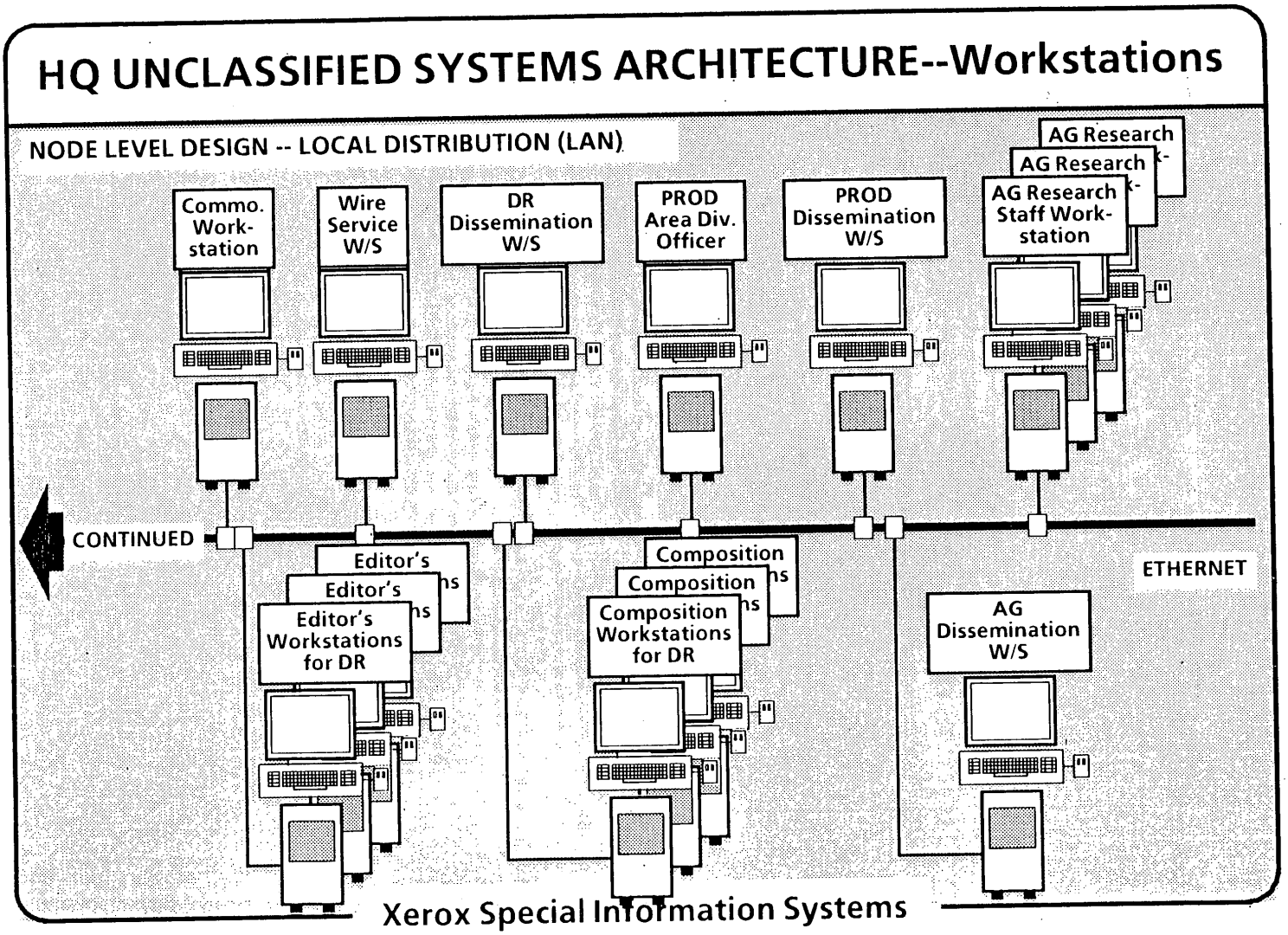


Xerox Special Information Systems

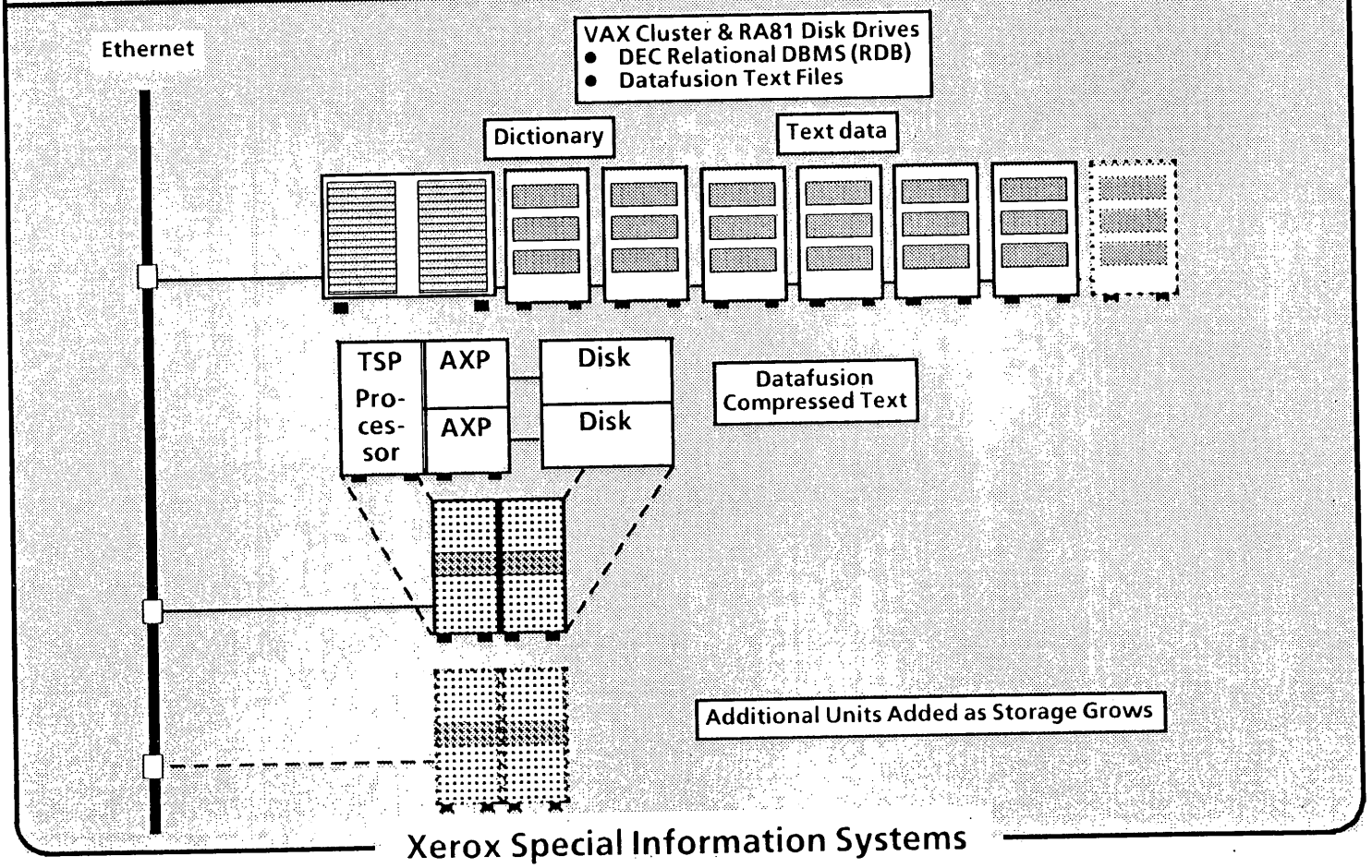




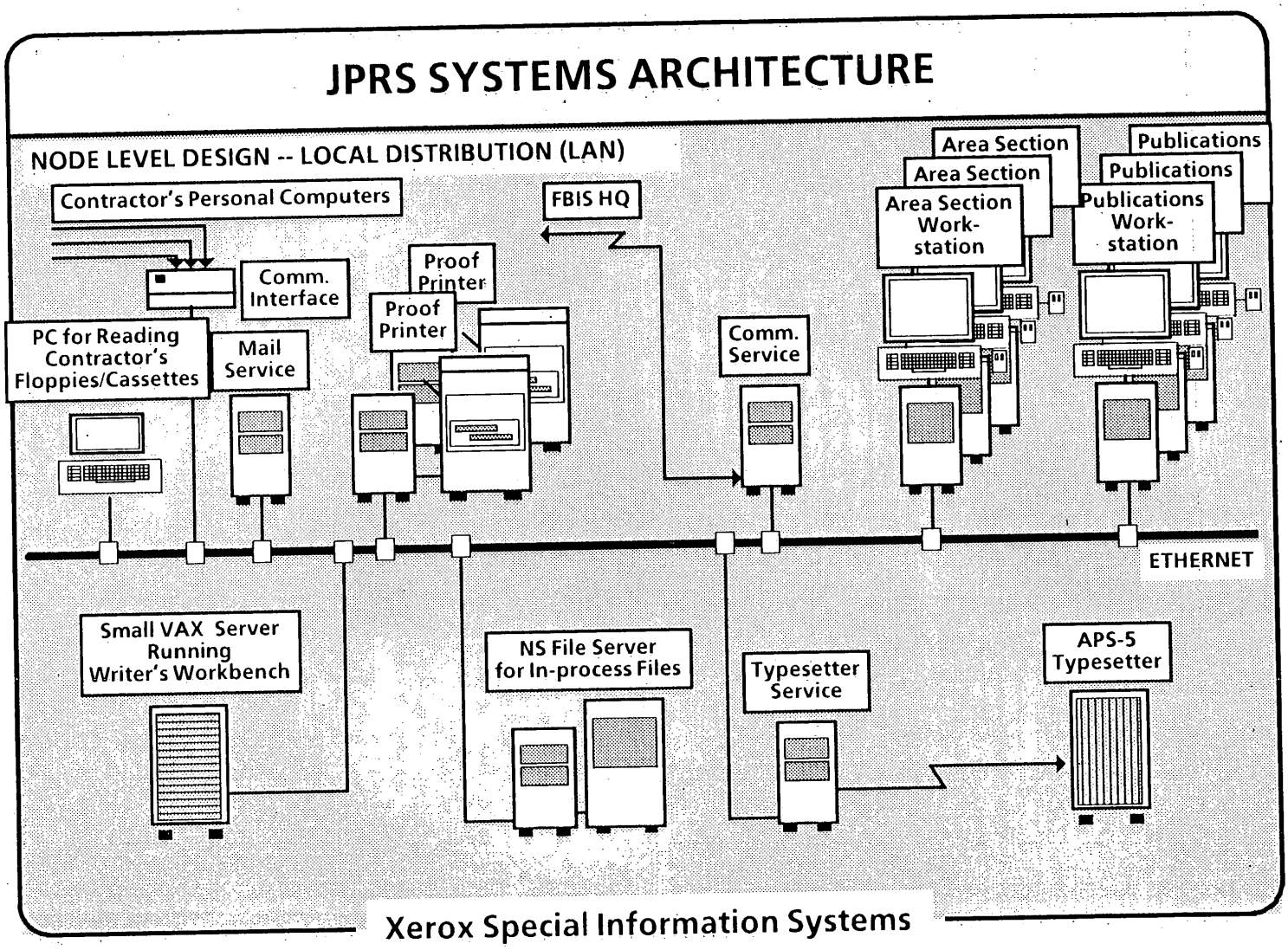
HQ UNCLASSIFIED SYSTEMS ARCHITECTURE--Workstations



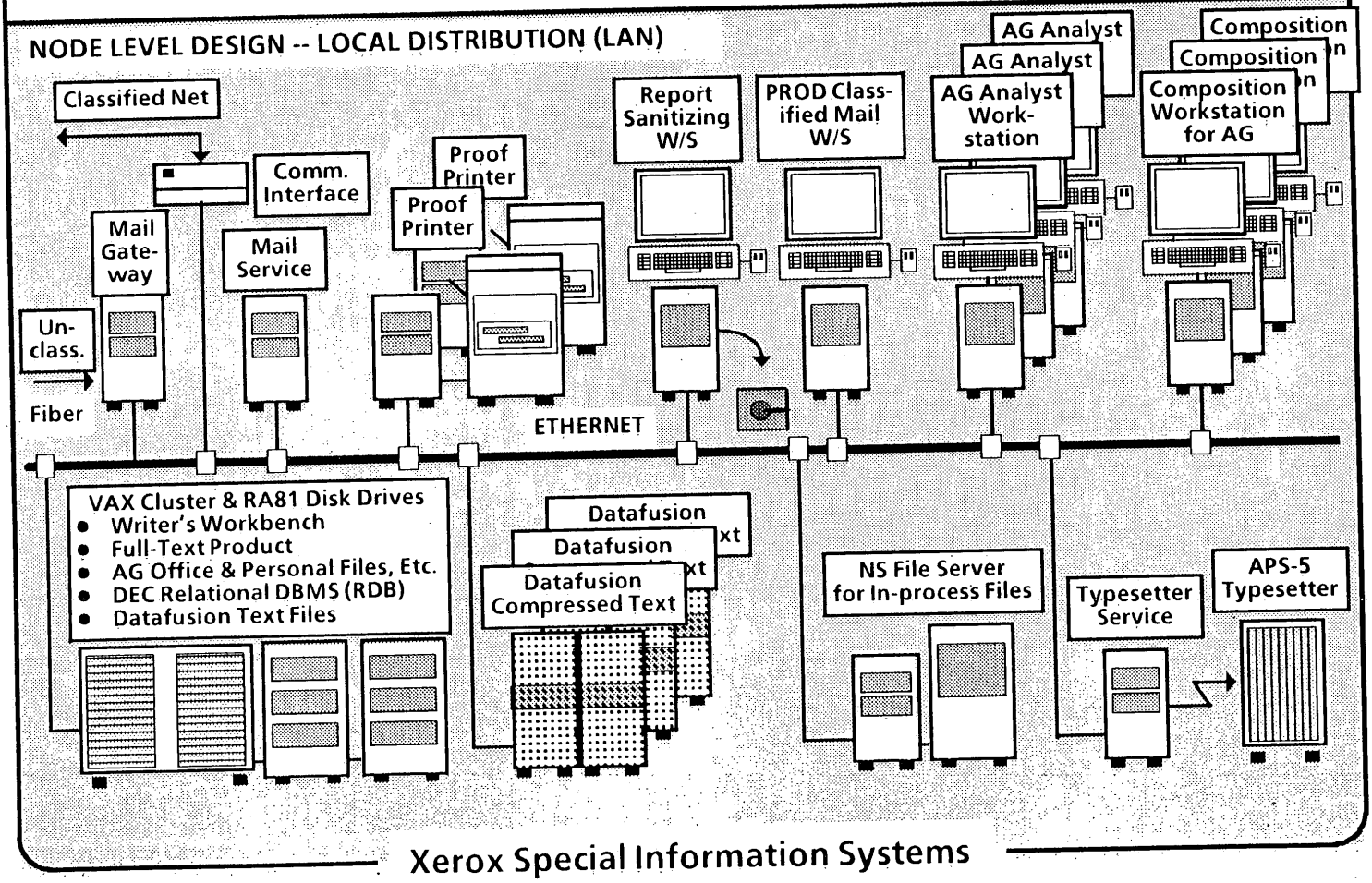
DATAFUSION ARCHITECTURE



Xerox Special Information Systems



HEADQUARTERS CLASSIFIED SYSTEMS ARCHITECTURE



Xerox Special Information Systems

COLLECTION AUTOMATION

- Subsystem description
- Functions vs. operations
- Man-machine interfaces
- Operational impacts

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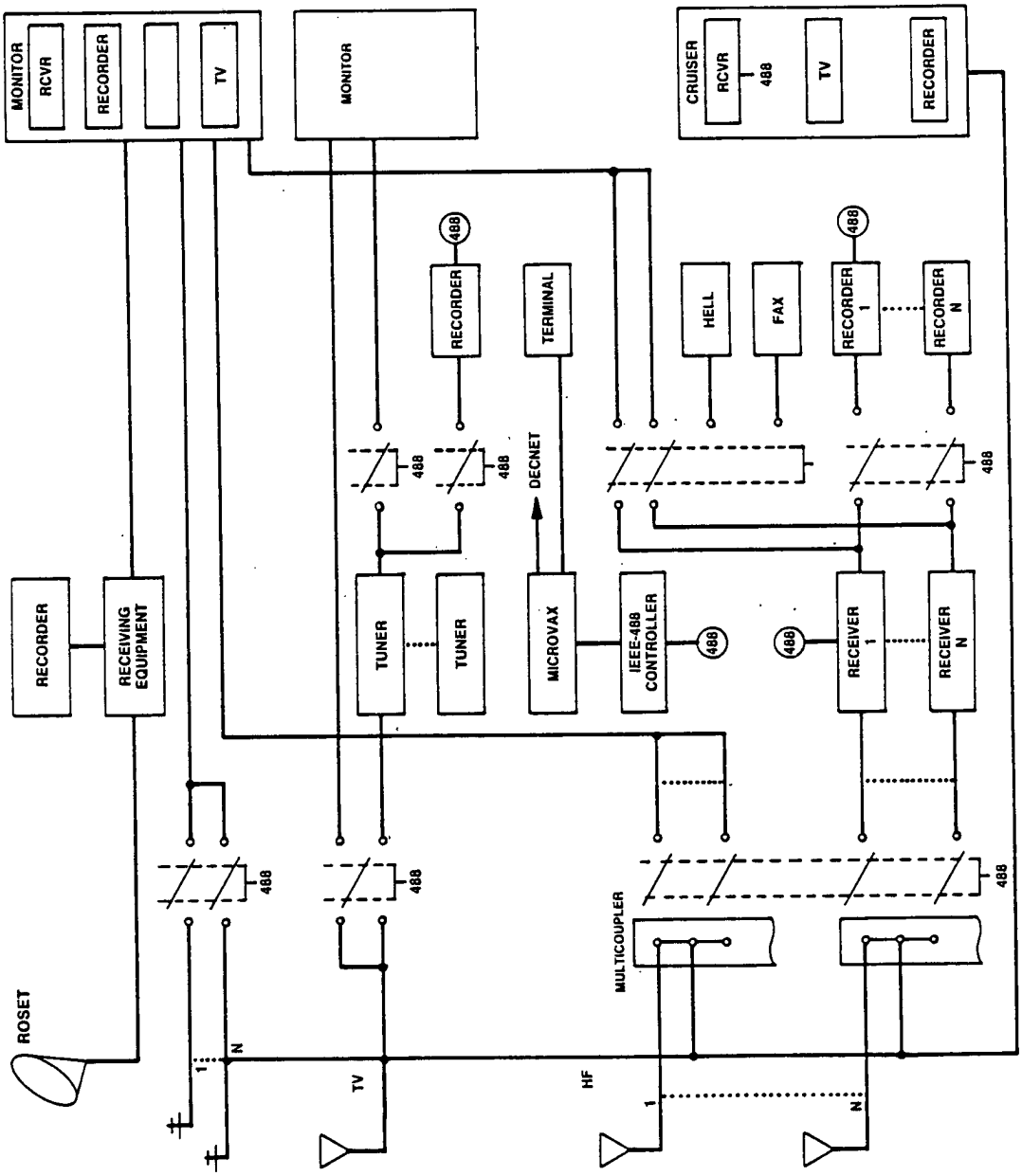
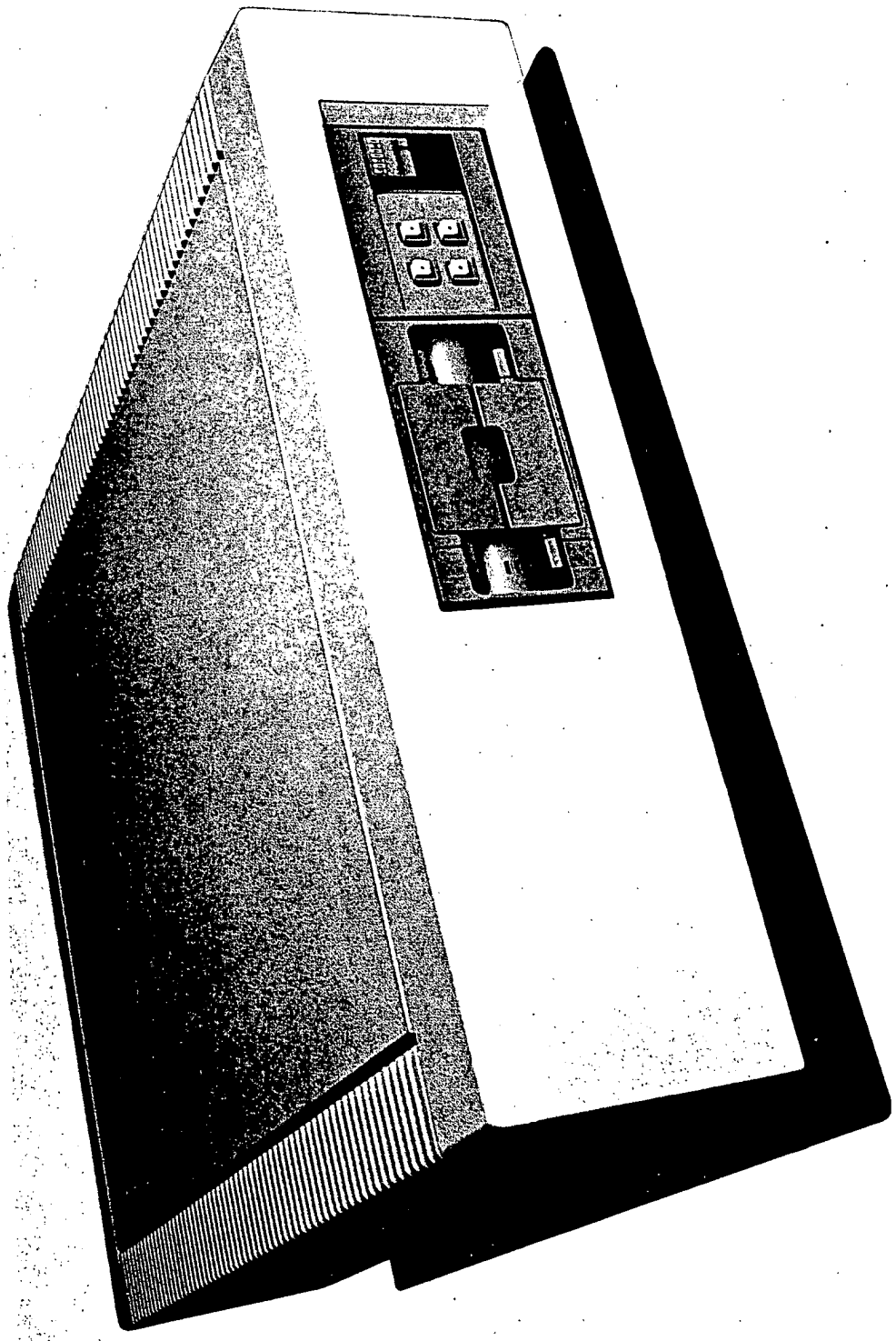
FIELD BUREAU SYSTEM ARCHITECTURE



Xerox Special Information Systems

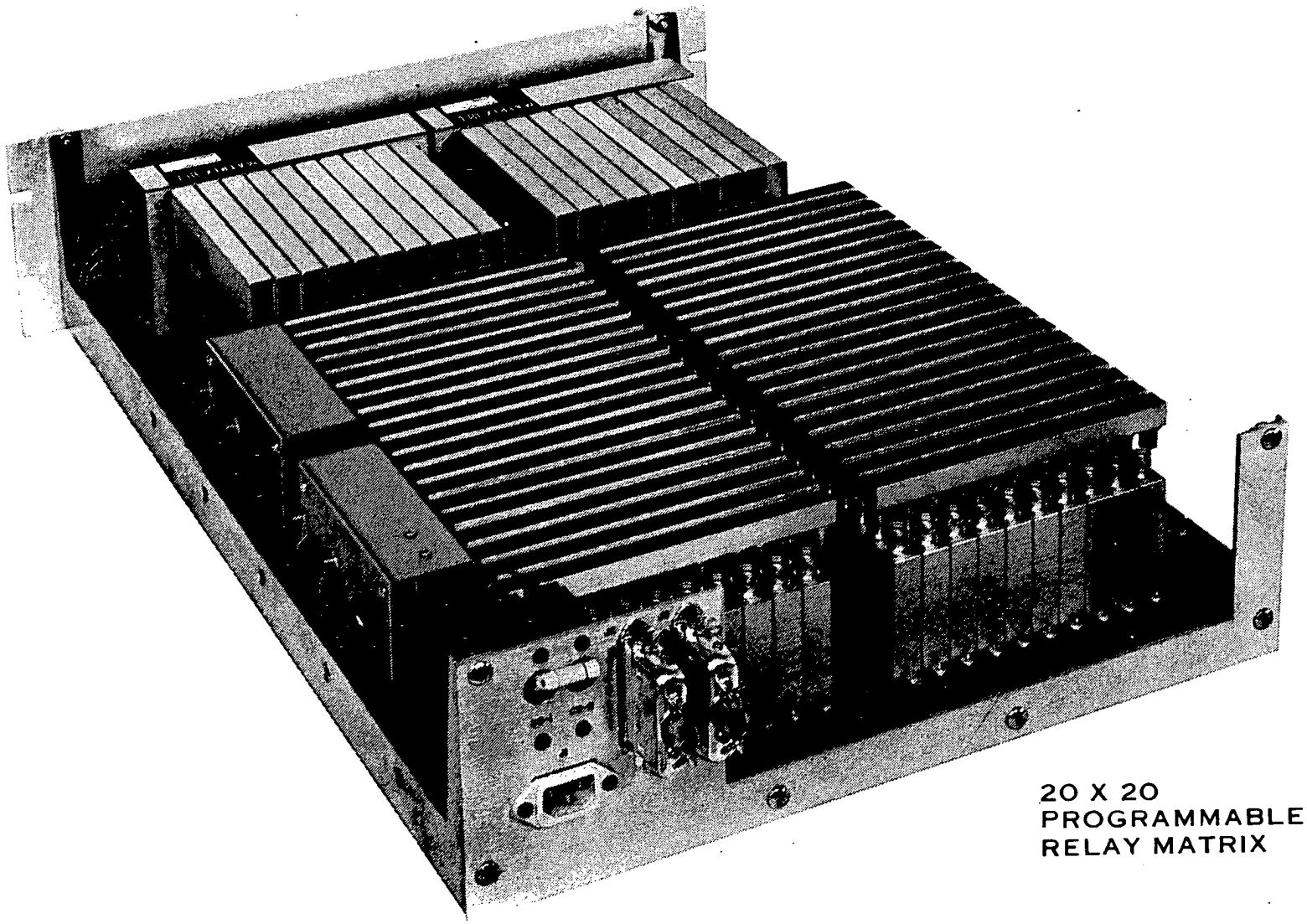
X4124

DEC MICROVAX



Xerox Special Information Systems

MATRIX 7300 COAXIAL SWITCH



20 X 20
PROGRAMMABLE
RELAY MATRIX

Xerox Special Information Systems

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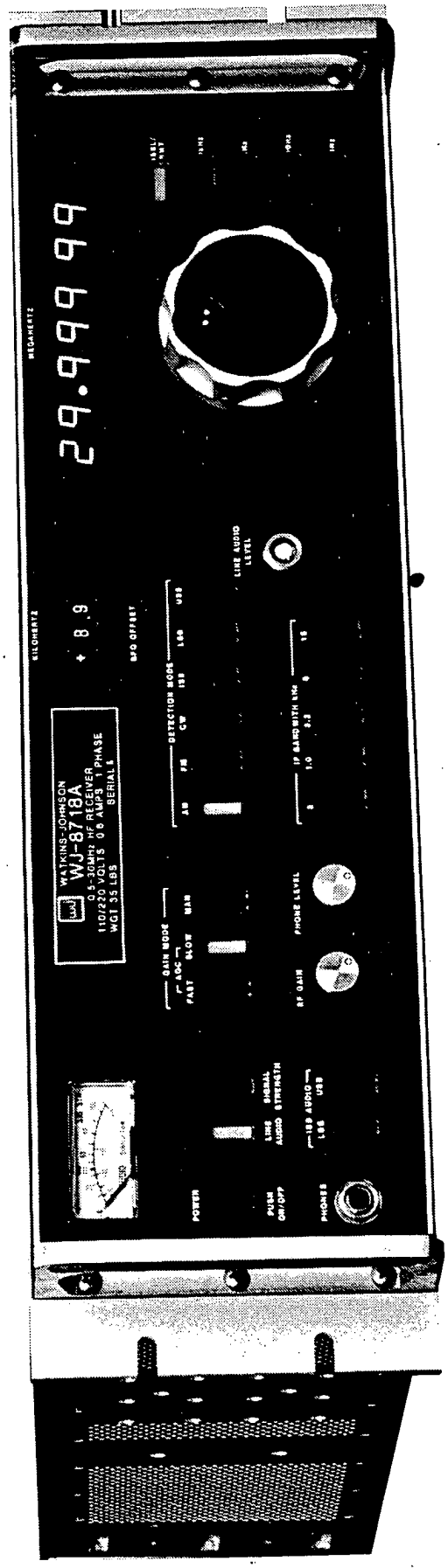
WJ-8718A HF RECEIVER

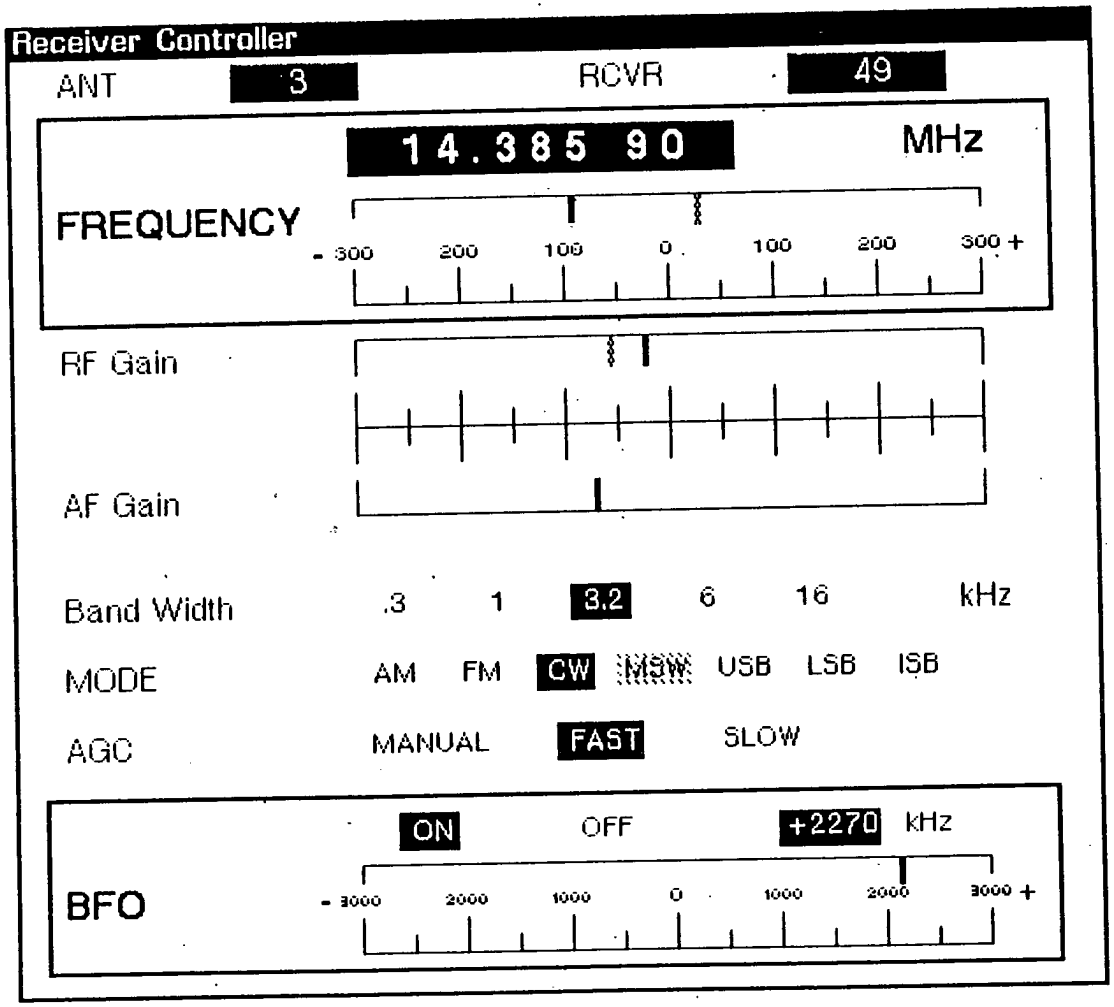


Xerox Special Information Systems

DICTAPHONE 5842 DUAL CASSETTE RECORDER

Xerox Special Information Systems

COLLECTION AUTOMATION



Xerox Special Information Systems

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COLLECTION AUTOMATION

X4141

Functions vs. Operations

2.2.1.1 Automation of radio reception Requirements	
2.2.1.1.2.1 Selection of:	
receiver	Computer-controlled matrix switches
frequency	Computer-controlled (IEEE-488)
antenna	Computer-controlled matrix switches
distribution	Computer-controlled matrix switches
display configuration	Boardman terminal & Monitor W/S
modify configuration	Boardman terminal & Monitor W/S
2.2.1.1.2.2 Automatic frequency tracking	Receiver AFC
2.2.1.1.2.3 Provision for:	
manual receiver turning	Boardman and Monitor W/S
manual antenna selection	Boardman and Monitor W/S

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COLLECTION AUTOMATION

X4140

Functions vs. Operations

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

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COLLECTION AUTOMATION

X4139

Functions vs. Operations

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

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COLLECTION AUTOMATION

X4138

Functions vs. Operations

2.2.1.3 Television broadcast Requirements	
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

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COLLECTION AUTOMATION

X4137

Functions vs. Operations

2.2.2 Cruising Requirements	
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

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COLLECTION AUTOMATION

MAN-MACHINE INTERFACES (MMI)

- Boardman operator
  - VT100 terminal with proven MMI
  - Special forms for Schedule/Modify/Examine
- Cruiser
  - Icon/window on workstation
  - Fast, natural and reliable control
  - Form fill-in with auto parameter read
  - Visual confirmation
- Monitor receiver display/control
  - Icon/window on workstation
  - Fast, natural and reliable control
  - Visual feedback for confirmation
  - See following example

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COLLECTION AUTOMATION

OPERATIONAL IMPACTS

- Boardman has computer control of antenna, receiver and recorder scheduling with records filed in DBMS
- Monitor has full display and control of antenna selection and receiver parameters in integrated workstation environment
- Monitor tape playback is referenced to date/time on tape
- Cruiser data is automatically entered into file on demand

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FBIS BUREAU MONITOR/EDITOR OPERATIONS

Functions versus FBIS Requirements

- Requirements Checklist
- Screen Concepts
- Logical Architecture
- Physical Architecture
- System Sizing

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FBIS BUREAU MONITOR/EDITOR OPERATIONS

2.3 Processing	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	*Covered under Collection Automation (2.2)*
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

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FBIS BUREAU MONITOR/EDITOR OPERATIONS

2.4 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 *expand* 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

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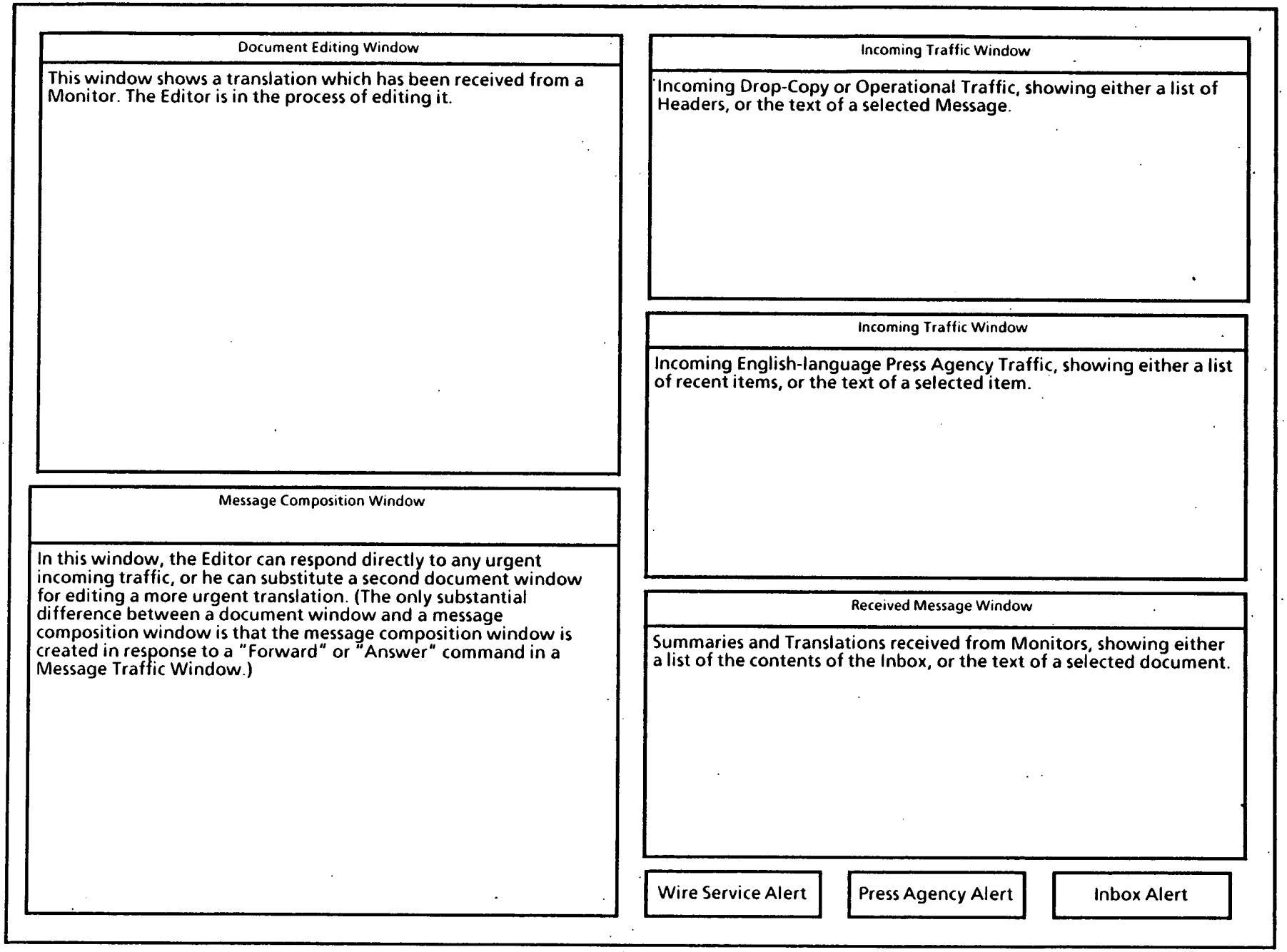

Editor Handling Incoming Traffic -- Concept

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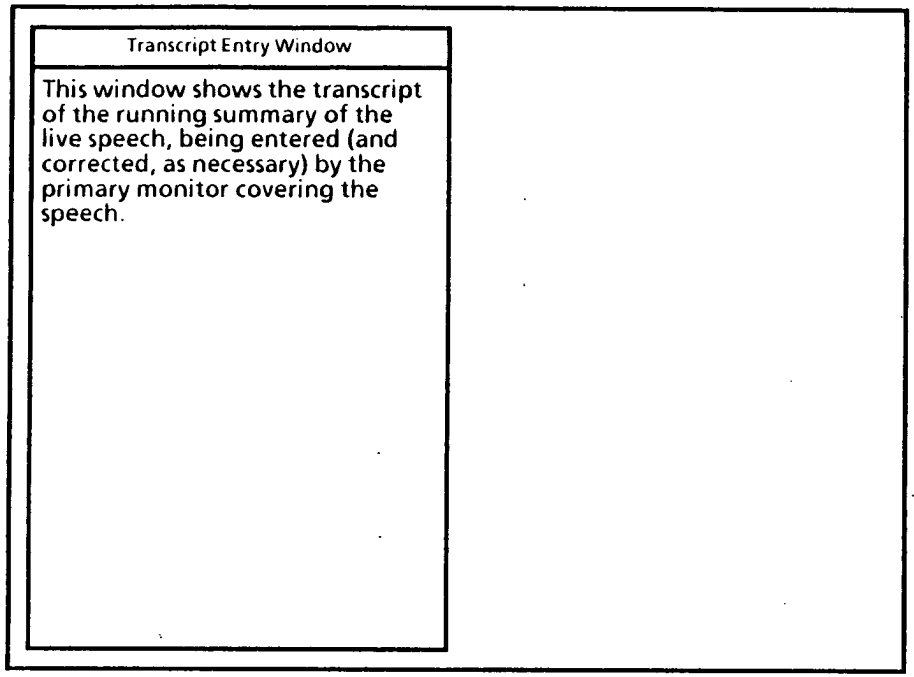
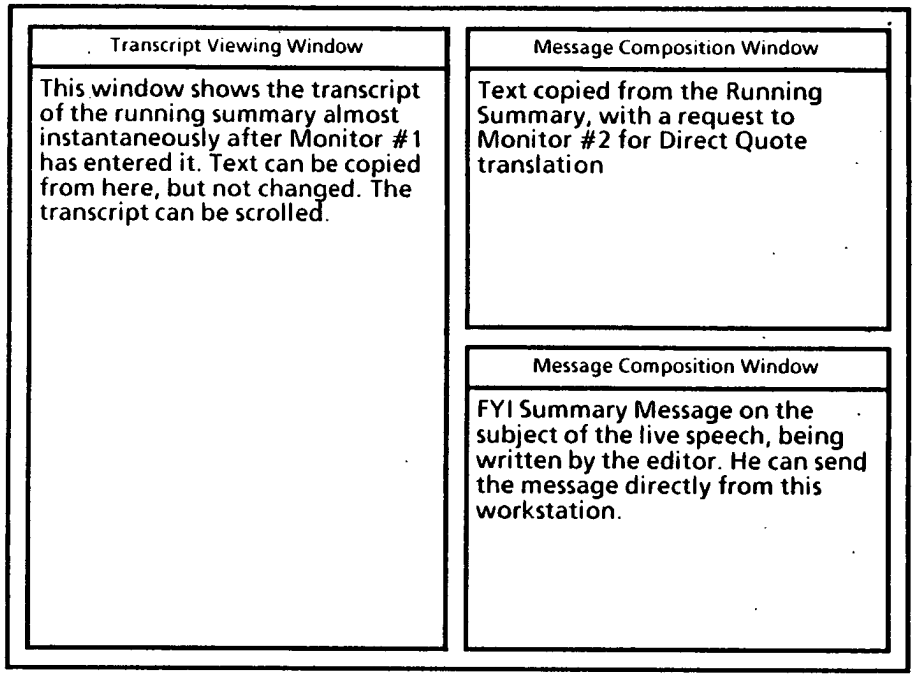
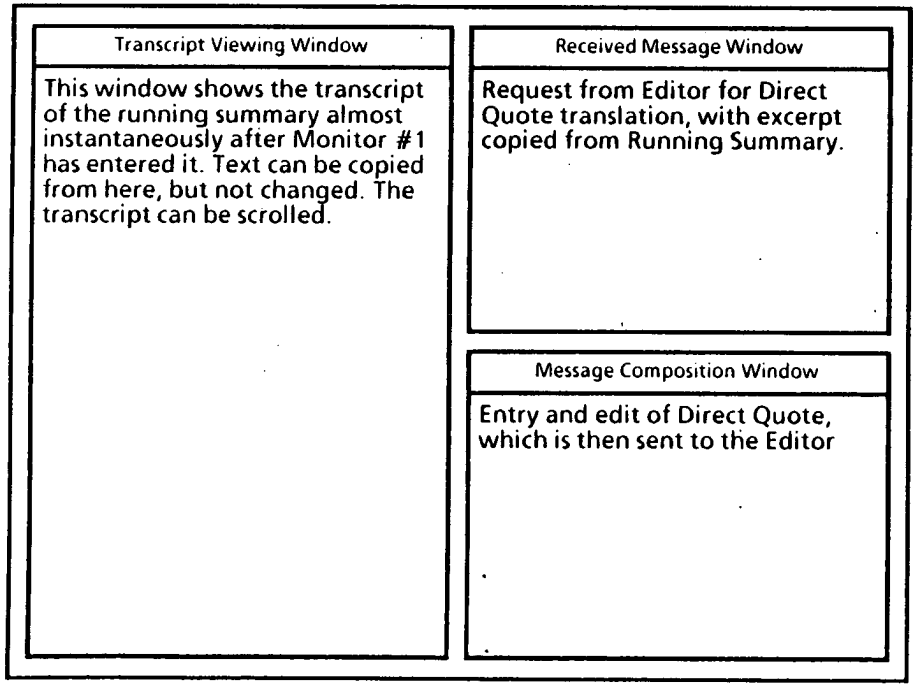


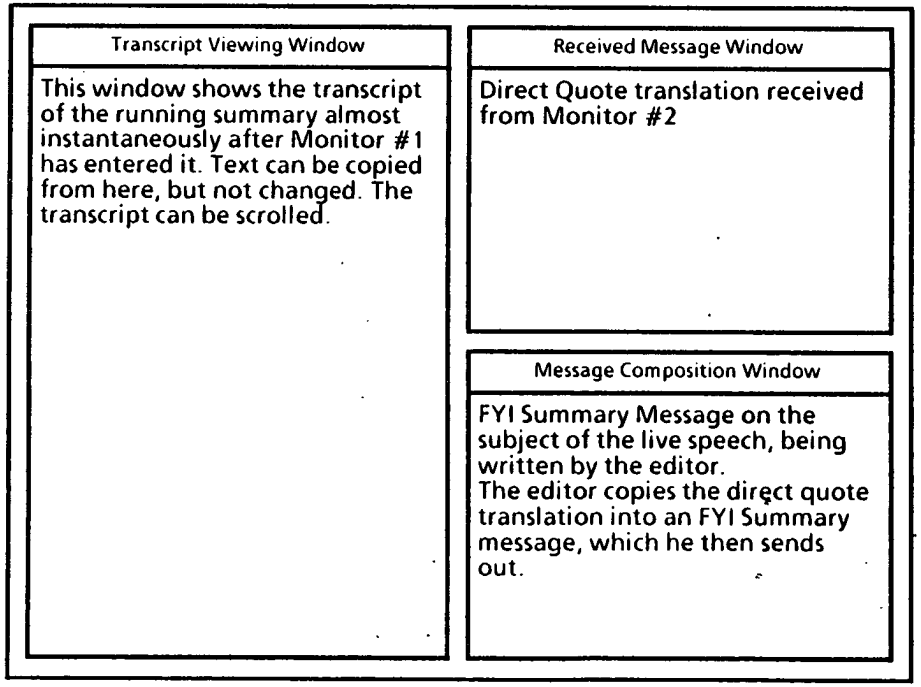
Monitor #1's Workstation



Editor's Workstation (a)



Monitor #2's Workstation



Editor's Workstation (b)

Covering a Live Speech -- Concept

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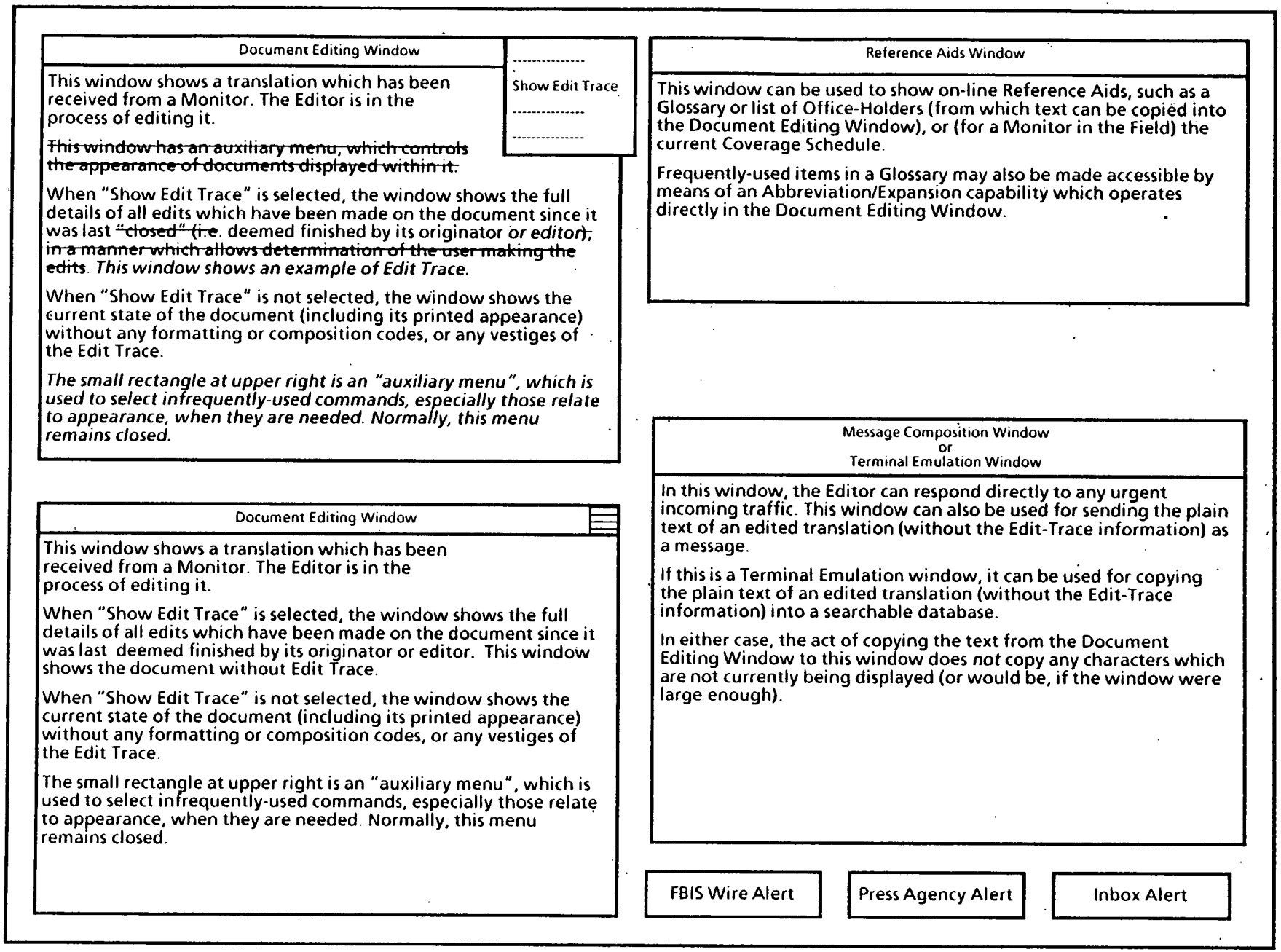

Edit-Trace on the Screen -- Concept

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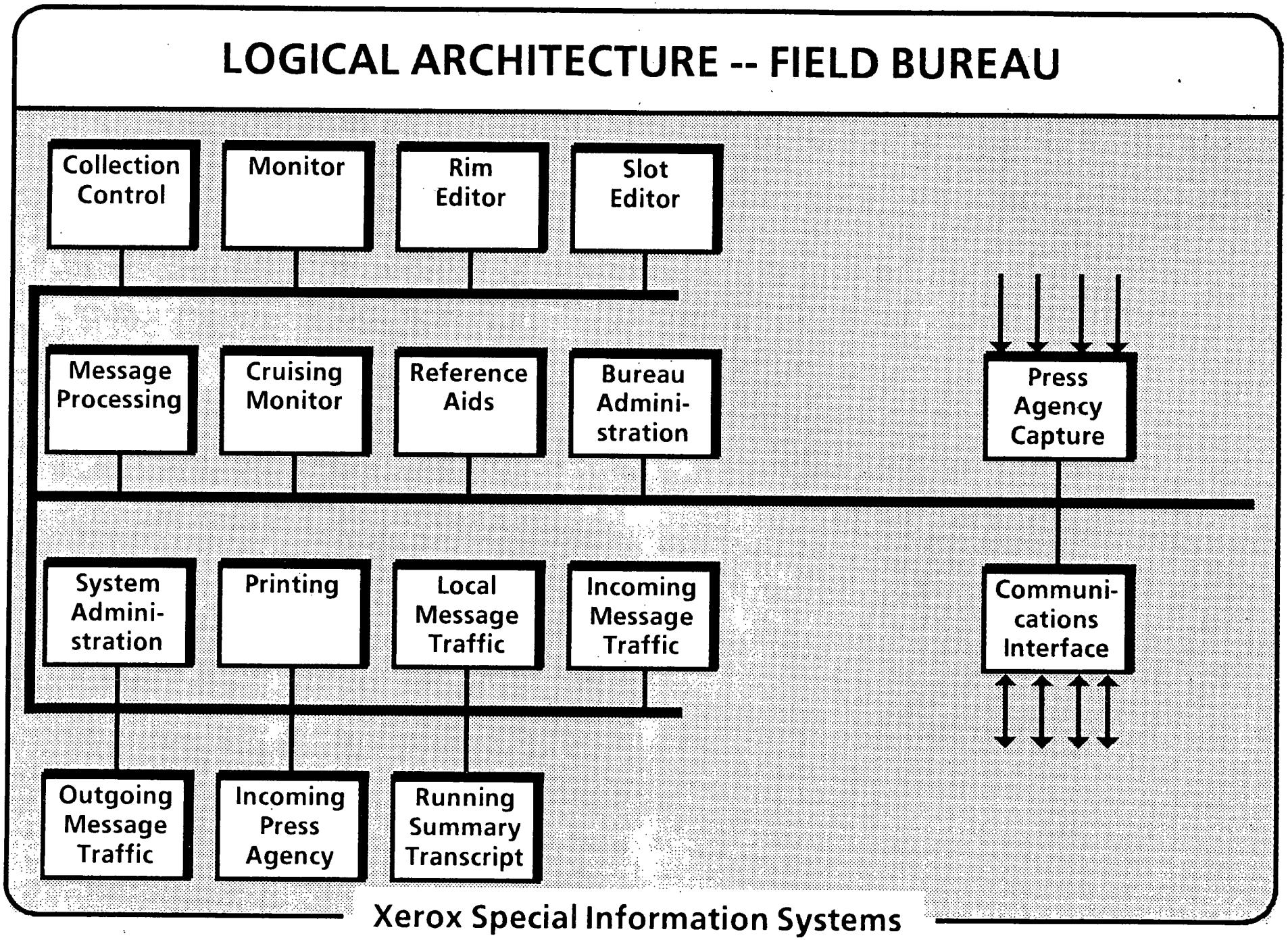

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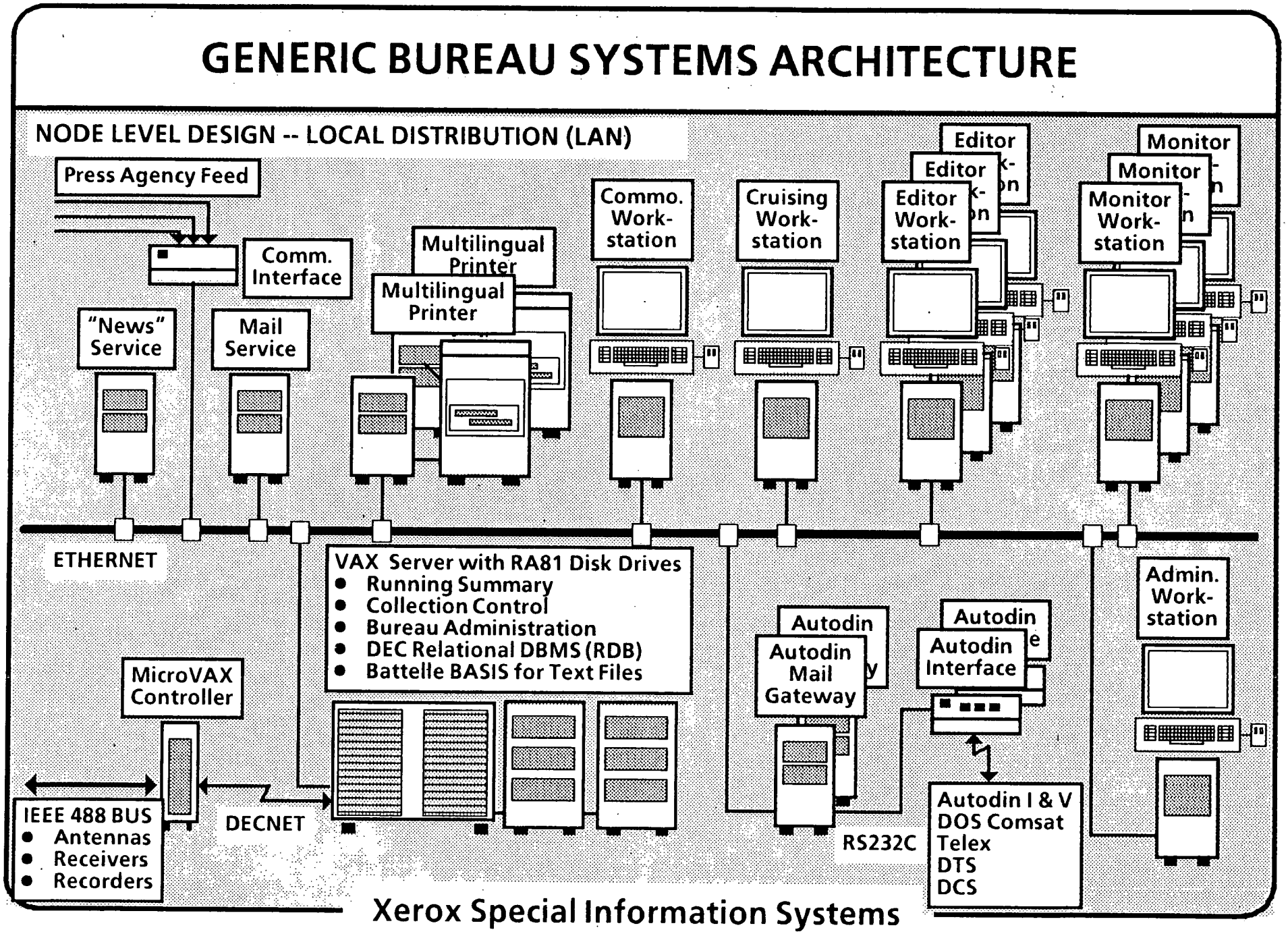

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Bureau	Editorial Workstations	Admin. Workstations	Multi-Lingual Printers[1]	Autodin Mail Gateways	Mail/"News" Servers[2]	Comm. Interface Ports[3]
Bolo Point, Okinawa	36	8	6	2	3	13
Abidjan, Ivory Coast	13	2	3	2	2	7
Amman, Jordan	11	3	3	2	2	7
Asuncion, 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, Bahrein	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

[1]Rationale: One printer for every eight workstations, plus one spare; add one if Press Agency traffic is over 500K words/day

[2]Rationale: One "News"/Mail Service plus one spare; add one if Press Agency traffic is over 500K words/day

[3]for Press Agency feeds; Mail Gateways have their own Communications ports; these ports are available in groups of 4

FBIS BUREAU MONITOR/EDITOR OPERATIONS

Operational Impacts

- Summaries, FYIs, and Publishable Messages are created, communicated, and edited electronically, using the workstations
- English Press Agency traffic is captured electronically for editing
- Copy can be printed at any time for review and discussion
- Edited copy is sent to the Communications Operator in electronic form
- Commo. adds/expands and edits addressee lists electronically
- Publishable traffic dissemination and management is handled using the Mail Gateway

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FBIS BUREAU MONITOR/EDITOR OPERATIONS

Operational Impacts (cont.)

- Running summaries are available for quasi-real time viewing, scrolling and copying at other workstations
- Within a translation, the edits from the previous version can be viewed at the user's command
- Outgoing traffic, drop copy, English Press Agency, and administrative messages are printed periodically to be available for read-in
- Character-oriented vernacular Press Agency can be captured electronically and printed or viewed at the user's discretion

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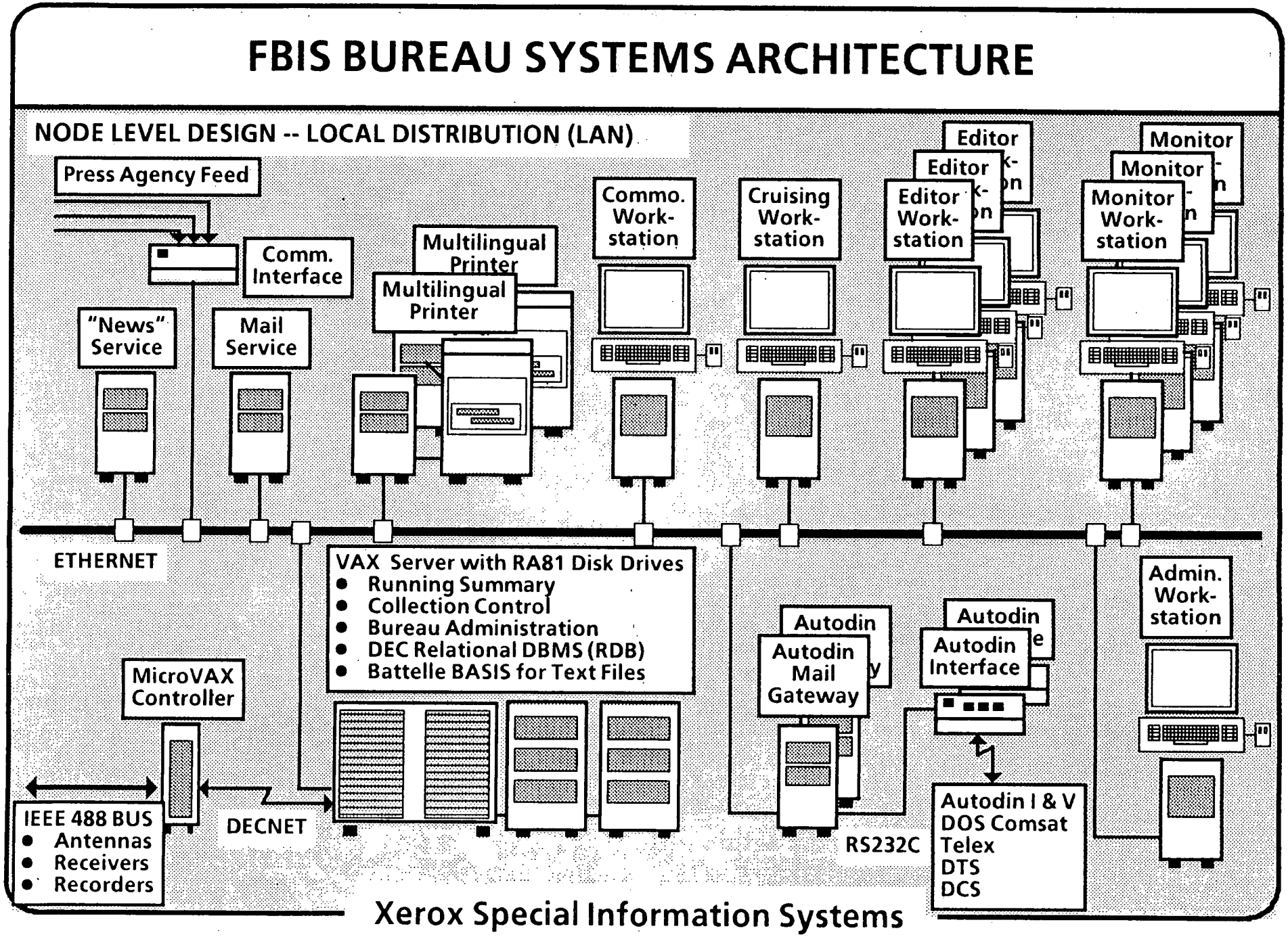

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BUREAU DBMS ARCHITECTURAL HIGHLIGHTS - HARDWARE

Disk capacity more than double required to store data

- **Primary storage of data base**
- **Shadow copy of data base**
- **"Hot" reserve disk drive**

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BUREAU DBMS ARCHITECTURAL HIGHLIGHTS - SOFTWARE

User interface

- Xerox supplied application software
  - Workstation - facilitate data entry
  - VAX - integrate DBMSs

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BUREAU DBMS FUNCTION vs FBIS OPERATIONS

- Requirements Checklist
- Physical Architecture
- System Sizing

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BUREAU DBMS FUNCTION vs FBIS OPERATIONS

Integrated

- **DEC's VAX Rdb/VMS for structured files**
- **Battelle's BASIS for text files**

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BUREAU DBMS FUNCTION vs FBIS 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

N/A = Not Applicable

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BUREAU DBMS FUNCTION vs FBIS OPERATIONS

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 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

N/A = Not Applicable

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BUREAU DBMS FUNCTION vs FBIS OPERATIONS

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

N/A = Not Applicable

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BUREAU DBMS FUNCTION vs FBIS OPERATIONS

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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BUREAU DBMS FUNCTION vs FBIS OPERATIONS

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

N/A = Not Applicable

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BUREAU DBMS FUNCTION vs FBIS OPERATIONS

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

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BUREAU DBMS FUNCTION vs FBIS OPERATIONS

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

N/A = Not Applicable

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BUREAU DBMS FUNCTION vs FBIS OPERATIONS

1.6 DBMS Report Generation Requirements (cont.)	Xerox Approach	
	DEC's VAX Rdb/VMS	Battelle's BASIS
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 ± n lines	N/A	Yes
1.6.1.7 print/display window around query matches	N/A	Yes

N/A = Not Applicable

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BUREAU DBMS FUNCTION vs FBIS OPERATIONS

1.6 DBMS Report Generation Requirements (cont.)	Xerox Approach	
	DEC's VAX Rdb/VMS	Battelle's BASIS
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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BUREAU DBMS FUNCTION vs FBIS OPERATIONS

Physical Architecture

- DEC VAX 11/730 or VAX 11/750 or VAX 11/780 depending on number of terminals supported
- DEC RA60 disk drive for system disk
- DEC Magnetic Tape drive for load device
- Some number of RA81 disk drives for data storage. Number depends on bureau storage requirements
- VAX processor connected to Ethernet
- VAX processor supporting file transfer and virtual terminal emulation

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BUREAU DBMS FUNCTION vs FBIS OPERATIONS

System Sizing

- VAX 11/730 processors at
  - Abidjan
  - Jordan
  - Paraguay
  - Key West
  - Gulf
  - Swaziland
  - Nicosia
  - Seoul
  - Tel Aviv

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BUREAU DBMS FUNCTION vs FBIS OPERATIONS

System Sizing

- VAX 11/750 processors at
  - Bangkok
  - Hong Kong
  - Panama

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BUREAU DBMS FUNCTION vs FBIS OPERATIONS

System Sizing

- VAX 11/780 processors at
  - Okinawa
  - London
  - Austria

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BUREAU DBMS FUNCTION vs FBIS OPERATIONS

System Sizing for First Five Years

- 3 RA81 data disks at
  - Abidjan
  - Jordan
  - Paraguay
  - Bangkok
  - Hong Kong
  - Key West
  - Gulf
  - Swaziland
  - Nicosia
  - Seoul
  - Tel Aviv
  - Austria

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BUREAU DBMS FUNCTION vs FBIS OPERATIONS

System Sizing for First Five Years

- 5 RA81 data disks at
  - Okinawa
  - Panama

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BUREAU DBMS FUNCTION vs FBIS OPERATIONS

System Sizing for First Five Years

- 7 RA81 data disks at
  - London

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BUREAU DBMS MAN-MACHINE INTERFACES

- Moving documents on desktop
  - To printer
  - To file drawer
  - To folder
  - To mail out basket
  - *To DBMS*

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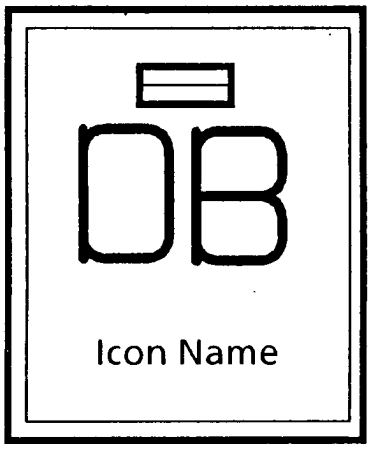
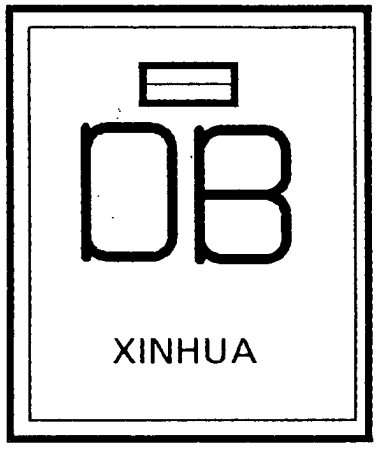
BUREAU DBMS MAN-MACHINE INTERFACES



New "transfer to DB" icon



- For data entry to text data base
- Works same as "send mail" and "printer" icons

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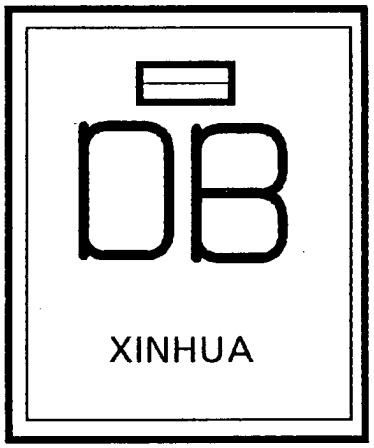
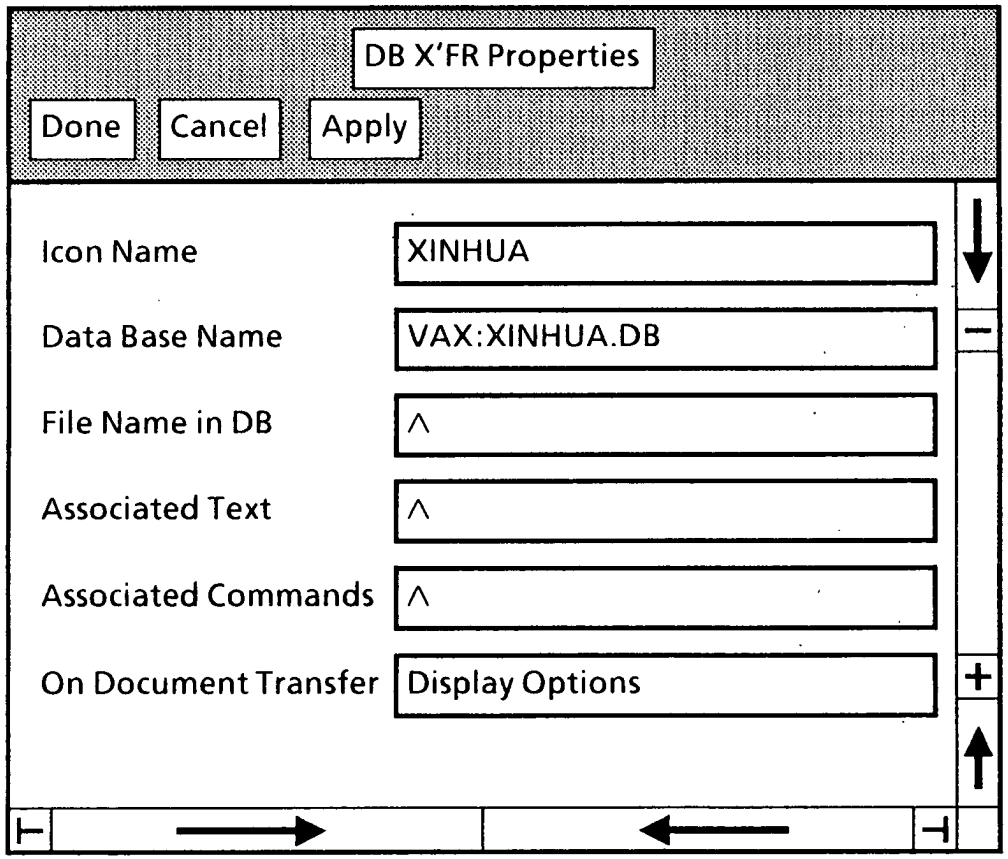
BUREAU DBMS MAN-MACHINE INTERFACES

"transfer to DB" icon Property Sheet





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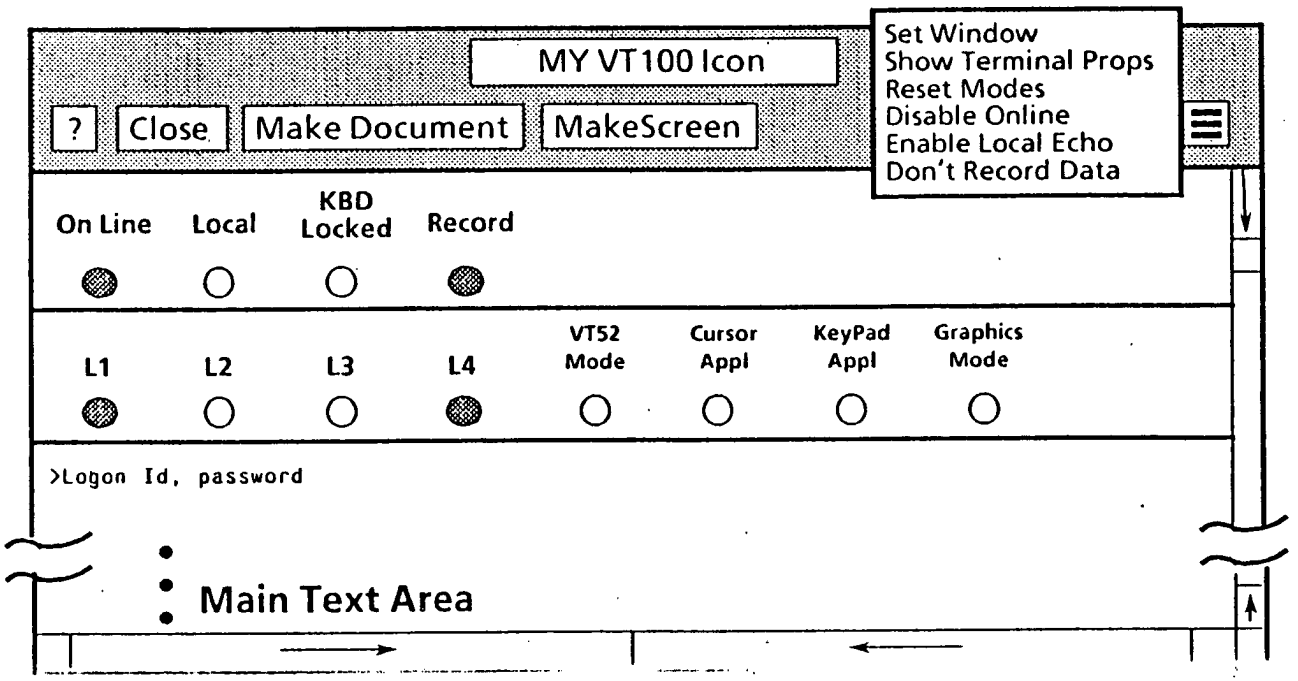
BUREAU DBMS MAN-MACHINE INTERFACES



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BUREAU DBMS MAN-MACHINE INTERFACES

- Query and report writing with DATATRIEVE
- DATATRIEVE capabilities
  - Access VAX Rdb/VMS Data Bases
  - Format reports
  - Totals, Sub-totals, Headers, Footers, etc.

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BUREAU DBMS MAN-MACHINE INTERFACES

DEC's TDMS, Terminal Data Management System

- VT100 Terminal Emulation Window
- Display DBMS data
- Input DBMS queries

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BUREAU DBMS MAN-MACHINE INTERFACES

TDMS features

- Fourth Generation Language
- Record level interfaces to VAX Rdb/VMS Data Bases
- Terminal/Data Independence
- Interfaces with DATATRIEVE

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BUREAU DBMS OPERATIONAL IMPACTS

- Provides new capability at bureaus
- Automates previously manual operations
- Previously unavailable or non-standardized operations are
  - Query program summaries and other documents
  - Organize administrative data at the bureaus

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BUREAU COMMUNICATIONS

- Subsystem description
- Functions vs. operations
- Man-machine interfaces
- Operational impacts

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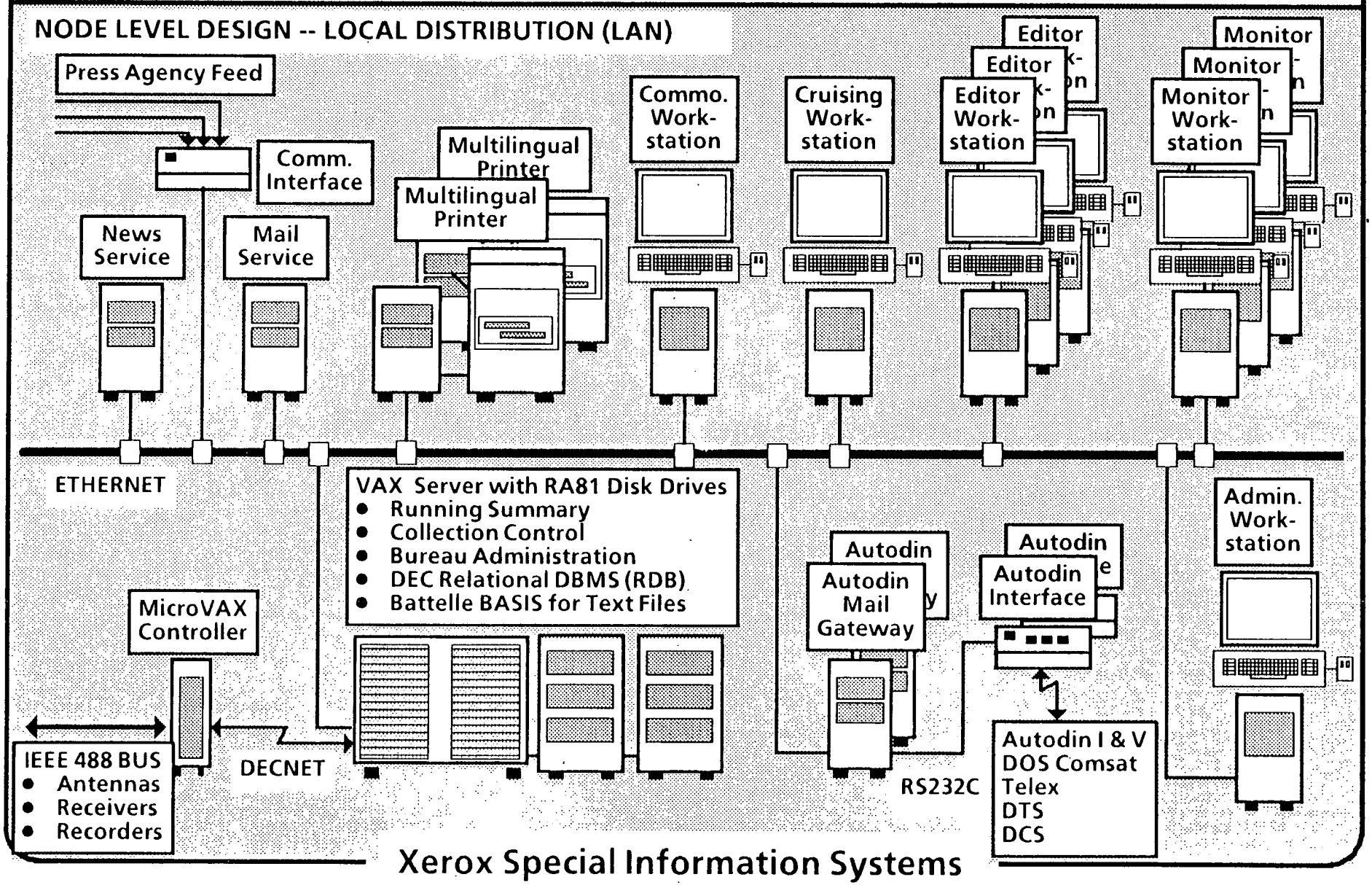
GENERIC BUREAU SYSTEMS ARCHITECTURE



Xerox Special Information Systems

BUREAU COMMUNICATIONS

X4136

Functions vs. Operations

2.6 Message traffic support Requirements	
2.6.2 Interfaces	
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
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

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BUREAU COMMUNICATIONS

X4135

Functions vs. Operations

2.6 Message traffic support Requirements (cont'd)	
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

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BUREAU COMMUNICATIONS

X4134

Functions vs. Operations

2.6 Message traffic support Requirements (cont'd)	
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 multiple takes	AUTODIN Mail Gateway
outgoing logged and filed	AUTODIN Mail Gateway

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BUREAU COMMUNICATIONS

MAN-MACHINE INTERFACES

- Commo operator
  - Workstation with CRT-type display vs. teletype
  - Electronic distribution vs. paper tape
  - Electronic receipt of items vs. hardcopy
  - Special windows/forms for:
    - Trouble diagnosis
    - Corrective action
    - Log/file access
    - Abort or retransmit
    - User notification
  - Common interface characteristics
  - Visual confirmation

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BUREAU COMMUNICATIONS

OPERATIONAL IMPACTS

- Commo operator has control but does not rekey traffic
- Electronic distribution
- Electronically stored Address Lists

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FBIS HEADQUARTERS PROCESSING AND COMPOSITION

Functions versus FBIS Requirements

- Requirements Checklist
- Screen Concepts
- Logical Architecture
- Physical Architecture
- System Sizing

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FBIS HEADQUARTERS PROCESSING AND COMPOSITION

1.2 Processing	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
Publishing	See 1.8
Storage	See 1.4
Retrieval and Processing	See 1.5
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

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FBIS HEADQUARTERS PROCESSING AND COMPOSITION

1.2 Processing (cont.)	Xerox 8000 NS products and their successors
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
1.2.5.2 Data Bases	See 1.4, 1.5, and 1.6
1.2.5.3 Message handling	See 1.3
1.2.5.4 Composition	See 1.8

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FBIS HEADQUARTERS PROCESSING AND COMPOSITION

1.7 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

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FBIS HEADQUARTERS PROCESSING AND COMPOSITION

1.7 Text Processing Requirements (cont.)	Xerox 8000 NS products and their successors
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
1.7.3.7 word/character counting	*Superseded by 2.6.6.4, since this requirement is for Autodin take length*
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

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FBIS HEADQUARTERS PROCESSING AND COMPOSITION

1.8 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

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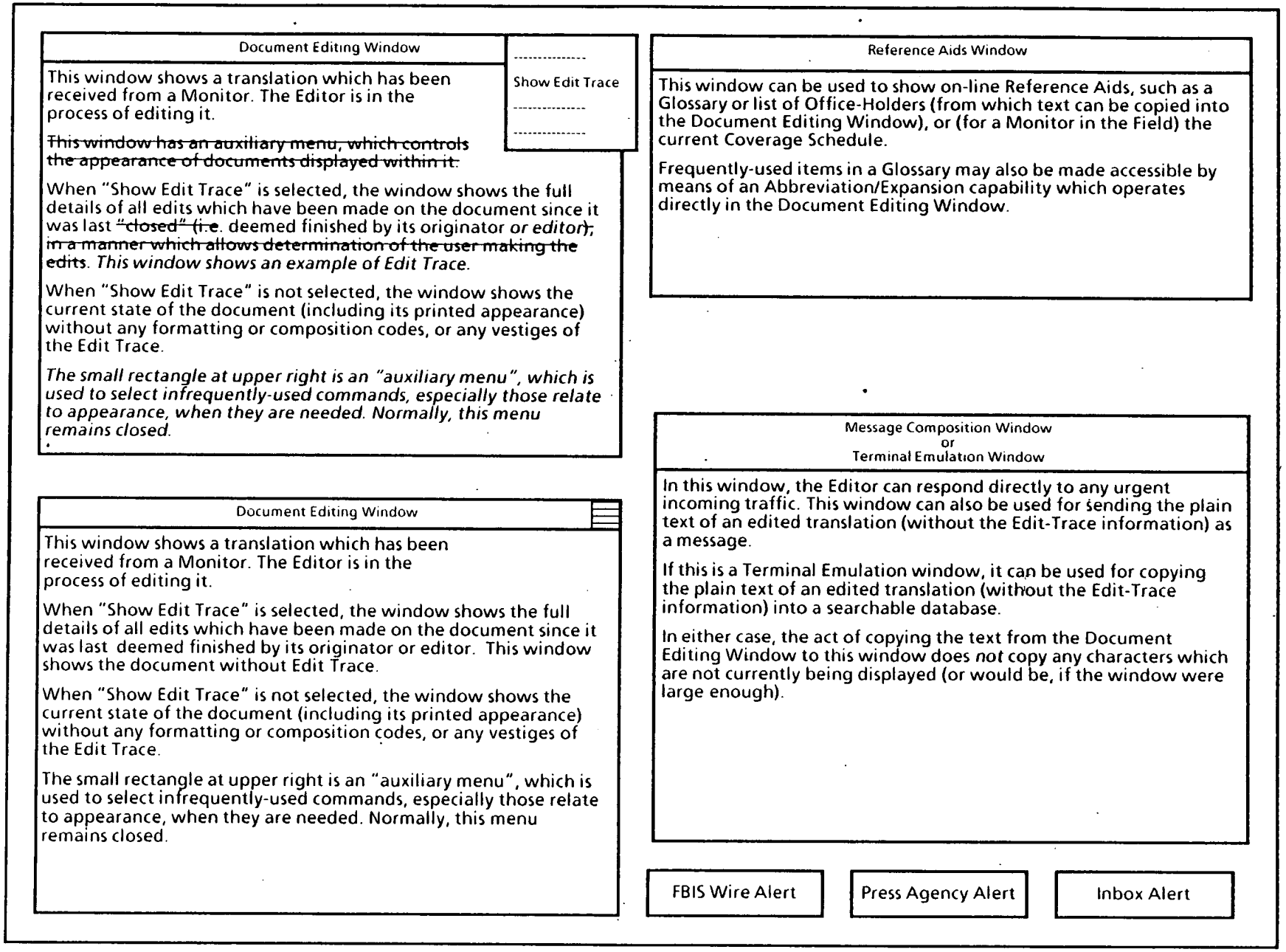

Edit-Trace on the Screen -- Concept

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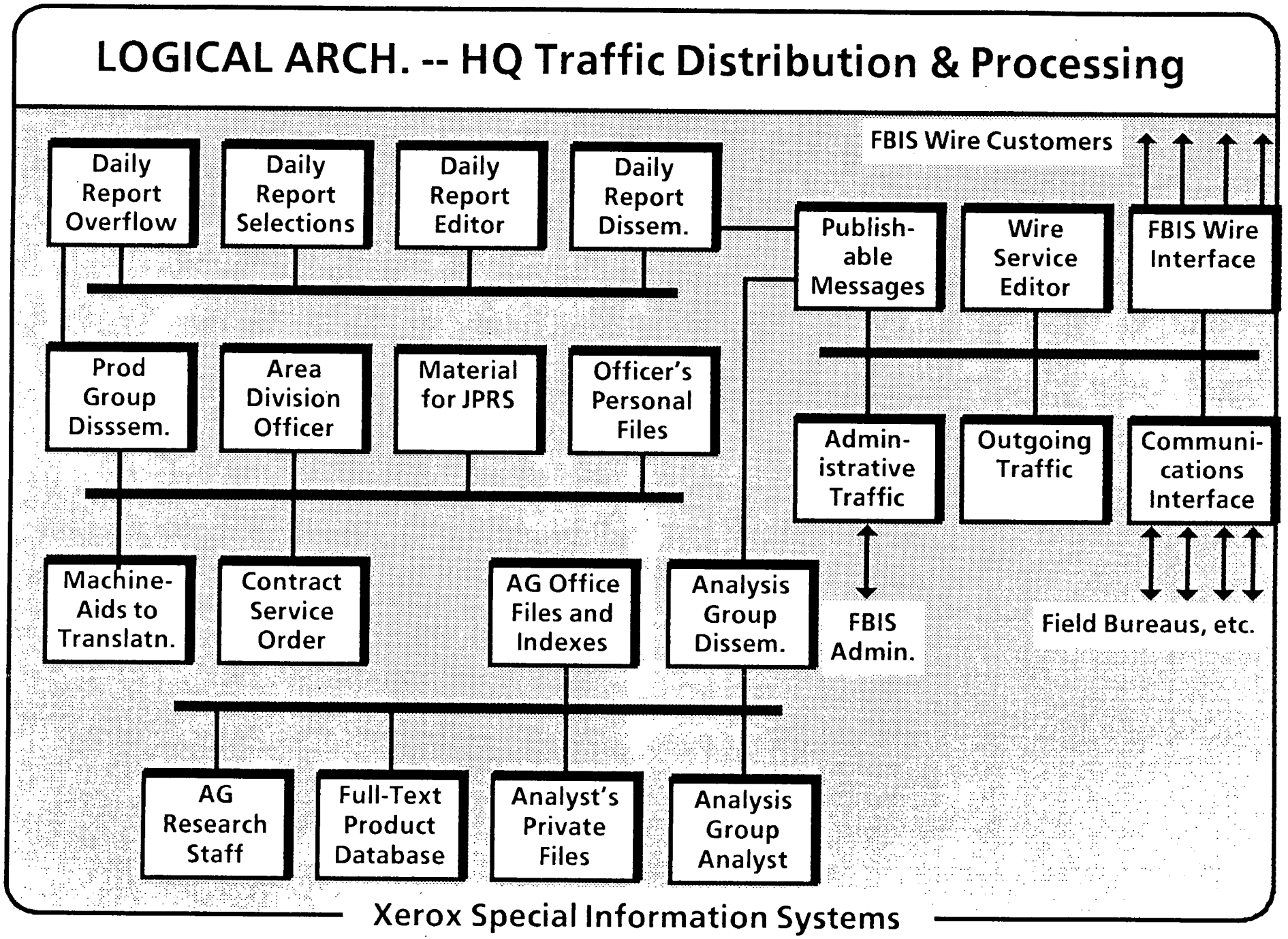

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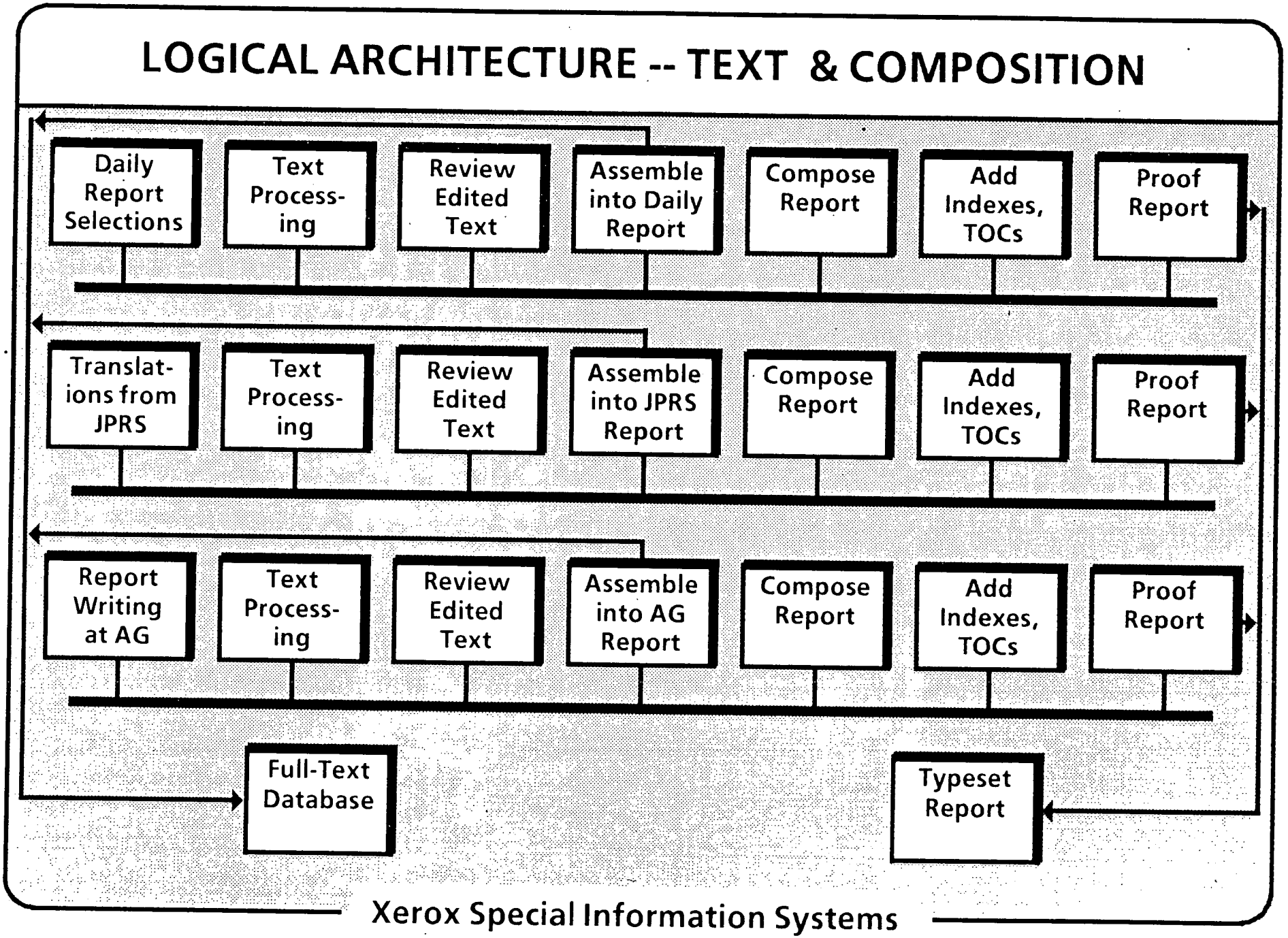

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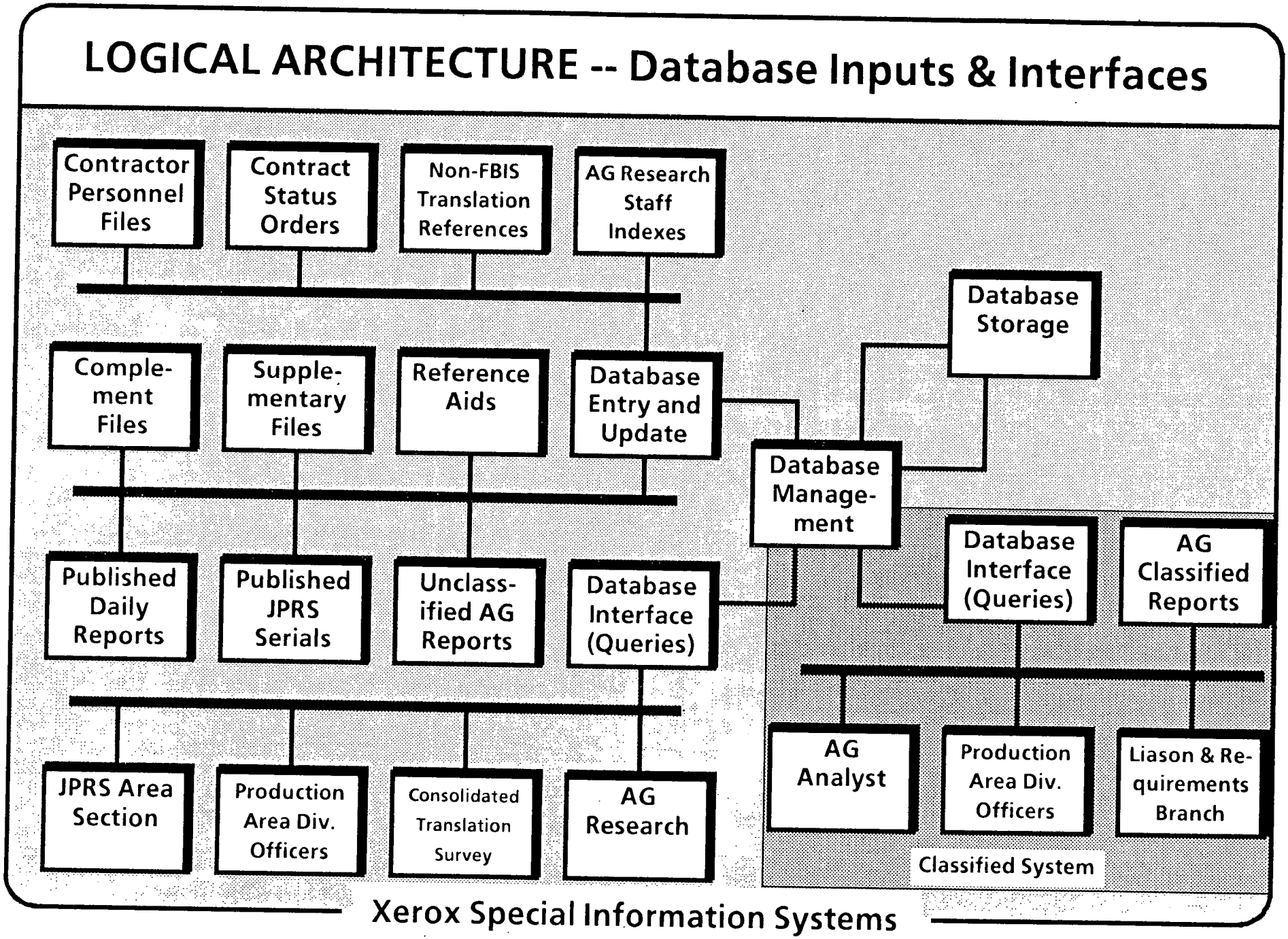

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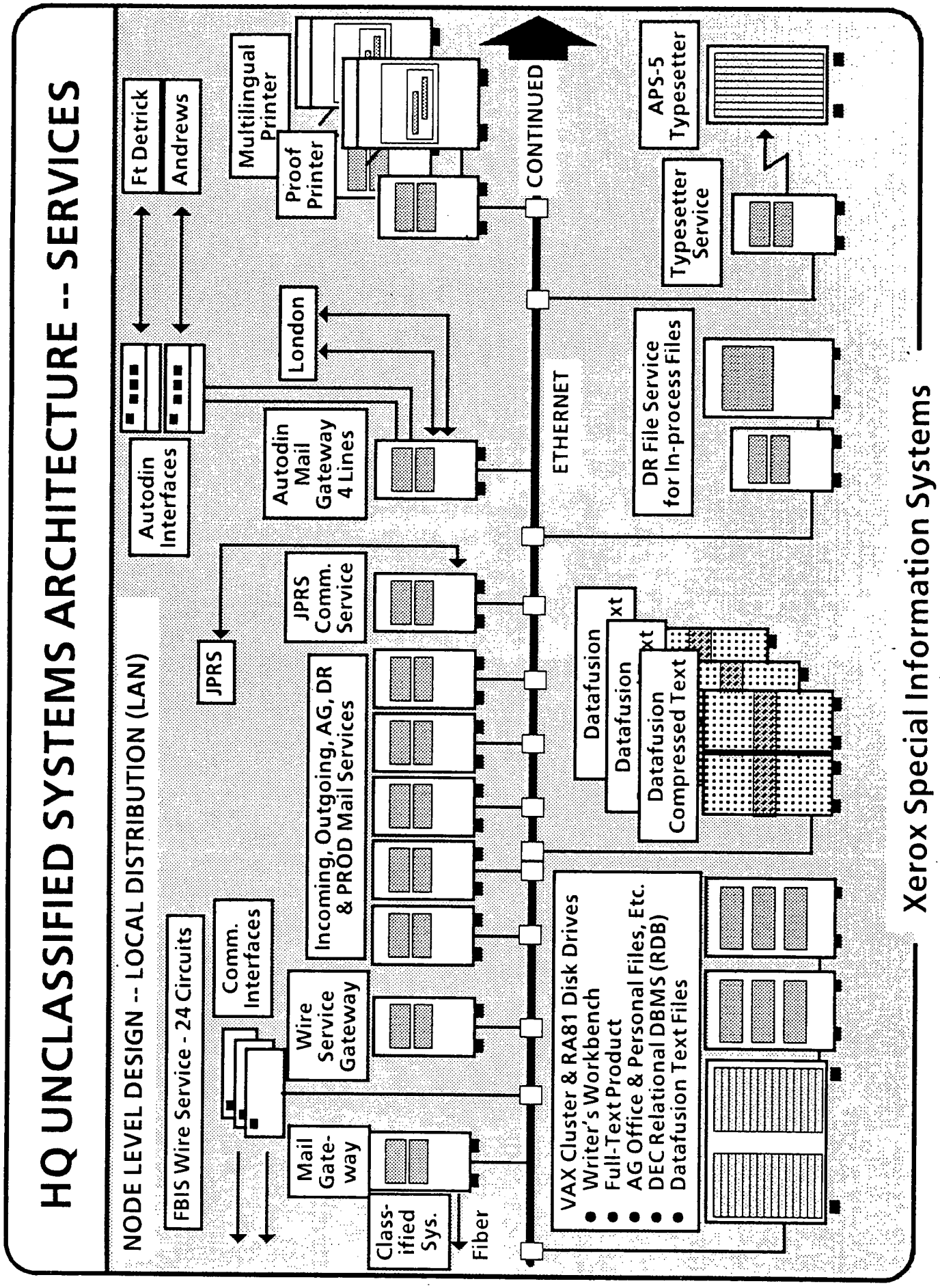
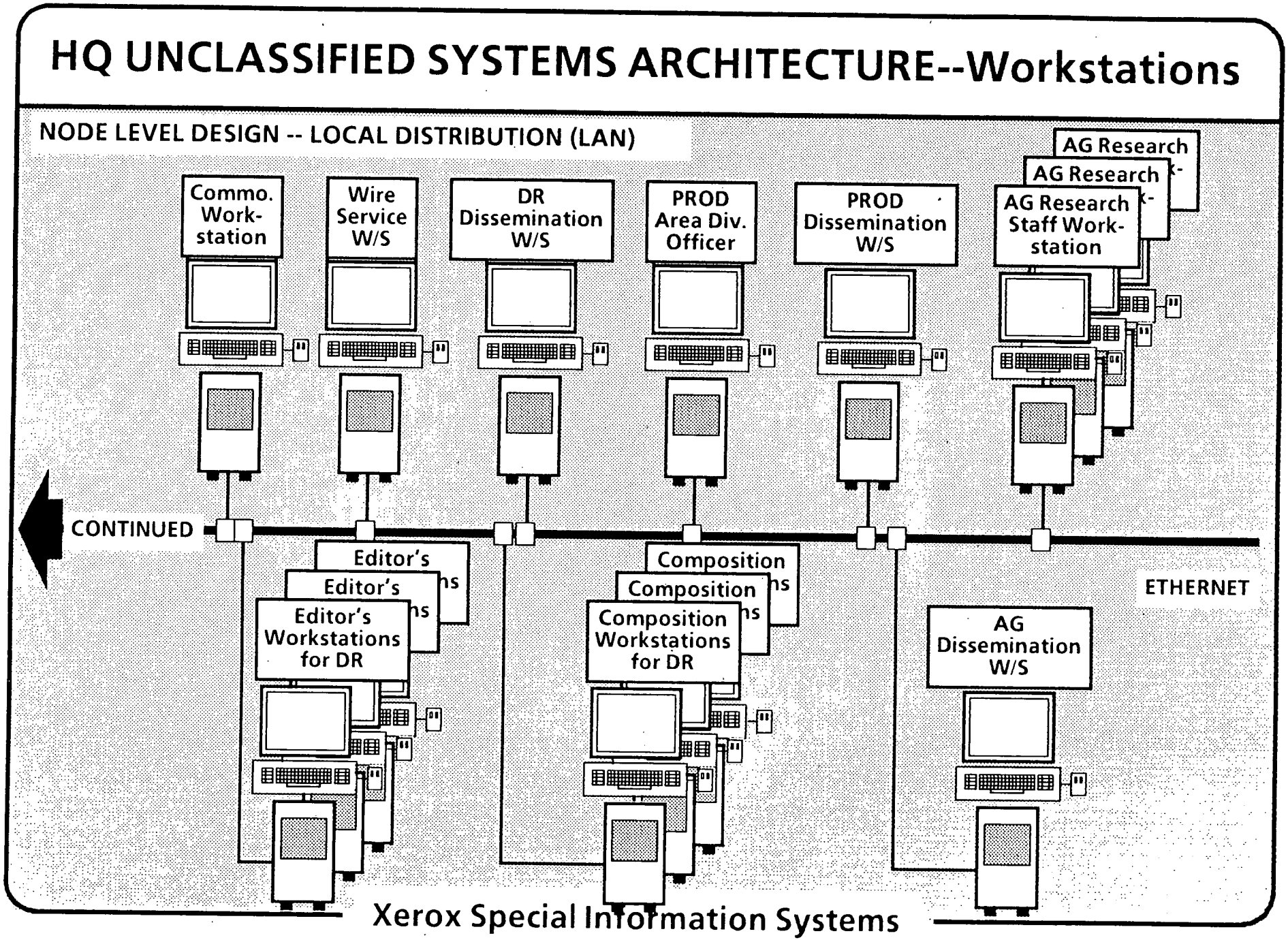


HQ UNCLASSIFIED SYSTEMS ARCHITECTURE--Workstations



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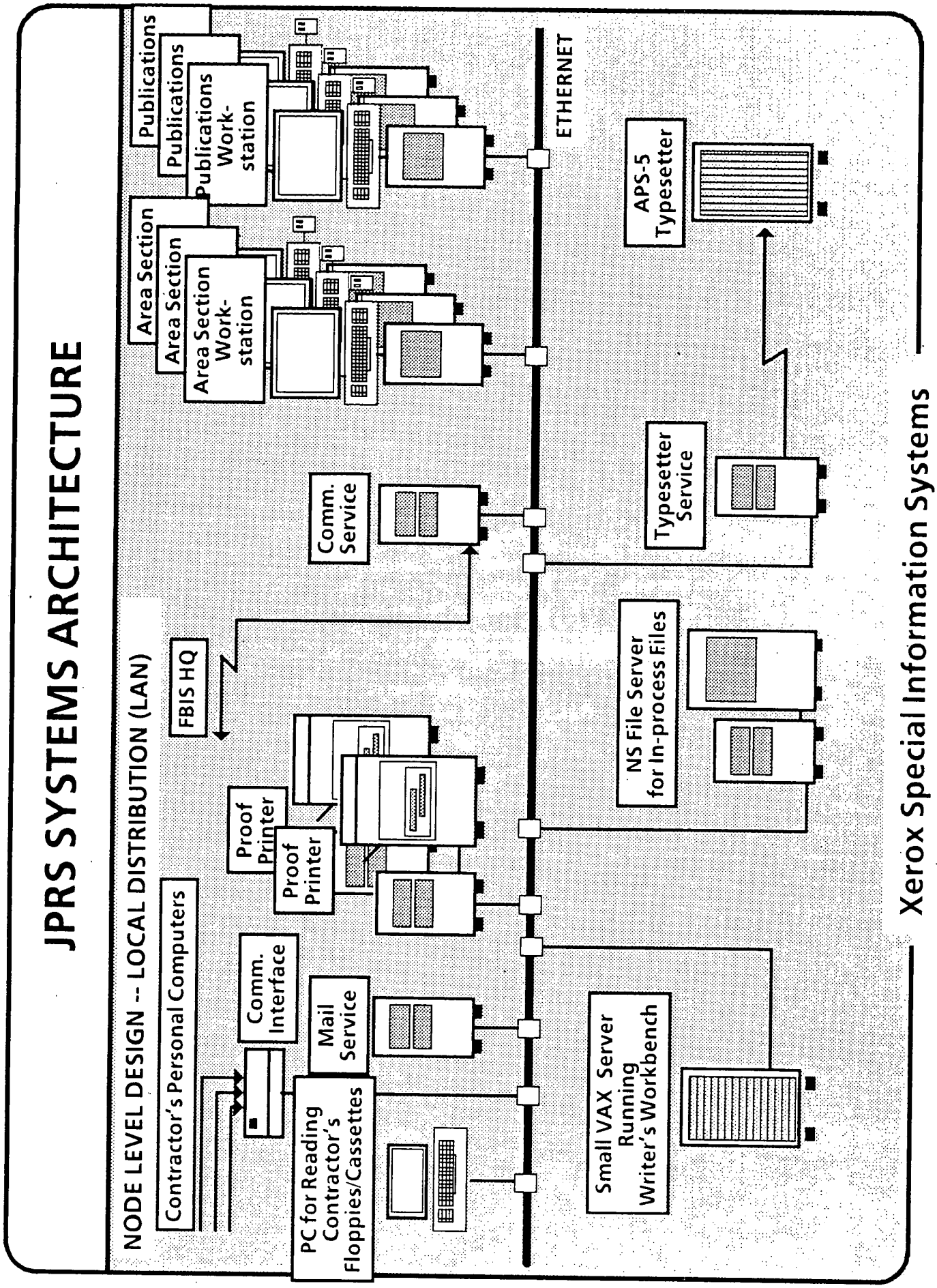
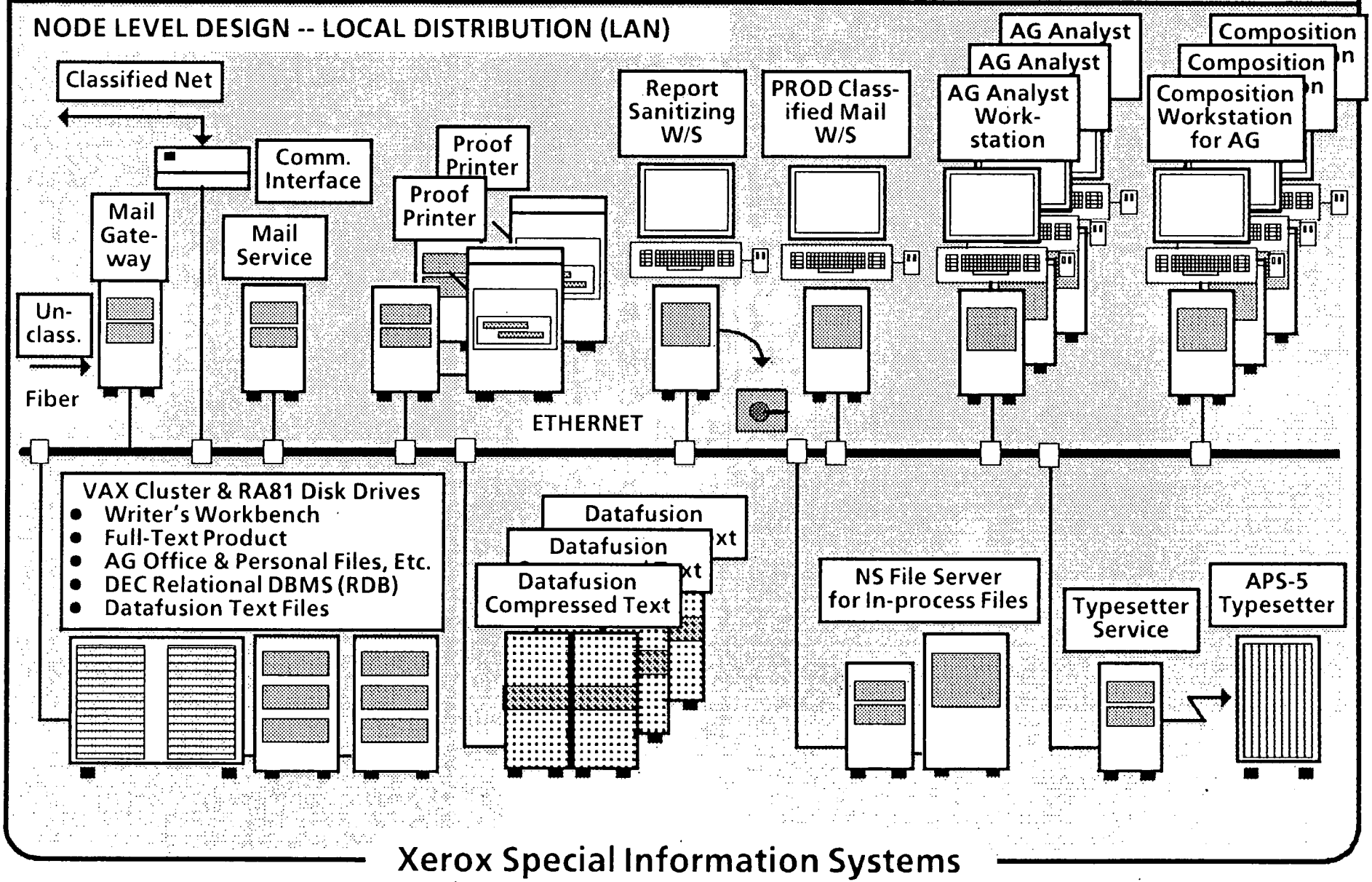


HEADQUARTERS CLASSIFIED SYSTEMS ARCHITECTURE



Xerox Special Information Systems

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Unclassified System

FBIS HQ Organization	Editorial Workstations	Multi-Lingual Workstations	Multi-Lingual Printers[1]	Special Mail Gateways[2]	Mail/File Servers[3]	Comm. Interface Ports[4]
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

[1]Rationale: One printer for every ten workstations; outside of PROD, printers are not necessarily multi-lingual; total includes two "Typesetter" Print Servers

[2]Two Autodin Mail Gateways and two FBIS Wire Service Gateways for Ops; Mail Gateway to Classified System for AG

[3]File Services can coexist with Mail Services; separation is for capacity reasons; File Server storage is for material in progress only; the Comm. Service to JPRS coexists with other services at each end

[3]for Wire Service feeds and Independent Contractor links; Mail Gateways have their own Communications ports; these ports are available in groups of 4

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Classified System

FBIS HQ Organization	Editorial Workstations	Multi-Lingual Workstations	Printers[1]	Special Mail Gateways[2]	Mail/File Servers[3]	Comm. Interface Ports[4]
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

[1]Rationale: One printer for every ten workstations; total includes a "Typesetter" Print Server
[2]Mail Gateway to Unclassified System for AG
[3]File Services can coexist with Mail Services; separation is for capacity reasons; File Server storage is for material in progress only
[4]for Classified message traffic; these ports are available in groups of 4

FBIS HEADQUARTERS PROCESSING AND COMPOSITION

Operational Impacts

- Operations Group
  - Wire Service
  - Daily Report
- Production Group
- Analysis Group

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FBIS HEADQUARTERS PROCESSING AND COMPOSITION

Operations Group

Wire Service

- Improved user interface; operations basically unchanged
- Wire Service and message traffic is printed periodically to be available for read-in

Daily Report

- All eight books processed electronically
- Improved user interface for those books already automated
- Within a processed item, the edits from the previous version can be viewed at the user's command

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FBIS HEADQUARTERS PROCESSING AND COMPOSITION

Operations Group

Daily Report (cont.)

- Spelling check is available on the workstation
- Syntax checking, etc., is available as a network service in batch mode
- Composition takes place in batch/background mode; problem pages can be adjusted interactively following composition
- Final edited and composed books/sections are deposited in the full-text product database
- Composed books are automatically converted to phototypesetter format and delivered to the phototypesetter electronically

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FBIS HEADQUARTERS PROCESSING AND COMPOSITION

Production Group

- Contract Service Orders handled electronically
- Independent Contractor files handled electronically
- Daily Report overflow material received and processed in electronic form
- Classified message traffic is handled using shared workstations on the classified system
- Machine aids to translation created and edited using multi-lingual workstations and printed using multi-lingual printers
- Completed translations will be captured electronically, so far as possible; others will be keyboarded to electronic form
- Within a translation, the edits from the previous version can be viewed at the user's command

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FBIS HEADQUARTERS PROCESSING AND COMPOSITION

Production Group (cont.)

- Spelling check is available on the workstation
- Syntax checking, etc., is available as a network service in batch mode
- Composition takes place in batch/background mode; problem pages can be adjusted interactively following composition
- Final edited and composed serials are deposited in the full-text product database, and automatically indexed in the Consolidated Translation Survey
- Composed serials are automatically converted to phototypesetter format and delivered to the phototypesetter electronically

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FBIS HEADQUARTERS PROCESSING AND COMPOSITION

Analysis Group

- Publishable messages from the Field received in electronic form
- Published Daily Reports and JPRS Serials available electronically in the full-text product database
- Research staff review material, create custom indices, and run queries on the full-text product database from workstations on the Unclassified system
- Individual analysts review material, create personal files, and run queries on a copy of the full-text product database from workstations on the Classified system
- Individual analysts *receive* unclassified messages on their workstations on the Classified system via a one-way flow from the Unclassified system

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FBIS HEADQUARTERS PROCESSING AND COMPOSITION

Analysis Group (cont.)

- Individual analysts *send* unclassified messages (e.g. queries to the Field) using shared workstations on the Unclassified system
- Individual analysts send and receive classified messages using their workstations on the Classified system
- Individual analysts create and edit reports on their workstations on the Classified system
- Spelling check is available on the workstation
- Syntax checking, etc., is available as a network service in batch mode
- Composition takes place in batch/background mode; problem pages can be adjusted interactively following composition

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FBIS HEADQUARTERS PROCESSING AND COMPOSITION

Analysis Group (cont.)

- Final edited and composed reports are deposited in the classified full-text database
- Composed reports are automatically converted to phototypesetter format and delivered to the phototypesetter electronically
- Completed reports are sanitized, and manually transfered to the Unclassified system for delivery to the Wire Service and the full-text product database

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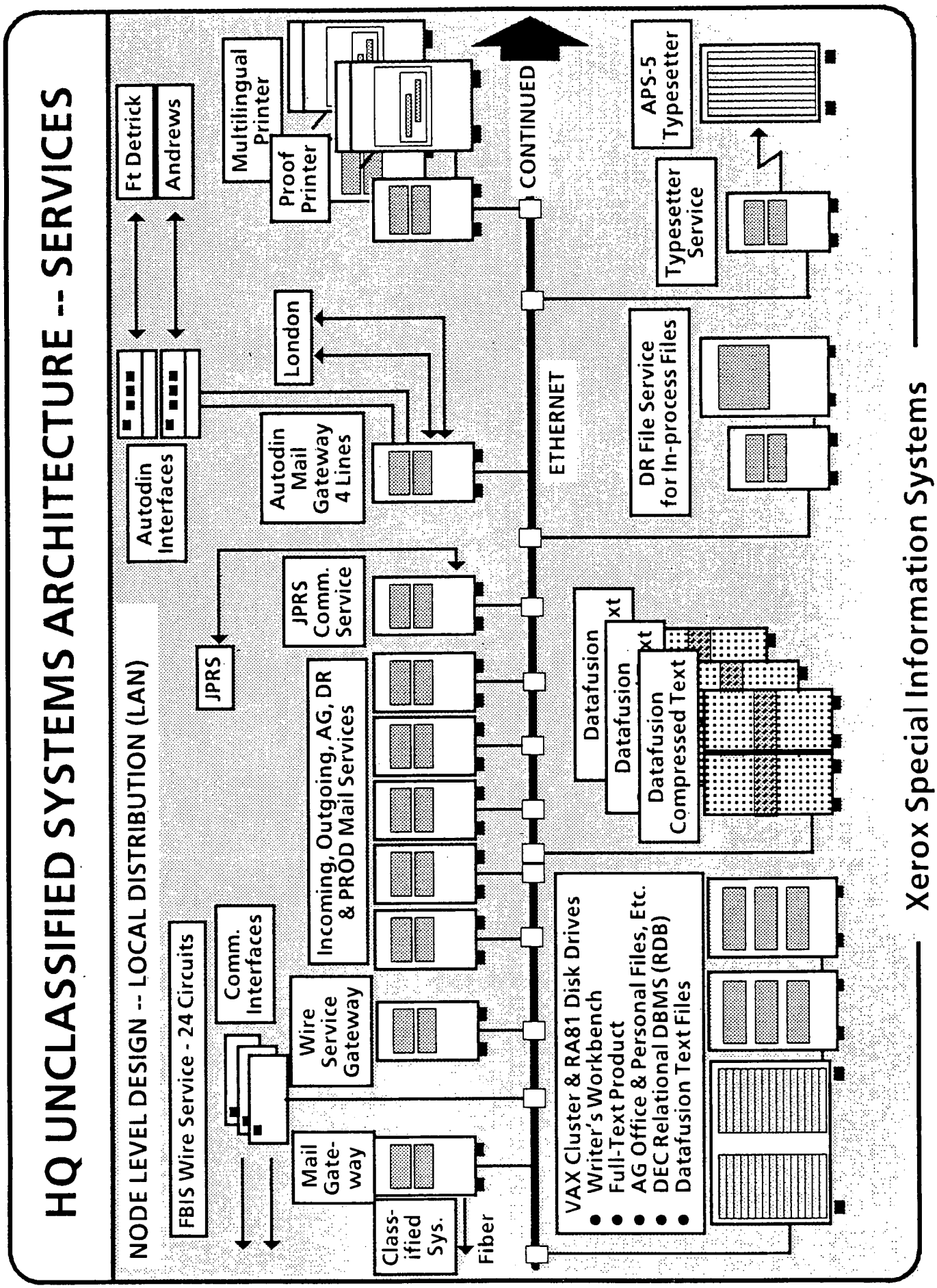
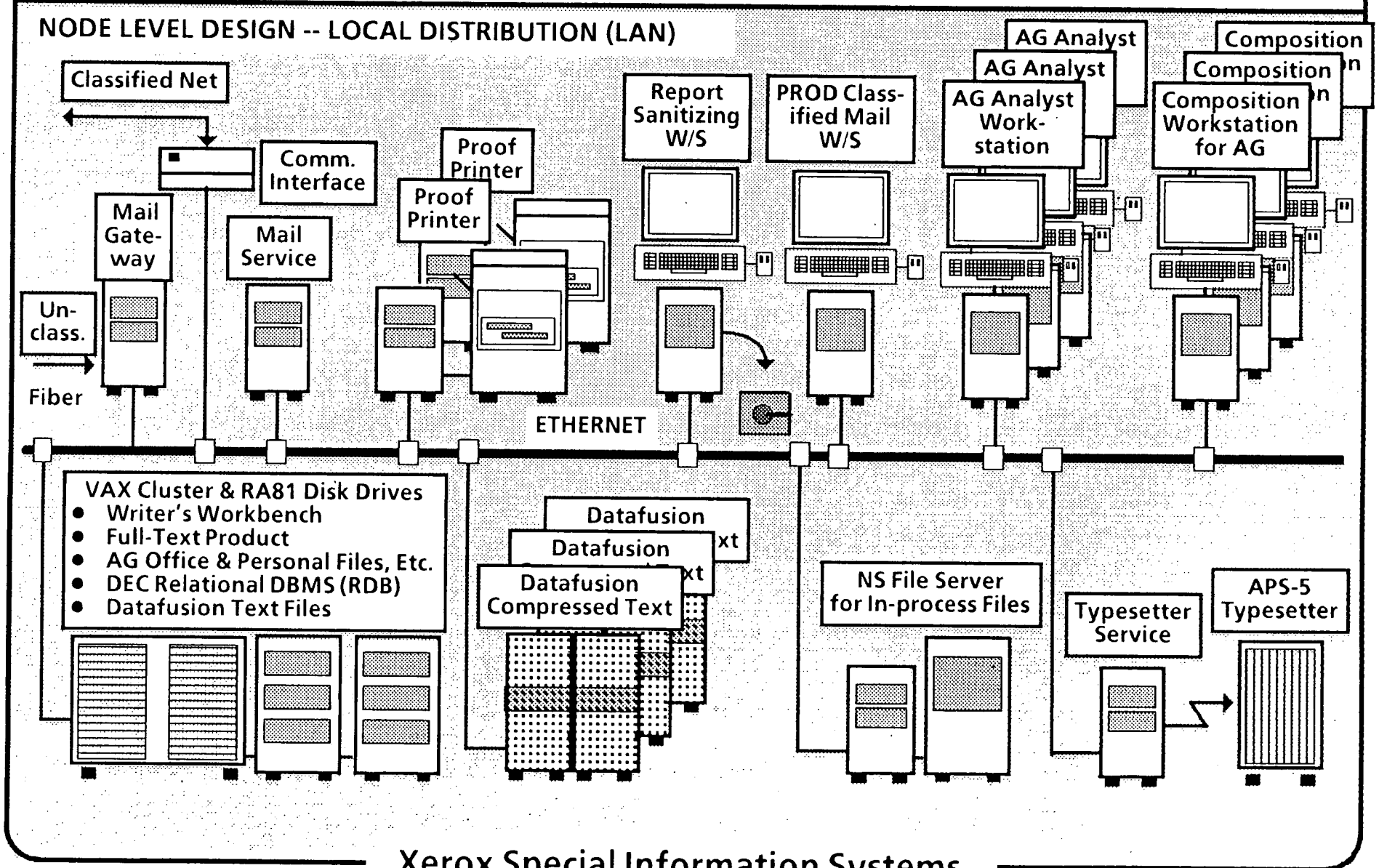


FBIS HQ CLASSIFIED SYSTEMS ARCHITECTURE



Xerox Special Information Systems

HEADQUARTERS DBMS HIGHLIGHTS - HARDWARE

Digital Equipment Corporation (DEC)

- Remote diagnostic enhances reliability (not on classified system)
- VAX Cluster
- Model VAX 785

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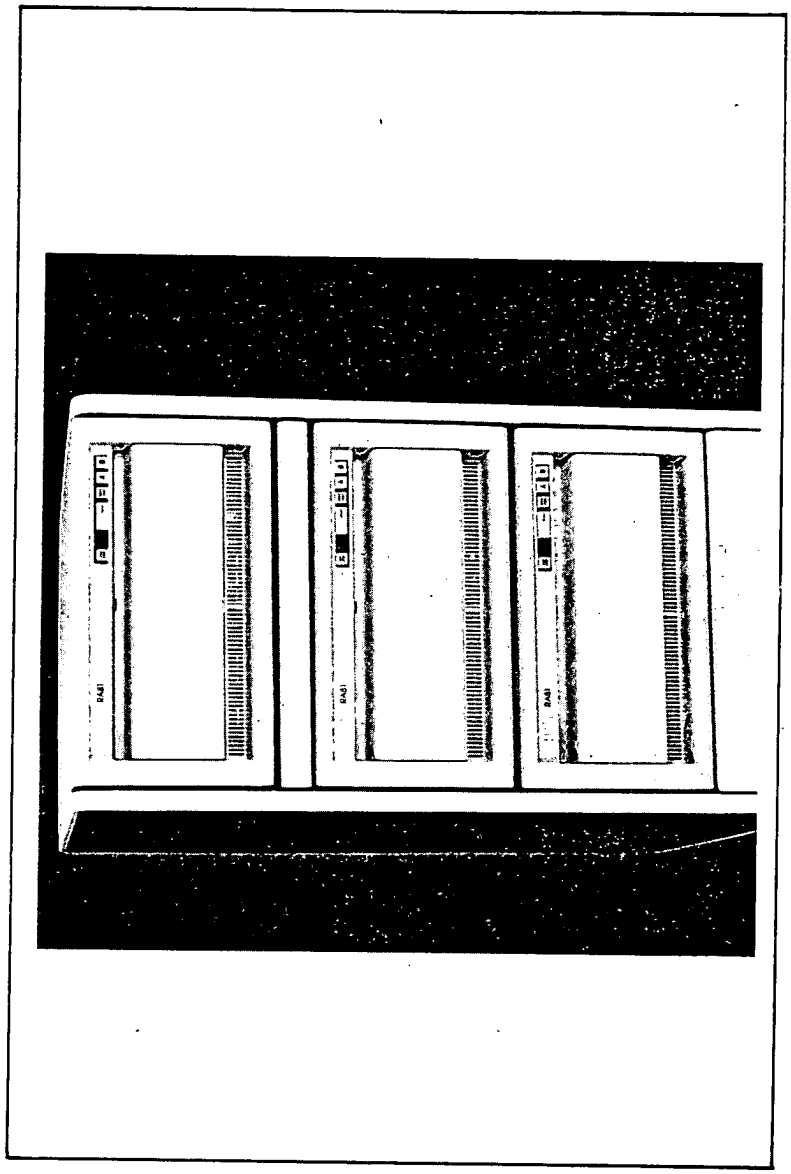
DEC RA 81 DISK DRIVE 3-PACK



Xerox Special Information Systems

HEADQUARTERS DBMS HIGHLIGHTS - HARDWARE

Digital Equipment Corporation (DEC)

- HSC50s
  - Up to 10 GB storage per HSC50
- With up to 24 RA81s for data storage
  - 456 Megabytes per RA81
  - Winchester technology
  - Built in diagnostics and diagnostic tracks
  - Overlapped seek and other optimizations

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HEADQUARTERS DBMS HIGHLIGHTS - HARDWARE

Disk capacity double required to store data

- Primary storage of data base
- Shadow copy of data base
- Text data is in a sequential file
- Archivable on optical disk in the future

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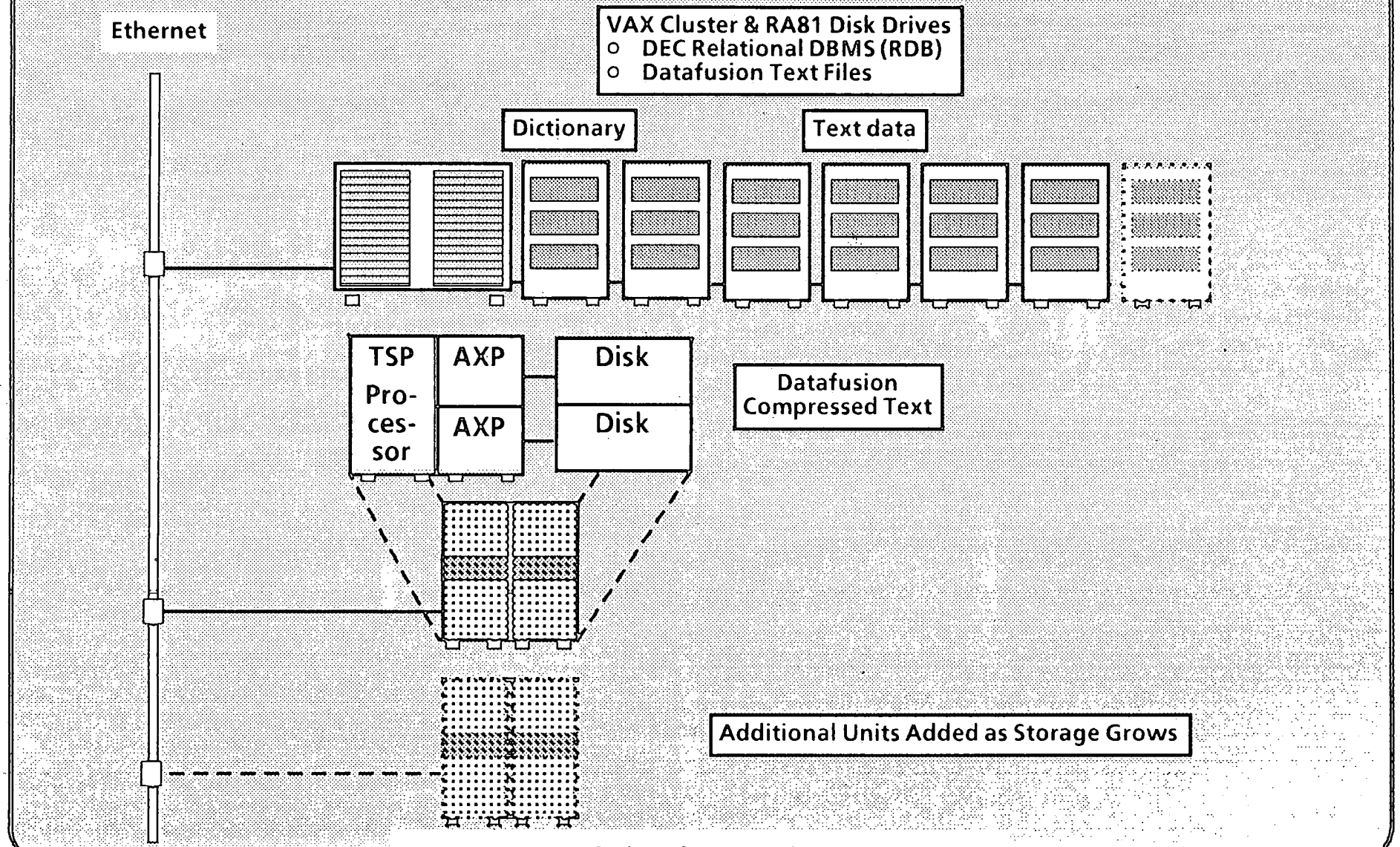
DATAFUSION ARCHITECTURE



Xerox Special Information Systems

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HEADQUARTERS DBMS HIGHLIGHTS - SOFTWARE

User interface

- Xerox supplied application software
  - Workstation - facilitate data entry
  - VAX - integrate text search and DBMS functions

Xerox Special Information Systems

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HEADQUARTERS DBMS FUNCTION vs FBIS OPERATIONS

- Requirements Checklist
- Physical Architecture
- System Sizing

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HEADQUARTERS DBMS FUNCTION vs FBIS OPERATIONS

Integrated

- DEC's VAX Rdb/VMS for structured files
- Datafusion's Text Search Processor for text files

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BUREAU DBMS FUNCTION vs FBIS 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

N/A = Not Applicable

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BUREAU DBMS FUNCTION vs FBIS OPERATIONS

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

N/A = Not Applicable

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BUREAU DBMS FUNCTION vs FBIS OPERATIONS

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

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BUREAU DBMS FUNCTION vs FBIS OPERATIONS

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

N/A = Not Applicable

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BUREAU DBMS FUNCTION vs FBIS OPERATIONS

1.5 DBMS Retrieval Requirements (cont.)	Xerox Approach	
	DEC's VAX Rdb/VMS	Datafusion's TSP
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:		
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

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BUREAU DBMS FUNCTION vs FBIS OPERATIONS

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	Application software
1.6.1.2 capability to store	Yes	Application software
1.6.1.2 capability to revise	Yes	Application software

N/A = Not Applicable

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BUREAU DBMS FUNCTION vs FBIS OPERATIONS

1.6 DBMS Report Generation Requirements	Xerox Approach	
	DEC's VAX Rdb/VMS	Datafusion's TSP
1.6.1.3 output format defs include:		
1.6.1.3 specific data elements	Yes	Application software
1.6.1.3 placement and width of data values	Yes	Application software
1.6.1.3 headers	Yes	Application software
1.6.1.3 footers	Yes	Application software
1.6.1.3 automatic page breaks	Yes	Application software
1.6.1.3 automatic page numbering	Yes	Application software

N/A = Not Applicable

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BUREAU DBMS FUNCTION vs FBIS OPERATIONS

1.6 DBMS Report Generation Requirements (cont.)	Xerox Approach	
	DEC's VAX Rdb/VMS	Datafusion's TSP
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 ± n lines	N/A	Application software
1.6.1.7 print/display window around query matches	N/A	Application software

N/A = Not Applicable

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BUREAU DBMS FUNCTION vs FBIS OPERATIONS

1.6 DBMS Report Generation Requirements (cont.)	Xerox Approach	
	DEC's VAX Rdb/VMS	Datafusion's TSP
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	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

N/A = Not Applicable

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HEADQUARTERS DBMS FUNCTION vs FBIS OPERATIONS

Physical Architecture Unclassified System

- This sizing is for the first five years of data
- DEC VAX 11/785 Cluster
  - RA81 3-Pack for system disks and files
  - Magnetic Tape as load device
  - 2 HSC50 Nodes on the cluster
- Each HSC50 Node has 24 RA81 disk drives and stores 10 GB of data.
- 8 Datafusion machines
- VAX Cluster connected to Ethernet
- VAX Cluster supporting file transfer and virtual terminal emulation

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HEADQUARTERS DBMS FUNCTION vs FBIS OPERATIONS

Physical Architecture Classified System

- Same as unclassified system

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HEADQUARTERS DBMS FUNCTION vs FBIS OPERATIONS

System Sizing

- First year - 3 GB
- First five years - 12 $\frac{1}{2}$ GB
- Twenty year size less than 50 GB
- Storage can easily be added in increments

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HEADQUARTERS DBMS MAN-MACHINE INTERFACES

- Moving documents on desktop
  - To printer
  - To file drawer
  - To folder
  - To mail out basket
  - *To DBMS*
  - *To Writer's Workbench*

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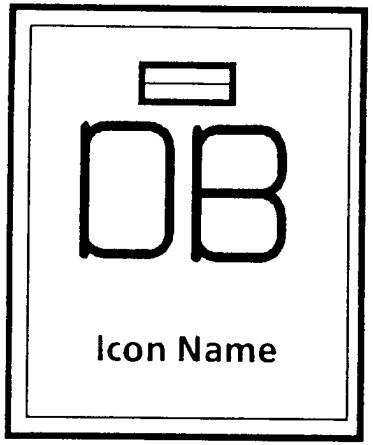
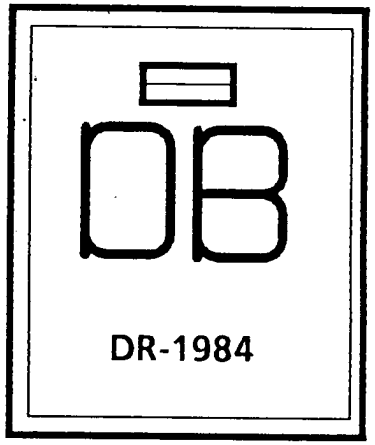
HEADQUARTERS DBMS MAN-MACHINE INTERFACES



New "transfer to DB" icon



- For data entry to text data base
- Works same as "send mail" and "printer" icons

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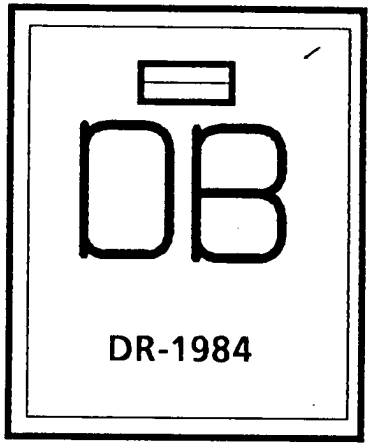
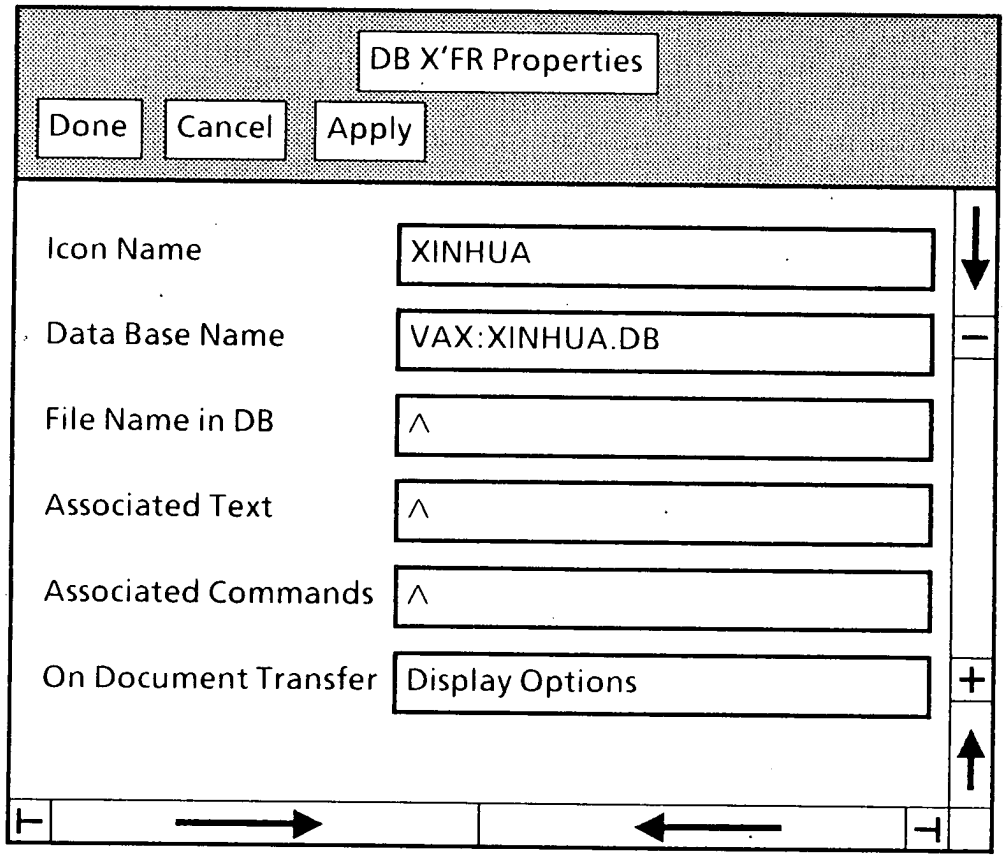
HEADQUARTERS DBMS MAN-MACHINE INTERFACES

"transfer to DB" icon Property Sheet





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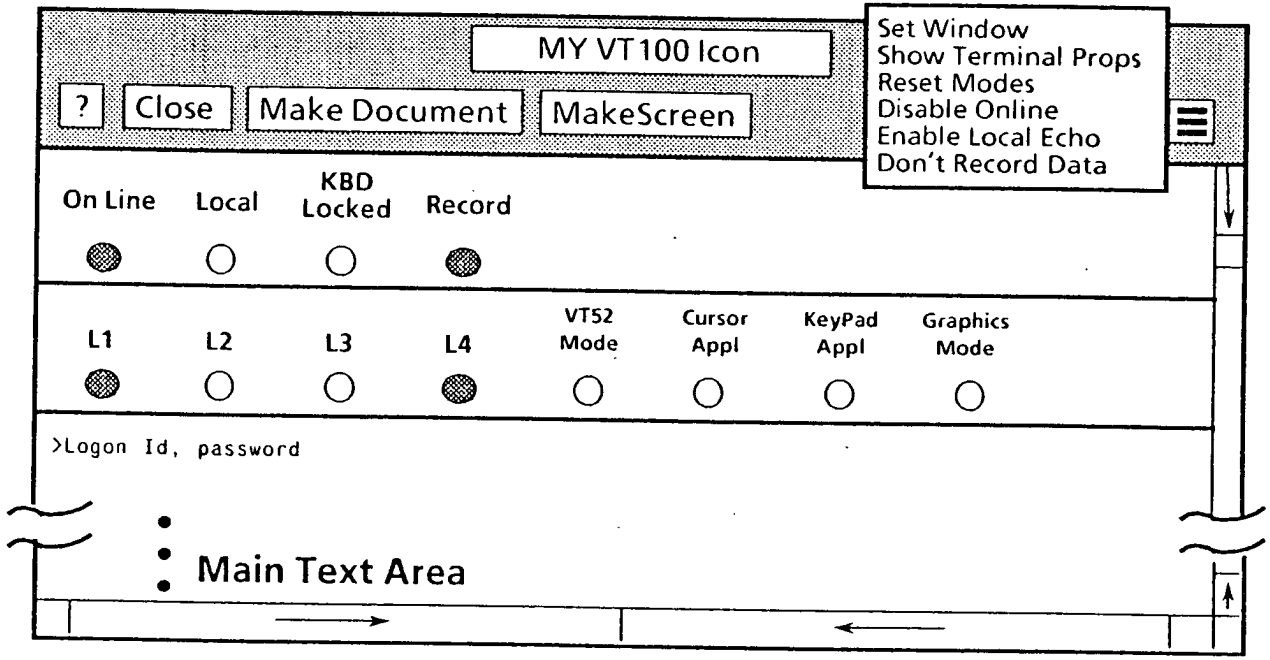
HEADQUARTERS DBMS MAN-MACHINE INTERFACES



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HEADQUARTERS DBMS MAN-MACHINE INTERFACES

- Query and report writing with DATATRIEVE
- DATATRIEVE capabilities
  - Access VAX Rdb/VMS Data Bases
  - Format reports
  - Totals, Sub-totals, Headers, Footers, etc.

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HEADQUARTERS DBMS MAN-MACHINE INTERFACES

DEC's TDMS, Terminal Data Management System

- VT100 Terminal Emulation Window
- Display DBMS data
- Input DBMS queries

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HEADQUARTERS DBMS MAN-MACHINE INTERFACES

TDMS features

- Fourth Generation Language
- Record level interfaces to VAX Rdb/VMS Data Bases
- Terminal/Data Independence
- Interfaces with DATATRIEVE

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HEADQUARTERS DBMS OPERATIONAL IMPACTS

- Provides new and much needed capabilities
- Enhances previously manual or limited operations
- Previously unavailable operations are
  - Query Daily Reports, JPRS Reports, and AG Reports
  - Organize administrative data

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HEADQUARTERS COMMUNICATIONS

- Subsystem description
- Functions vs. operations
- Man-machine interfaces
- Operational impacts

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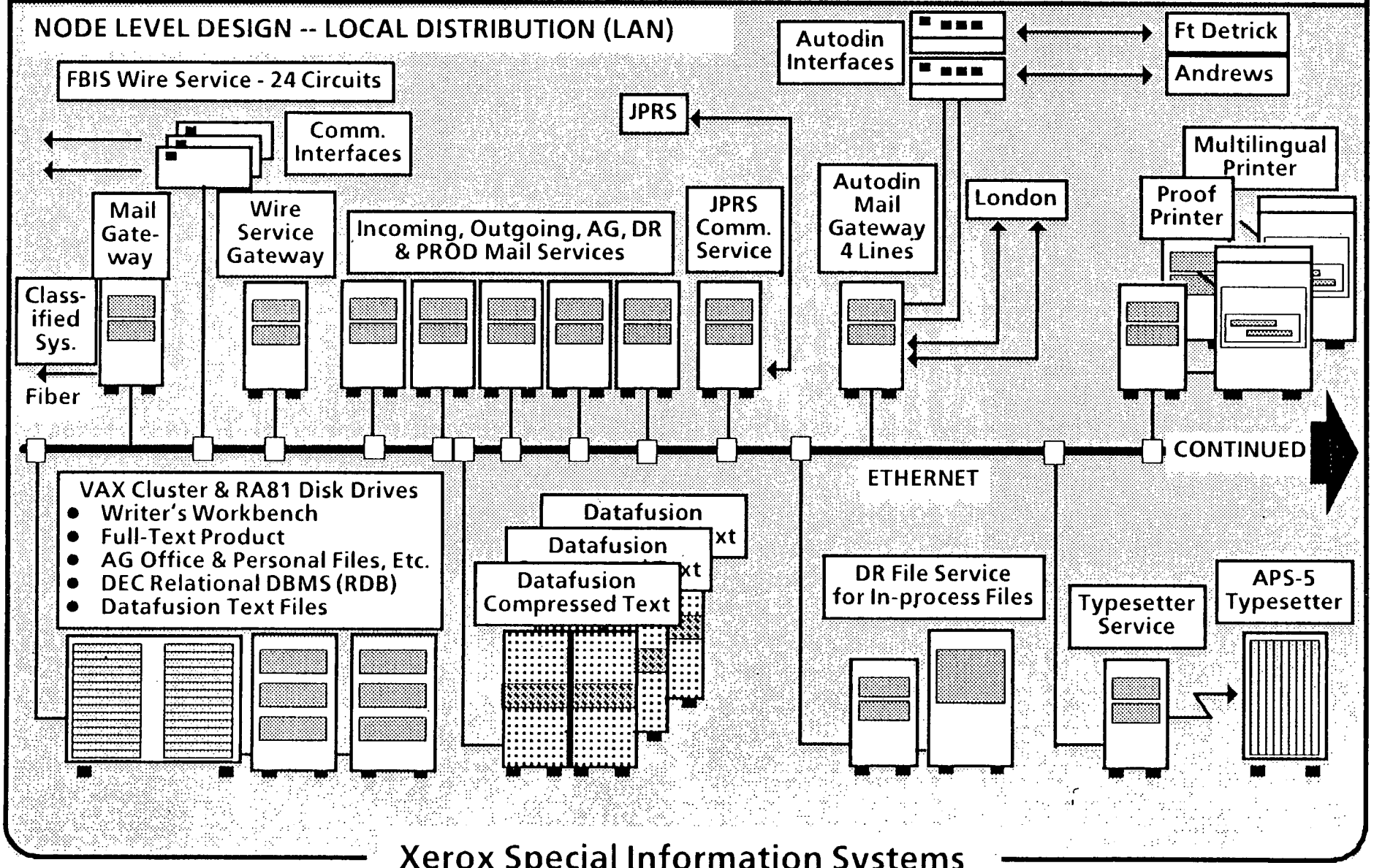
HQ UNCLASSIFIED SYSTEMS ARCHITECTURE -- SERVICES



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HEADQUARTERS COMMUNICATIONS

X4133

Functions vs. Operations

1.3 Message processing & dissemination Requirements	
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

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HEADQUARTERS COMMUNICATIONS

X4132

Functions vs. Operations

1.3 Message processing Requirements (cont'd)	
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

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HEADQUARTERS COMMUNICATIONS

X4131

Functions vs. Operations

1.3 Message processing Requirements (cont'd)	
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

HEADQUARTERS COMMUNICATIONS

MAN-MACHINE INTERFACES

- Wire Service Editor
  - Special windows/forms for:
    - Distribution
    - Log/file access
    - Cross-referencing
    - Approval (Slot Editor)
  - Common interface characteristics
  - Visual confirmation
- Commo operator
  - Special windows/forms for:
    - Trouble diagnosis
    - Corrective action
    - Log/file access
    - Abort or retransmit
    - User notification
  - Common interface characteristics (plus Bureau MMI)
  - Visual confirmation

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HEADQUARTERS COMMUNICATIONS

OPERATIONAL IMPACTS

- Commo operator has control but does not rekey traffic
- Electronic distribution
- Electronically stored Address Lists
- Minimal impact on Wire Service Editors other than MMI
- Incoming and outgoing IC material machine-readable

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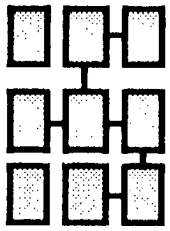
SYSTEMS ENGINEERING METHODOLOGY

Nth LEVEL OUTPUT: N + 1st LEVEL INPUT
- BLACK-BOX RESOURCE REQUIREMENTS
- INTERCONNECT SPECIFICATION

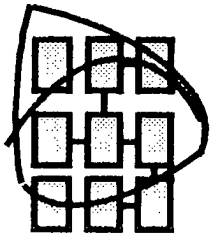
PARTITIONING & ALLOCATION CRITERIA

ANALYSIS



PROCESSES & DATA FLOWS
LOGICAL DATA FLOW DIAGRAMS

PARTITIONING



APPLICATION MODULES
ESTIMATES OF HARDWARE
LOGICAL ARCHITECTURE

ALLOCATION

COMPUTING RESOURCES
COMMUNICATIONS

SYNTHESIS

TOPOLOGY

N + 1st LEVEL OUTPUT: N + 2nd LEVEL INPUT

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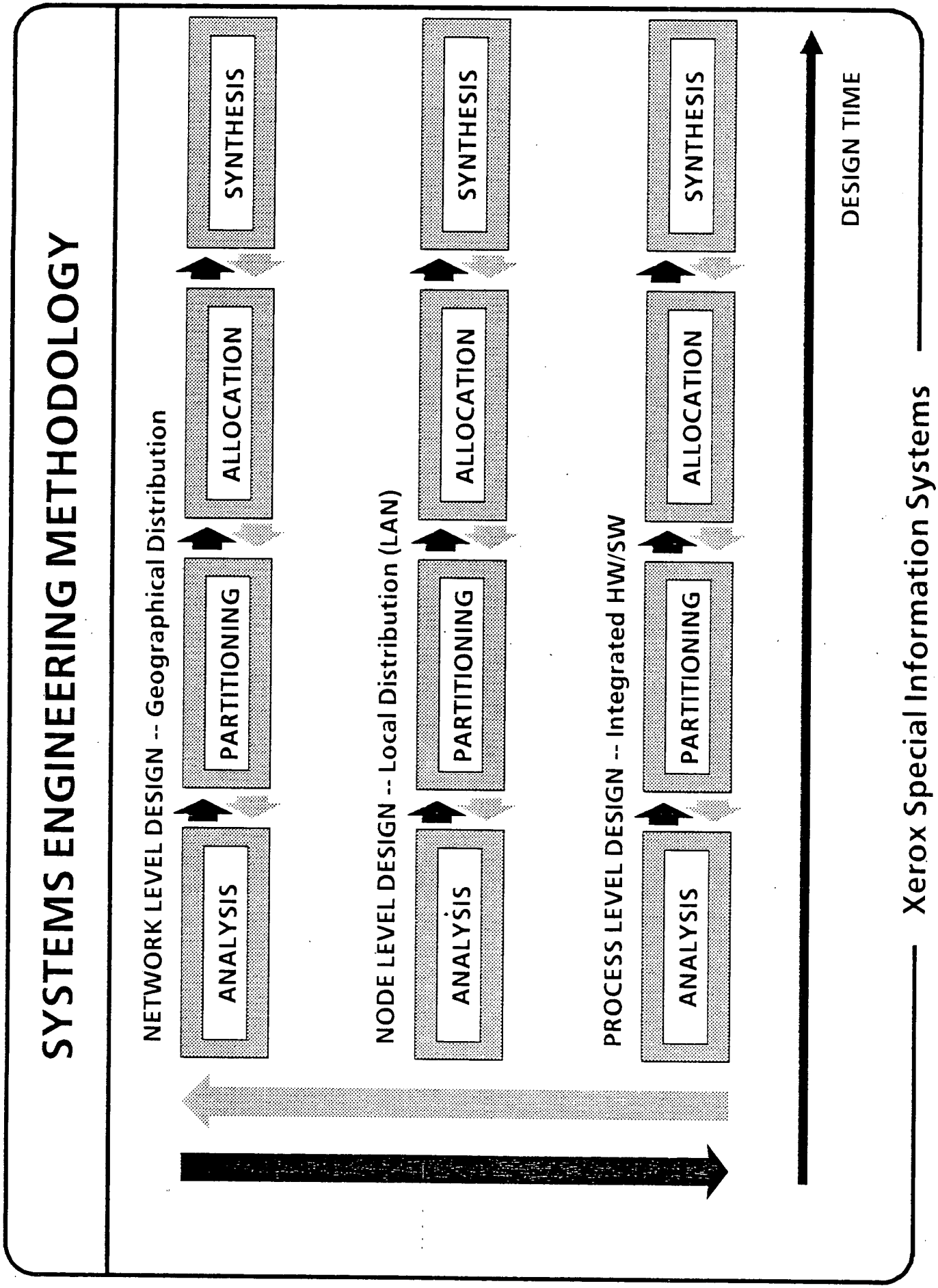

LEVELS OF DETAIL

Three levels of detail generally suffice for specifying the system architecture:

- *Network level design*, which distributes the system between multiple geographically separated nodes (facilities/bureaus), communicating over message switching networks.
- *Node level dsesign*, which distributes between multiple computers (and workstations), colocated in a single processing facility, communicating through their own I/O channels and local area network (LAN).
- *Process level design*, which specifies the integrated hardware and software needed for the system and distributes between multiple processes within a single computer or workstation.

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ANALYSIS

Analysis: This is the major activity in carrying the design from from one level of detail to the next.

Analysis has the following components:

- Requirements identification and elaboration (i.e. functional decomposition to the next detail level) -- Gane & Sarson logical data flow diagrams.
- Performance needs
- Size estimation
- Feasibility assessment
- Operational requirements accommodation.

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PARTITIONING

Partitioning: Partitioning (and allocation, below) distributes functional requirements to resources.

- Partitioning clusters requirements and allocation assigns the clusters (partitions) to the resources.
- Partitioning lowers the complexity of allocation by decreasing the number of items to be allocated.
- Partitioning criteria guide judgements in forming partitions from commonalities among processing entities.
- The criteria also reflect good design practices and the goals of the following allocation activity.
- Commonly, the criteria involve data access, reliability, performance, change, and growth.

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ALLOCATION

Allocation: Allocation relates characteristics of the partitions to potential resource characteristics.

- Allocation begins by selecting numbers and types of resources, based on examined characteristics of partitions.
- The allocation criteria are similar to the partitioning criteria.
- Criteria include resource constraints such as:
  - geographical; and
  - security requirements.

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SYNTHESIS

Synthesis: The final activity of the design process is the architecture synthesis which develops the interconnect topology.

That is, synthesis develops the physical specifications for the interconnect architecture and protocols necessary to support communications among the black-box resources defined by the allocation activity.

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MAIN PARTITIONING & ALLOCATION CRITERIA

- Must be Dependable and Reliable
- Must be Economically Extensible
  - Scale Applications Independently of Others
  - Localize Changes
- Must be an OPEN SYSTEM -- Standard interfaces & protocols
- Must be DEPLOYABLE
  - Use Standard Commercial Products Where Possible

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RELIABILITY/FAULT TOLERANCE

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

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NODAL CONSTRAINTS & COMPUTING CAPABILITIES

- Geographical location
- Size, weight, power, operating environment
- Availability of computing hardware and software
- Type of processing

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PERFORMANCE

- Data access commonality
- Data and program storage
- Resource demands
- Architectural characteristics
- Communications delays

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LIFE CYCLE CONSIDERATIONS

Changeability

- Localize changes

Survivability

- Decentralize 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
- Repair limitations
- Service/maintenance availability

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MOTIVATION FOR DISTRIBUTED ARCHITECTURE

Distributed Architecture is Used to:

- Cluster Tasks Appropriate for Different Processor Architectures or capabilities e.g. for Workstations (Star) vs. General Purpose Computers (VAX).
- Permit Geographical Distribution.
- Enhance Reconfigurability and Reliability Options.
- Increase Performance.

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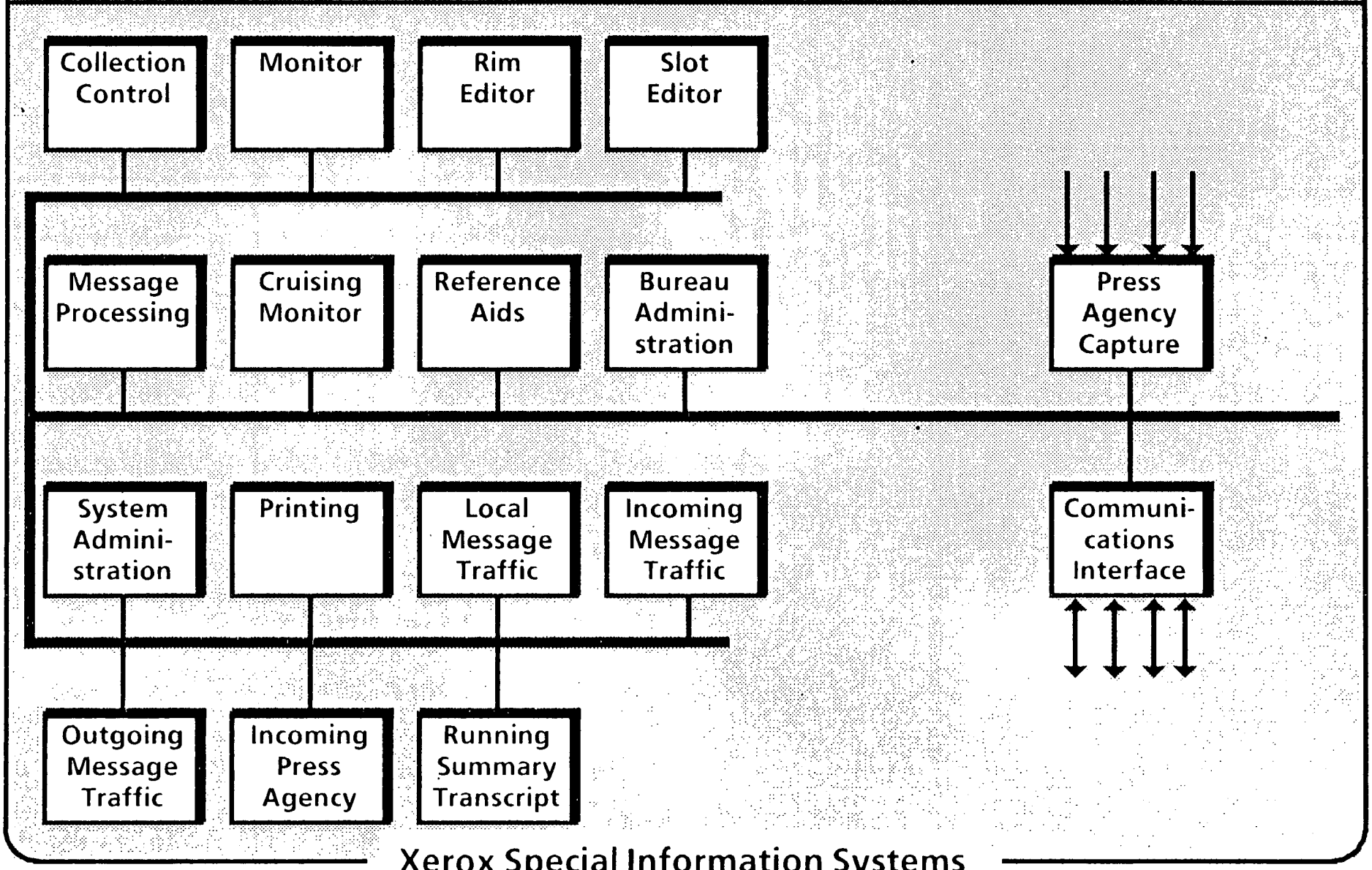
LOGICAL ARCHITECTURE -- FIELD BUREAU



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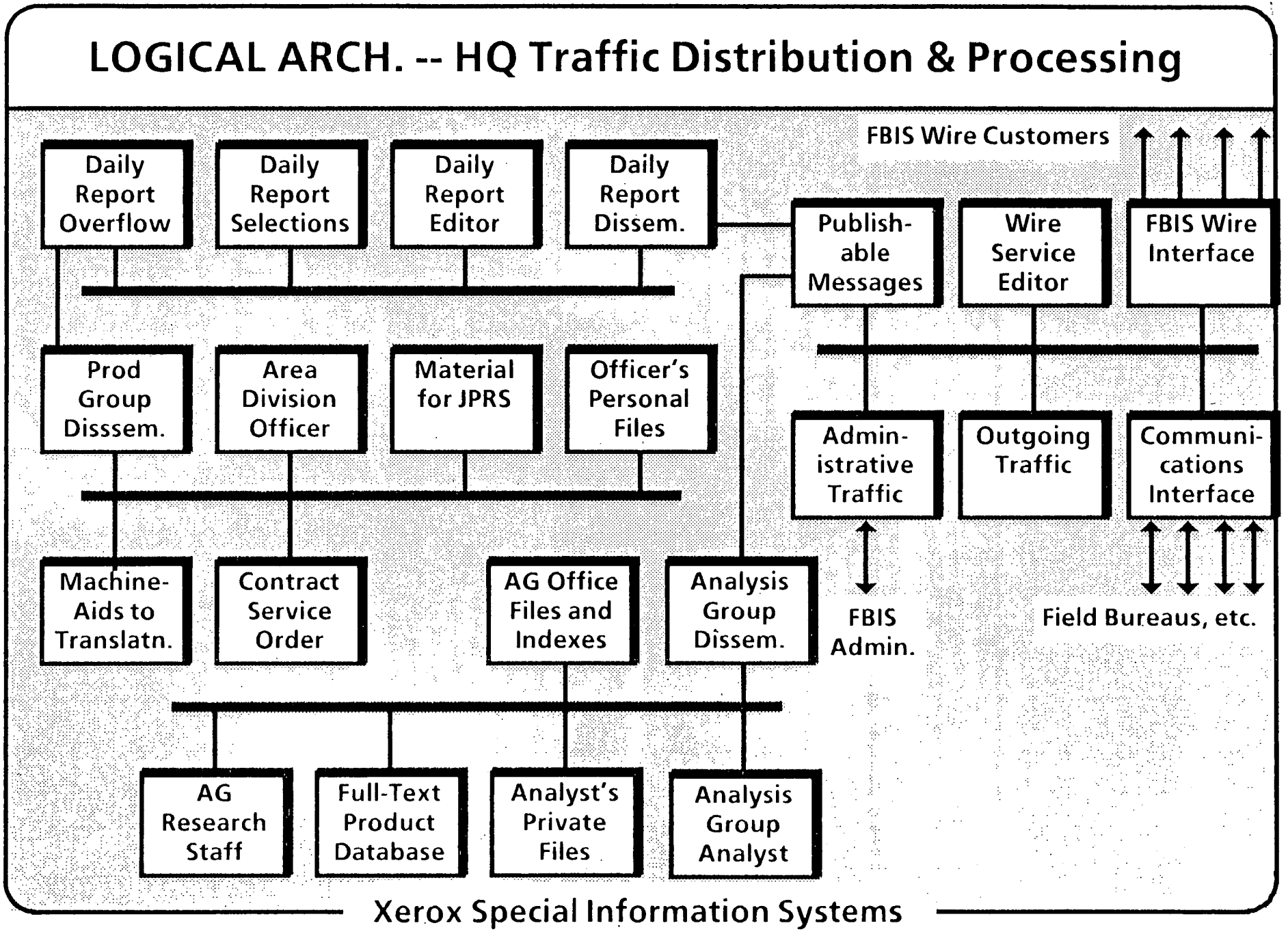
LOGICAL ARCH. -- HQ Traffic Distribution & Processing



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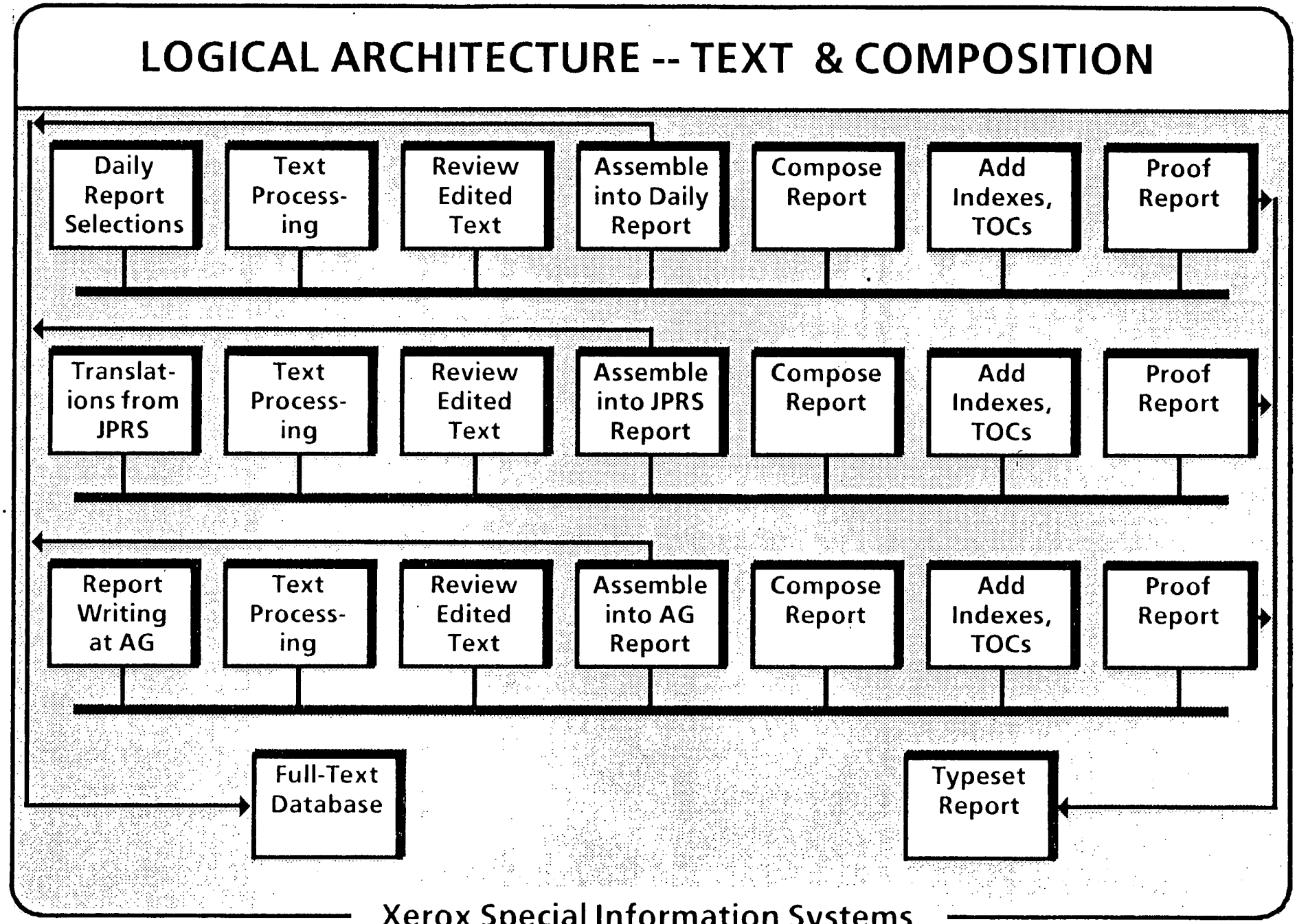

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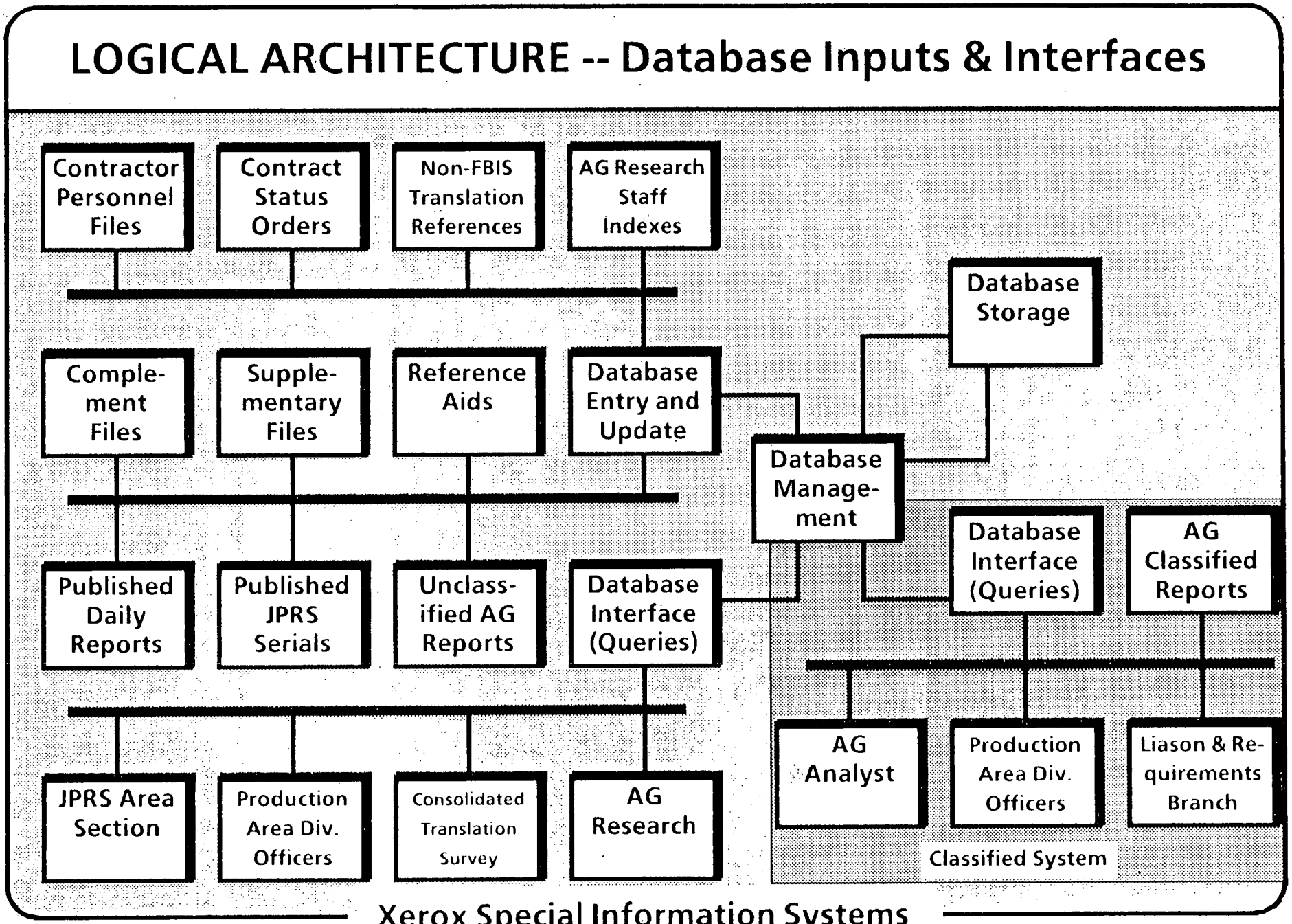
LOGICAL ARCHITECTURE -- Database Inputs & Interfaces



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SELECTION PROCESS - COLLECTION AUTOMATION

COMMERCIAL PRODUCTS

- Items vs. functions
- Description of item
- Short specification/features
- Why this one?

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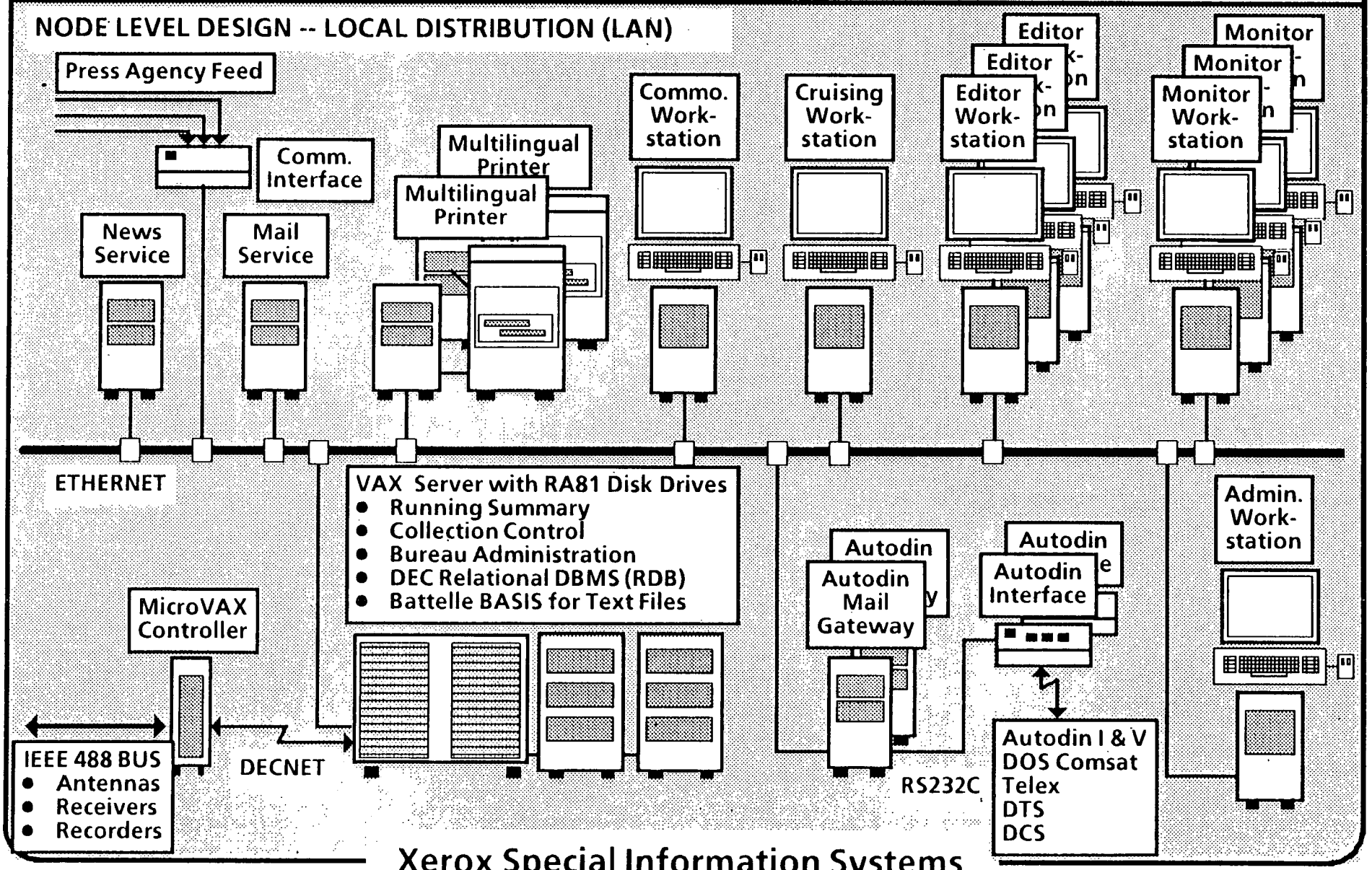
GENERIC BUREAU SYSTEMS ARCHITECTURE



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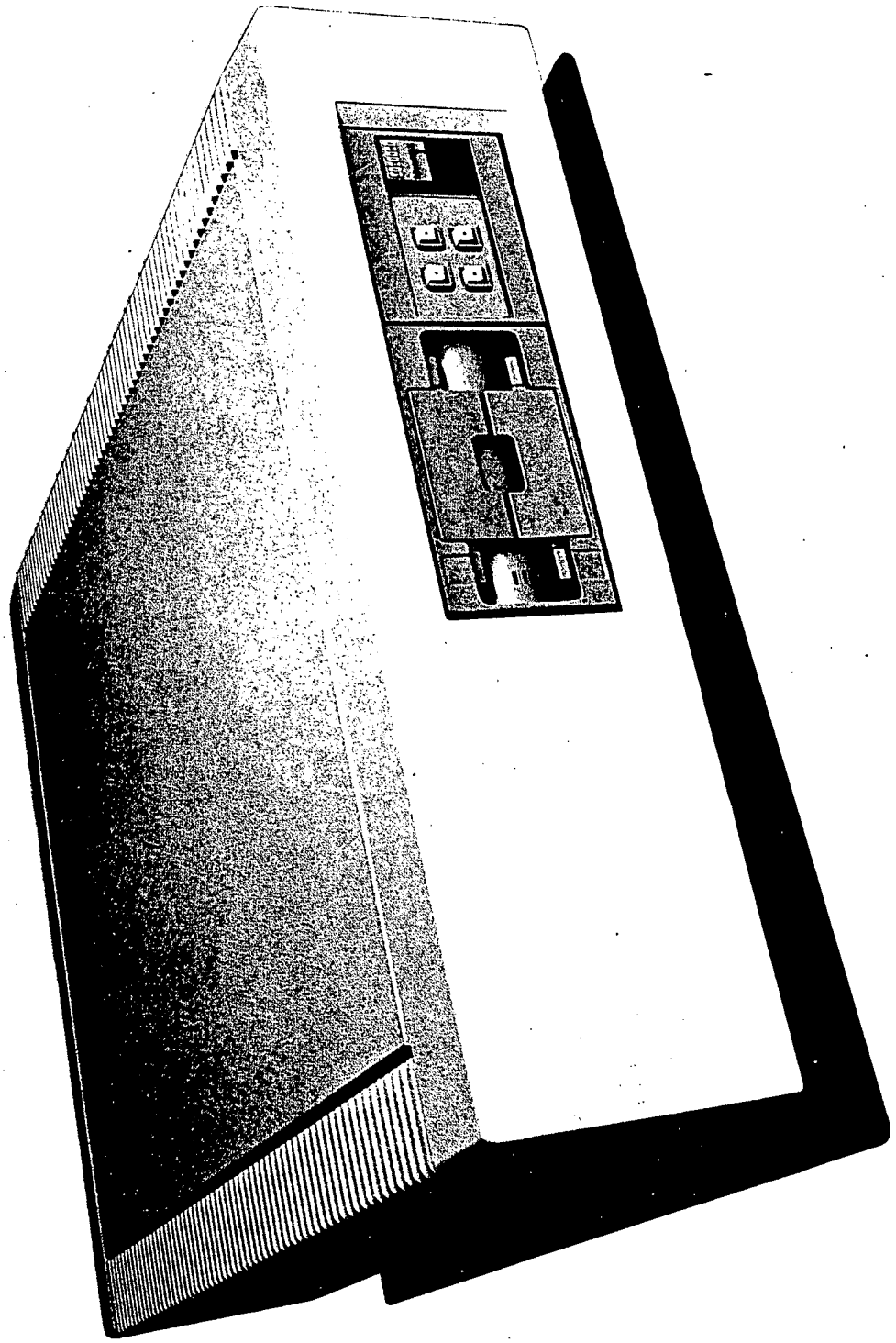
DEC MICROVAX



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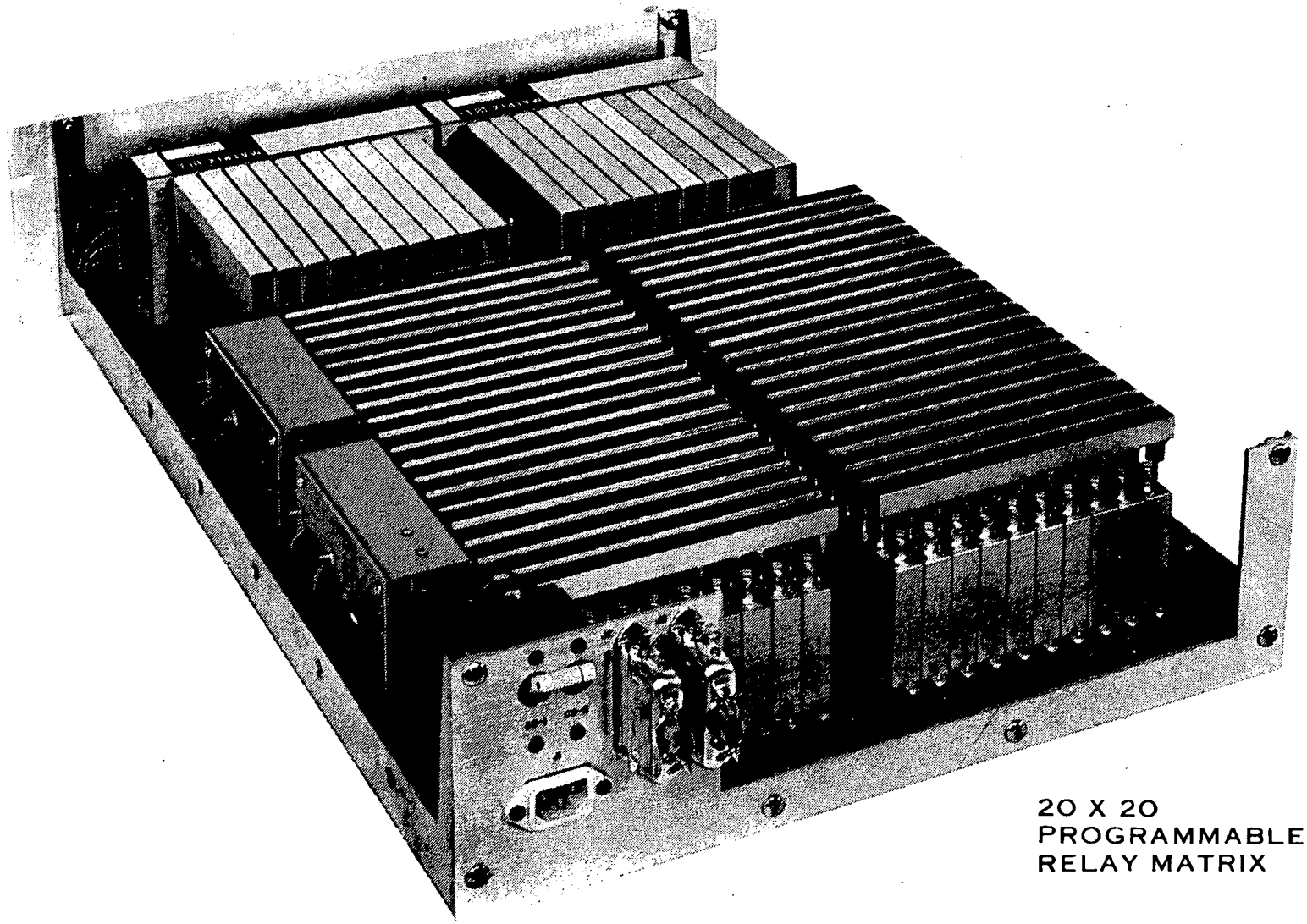
MATRIX 7300 COAXIAL SWITCH



20 X 20
PROGRAMMABLE
RELAY MATRIX

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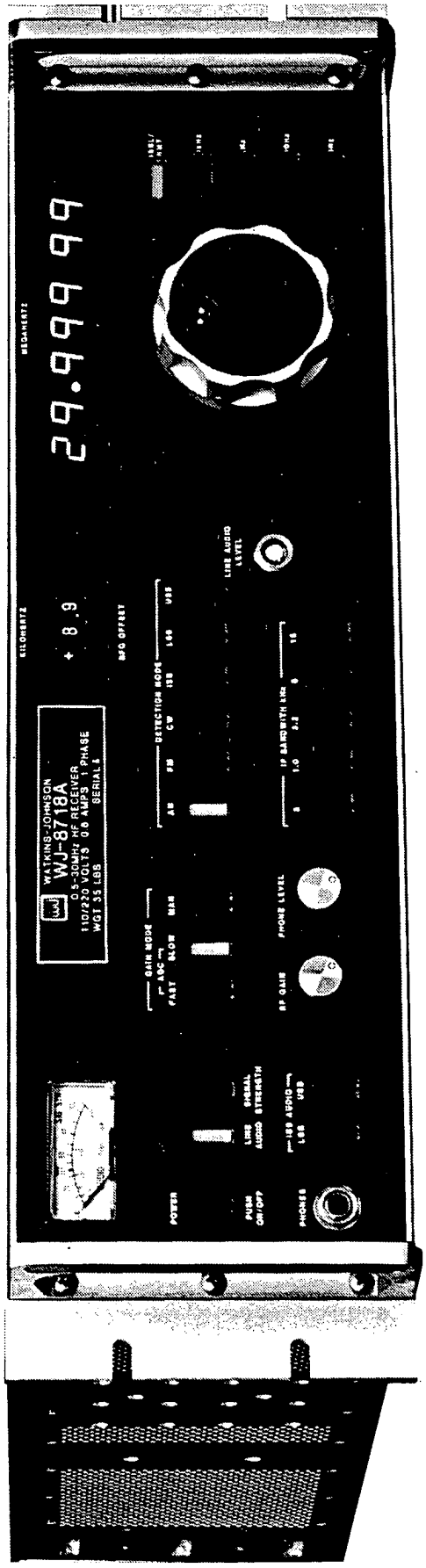
WJ-8718A HF RECEIVER



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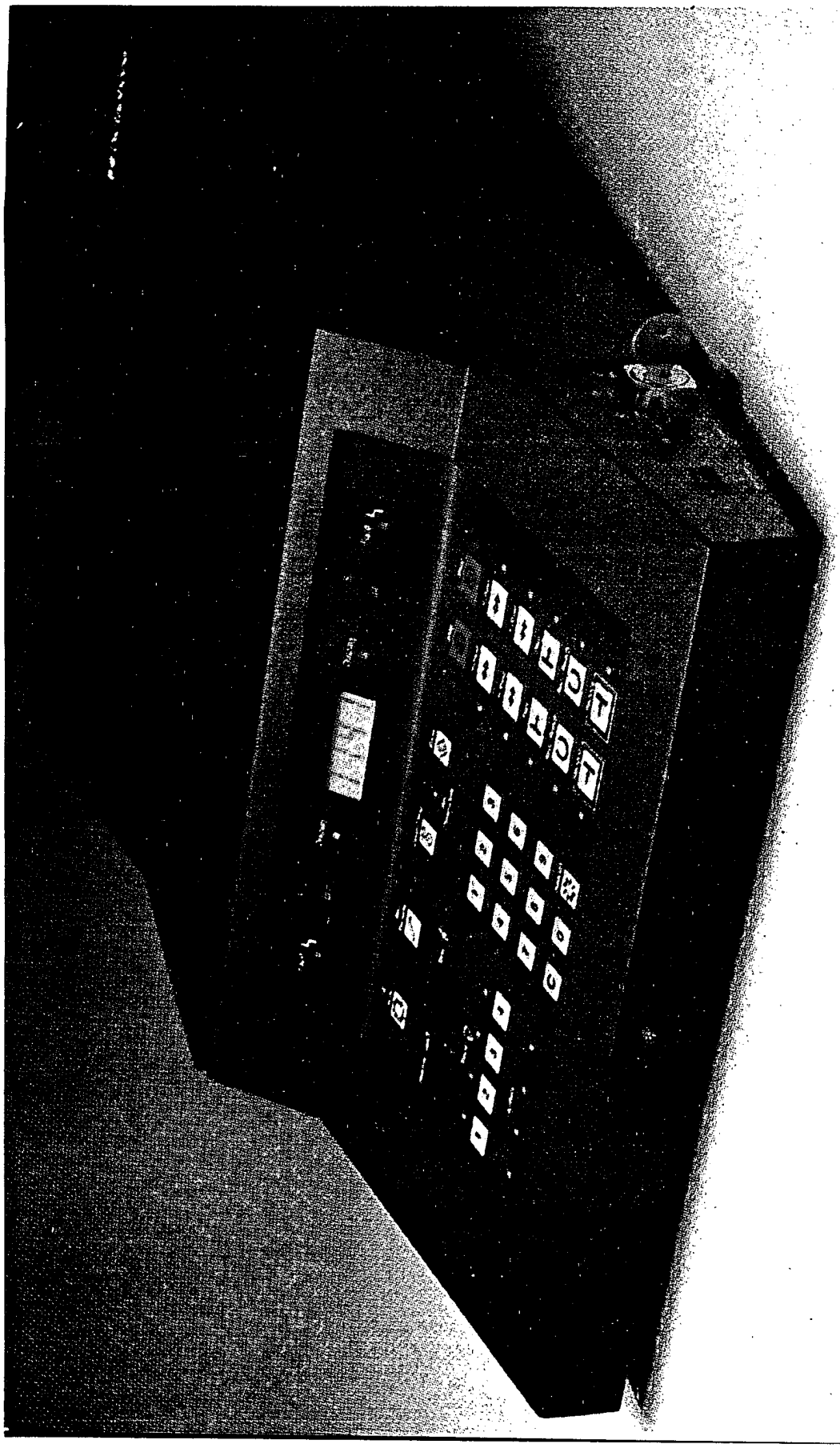
DICTAPHONE 5842 DUAL CASSETTE RECORDER



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SELECTION PROCESS - COLLECTION AUTOMATION

X4126

COMMERCIAL PRODUCTS

FUNCTION	COMMERCIAL PRODUCT
IEEE-488 antenna switches	Matrix Series 7300 Switch Assemblies
TV tuners	TBD
Receivers	WJ-8718A HF Receiver
IEEE-488 audio switches	Matrix Series 1600 Switch Assemblies
Recorders	Dictaphone 5842 Dual Cassette Recorder
Boardman computer	DEC MicroVAX

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SELECTION PROCESS - COLLECTION AUTOMATION

SPECIFICATIONS/FEATURES OF MATRIX SWITCHES

- True coaxial swithing
- IEEE-488 Bus controllable
- Matrix configuration
- Modular, building block architecture for flexibility
- Low VSWR with high isolation
- Extremely high reliability, (gntd. 100 million operations)

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SELECTION PROCESS - COLLECTION AUTOMATION

SPECIFICATIONS/FEATURES OF WJ-8718A HF RECEIVER

- Frequency Coverage from .5 kHz to 30 MHz in One Band
- Fully Synthesized including BFO
- Five IF Bandwidths to 16 kHz
- AM, FM, CW, ISB, USB AND LSB Detection Modes
- High Dynamic Range
- Modular Construction for Low MTTR and High MTBF
- IEEE-488 and BITE options available

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SELECTION PROCESS - COLLECTION AUTOMATION

SPECIFICATIONS/FEATURES OF DICTAPHONE CASSETTE RECORDER

- Dual cassette with auto-start of second unit
- Uses standard cassettes, C30/C60/C90
- Built-in Time Code Generator with auto searching
- Audible and visual alarms
- Keypad control
- Digital display of Time
- Professional quality for high reliability

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SELECTION PROCESS - COLLECTION AUTOMATION

SPECIFICATIONS/FEATURES OF DEC MICROVAX

- Full 32-bit superminicomputer architecture
- Fully compatible with VAX-11/780 (DBMS) and Ethernet
- Dual 800 KB floppy disk drives
- Built-in 31 MB Winchester disk
- Highly reliable design based on proven architecture
- Will run MicroVMS, DECNET and applications software

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SELECTION PROCESS - COLLECTION AUTOMATION

X4129

SWITCHES

FEATURES VS. MFG.	MATRIX	TRANSCO	TELEDYNE
Configuration available	+		
IEEE-488 control		NO	NO
Manual control			NO
Modular construction	+	-	-
Expandability	+	-	-
Reliability	+		
Cost	+		

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SELECTION PROCESS - COLLECTION AUTOMATION

X4130

RECEIVERS

FEATURES VS. MFG.	WJ	COLLINS	RACAL
Frequency coverage	+	+	-
Dynamic range	+	+	?
Sensitivity	+		?
Selectivity		+	
Stability		+	?
Digital readout	+	+	?
IEEE-488 remote control	+	No	?
BITE			?
High MTBF and low MTTR	+	+	?
General features	+	+	?
Remote control features	+	-	?
Cost	+	-	?

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SELECTION PROCESS - COLLECTION AUTOMATION

X4128

RECORDERS

FEATURES VS. MFG	MA	DICT	SON	LAN	REA	PAN	AKA
Standard cassettes	NO	2					
Auto take-over		YES					
No. of tracks	10	4	4	4	2	2	2
Auto search	YES	YES					
Internal time code & search	YES	YES					
General features		+					
Estimated reliability	+	+	+	+			
Cost	5K	2.5K	1.5K	3K	100	110	420

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SELECTION PROCESS - COLLECTION AUTOMATION

MICROVAX

- Compatibility
  - VMS
  - DECNET
  - Ethernet
  - Training and maintenance
- DEC VAX proven
  - Performance
  - Reliability

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SELECTION PROCESS - COLLECTION AUTOMATION

DEVELOPMENT

- Requirements
- Description of item
- Short specification/features
- Risks
  - Technology
  - Schedule
  - Cost

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SELECTION PROCESS - COLLECTION AUTOMATION

DEVELOPMENT OF MICROVAX APPLICATIONS SOFTWARE

- Required to provide Boardman computer control
- Features
  - Interfaces to MicroVMS and DECNET
  - Controls switches/receivers/recorders per schedule
  - Interfaces to DBMS
  - Provides operator input/change/check
- Risks
  - Technology - very low - established techniques & tools
  - Schedule - low - dependent on DBMS interface
  - Cost - low - good estimate possible plus low T & S risk

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SELECTION PROCESS - COLLECTION AUTOMATION

DEVELOPMENT OF MONITOR RECEIVER CONTROL WINDOW SOFTWARE

- Required to provide Monitor receiver display and control
- Features
  - Integrated icon/window MMI
  - Displays and controls all receivers parameters
  - Interfaces to VAX
  - Provides natural control and confirmation
- Risks
  - Technology - medium - dependent on VAX interface
  - Schedule - medium - dependent on VAX interface
  - Cost - low/medium - dependent on VAX interface but good backup position

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SELECTION PROCESS - COLLECTION AUTOMATION

DEVELOPMENT OF CRUISER INTERFACE SOFTWARE

- Required to provide Cruiser MMI and DBMS interfaces
- Features
  - Integrated icon/window MMI
  - Provides automatic DBMS entry of all required parameters
  - Interfaces to VAX
  - Provides natural control and confirmation
- Risks
  - Technology - medium - dependent on VAX interface
  - Schedule - medium - dependent on VAX interface
  - Cost - low/medium - dependent on VAX interface but good backup position

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FBIS BUREAU MONITOR/EDITOR OPERATIONS

Selection Process

- Design Process
- Automation Boundaries

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FBIS BUREAU MONITOR/EDITOR OPERATIONS

Design Process

- The most difficult requirement to meet is Multi-Lingual Display, Editing and Printing (accounting for half the HQ workstations)
  - this leads to the selection of the Xerox 8000NS, which provides the most multi-lingual character sets and the *only* full multi-lingual printing capability
- User-Interface consistency is required throughout the system (for ease of learning and use)
  - this leads to the choice of Xerox 8000NS workstations and architecture for all of HQ, including JPRS.
- Rotation of Editors between Daily Report and Field Bureaus, and among Field Bureaus, requires User-Interface consistency in the Field, and between the Field and HQ (for ease of learning and use).
  - thus the selection of Xerox 8000NS for the Field Bureau, also

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FBIS BUREAU MONITOR/EDITOR OPERATIONS

Design Process (cont.)

- Xerox 8000NS, an Ethernet-based system inherently meets the criteria for Adaptability and Extensibility, and minimizes the impact of any single-point failure.
- Xerox 8000NS, an Ethernet-based system, is inherently an Open System as far as integration of other devices is concerned, because of the publication of the Xerox System Integration Standards. The forthcoming Basic Workstation makes the 8000NS an Open System at the user application level, also.
- The only major area of development required for the Xerox approach, *additional* to that required with an approach using existing Newspaper Editorial systems, is the Press Agency interface.

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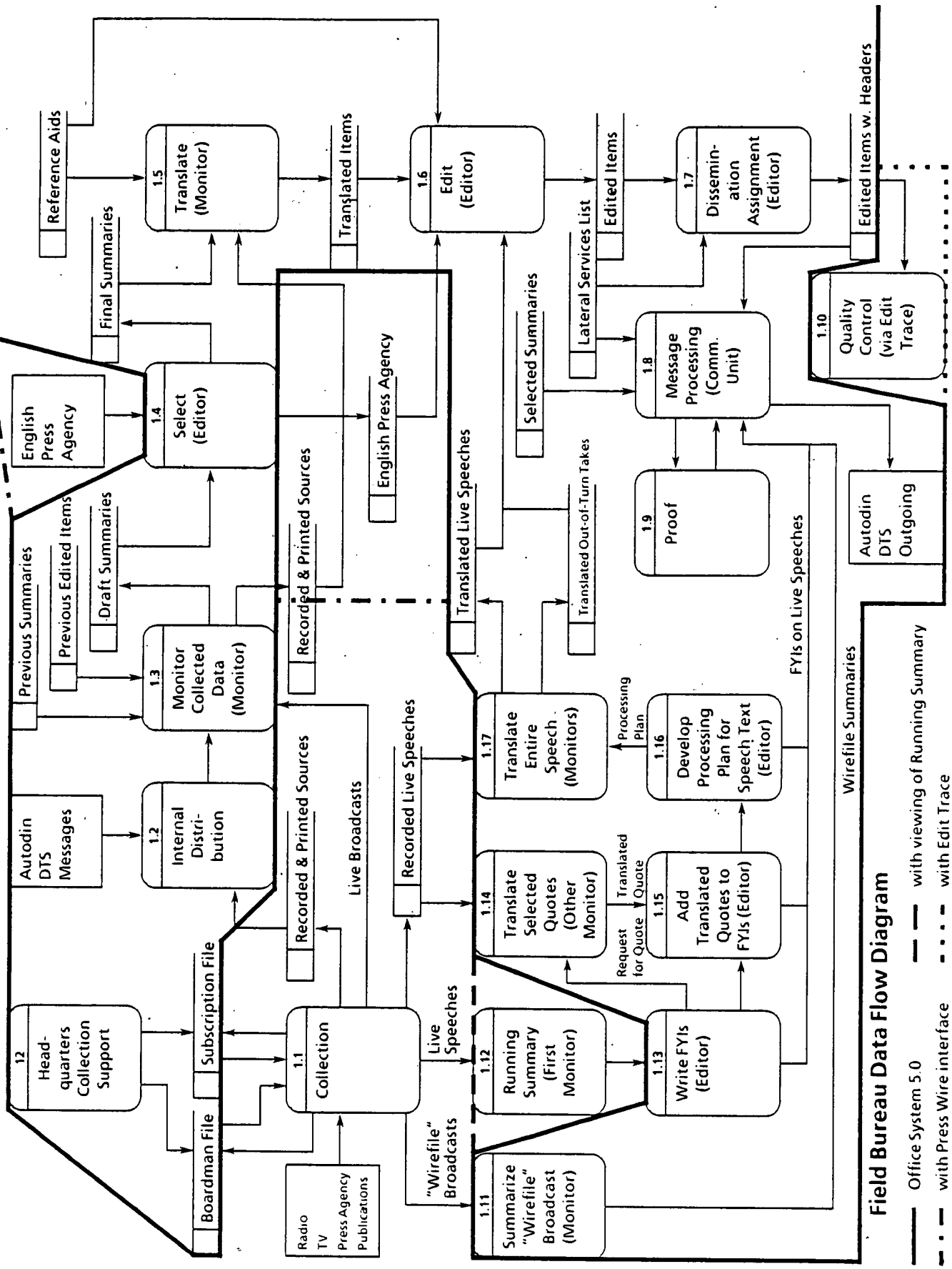

FBIS BUREAU MONITOR/EDITOR OPERATIONS

Development Requirements

Enhancements to the Network Services

- English Press Agency Interface
- Foreign-language Press Agency Interface
- Autodin Interface
- Autodin "Mail Gateway"

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FBIS BUREAU MONITOR/EDITOR OPERATIONS

Development Requirements (cont.)

Enhancements to the Basic Workstation

- Edit Trace (automatically)
- Database Interface(s) from the Workstation
- Very frequent "New Mail" checking
- Alerts to urgent incoming messages/wire traffic, and English Press Agency

Software Development for the VAX

- Remote Viewing (and Scrolling) of Running Summary

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FBIS BUREAU MONITOR/EDITOR OPERATIONS

Network Services Enhancements

Incoming Press Agency
English Press Agency Interface
Foreign-language Press Agency Interface

- Associate RS232C port with "well-known" File Drawer (or Mailbox) (as in the Remote Batch Service)
- Parse incoming items to determine Date/Time, Slug, Source, etc.
- Create attributes containing these parameters for each item placed in the well-known File Drawer (or Mailbox), so that listings may be made
- Items must be readable by client workstations, but not deletable under those circumstances
- Periodically (and automatically), the contents of the File Drawer (or Mailbox) should be (a) Printed, (b) Copied to the DBMS for 30 or 60 day retention, and (c) Deleted from the "News Service".

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FBIS BUREAU MONITOR/EDITOR OPERATIONS

Network Services Enhancements

- Autodin "Mail Gateway"/Autodin Interface
  - Autodin protocols on the RS232C port of the 8000 processor
  - Outgoing Autodin message (including the Autodin Headers and Routing Info.) is received over the Ethernet as the *text* of an NS message, addressed to one of four precedence queues
  - Outgoing message is stripped of its attributes, leaving plain text, and the text is forwarded to Autodin, with the queues being handled in precedence order
  - An outgoing message longer than 1000 words should be automatically broken up into "takes", with the (plain text) headers regenerated for subsequent takes, and appropriate cross-references added

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FBIS BUREAU MONITOR/EDITOR OPERATIONS

Network Services Enhancements

- Autodin "Mail Gateway"/Autodin Interface (cont.)
  - The precedence queues must be manipulable from a workstation, using Remote Administration procedures; if a message is moved from one queue to another, its precedence code must be changed appropriately
  - A log is kept containing copies of all outgoing traffic; this is periodically purged
  - Incoming message text is parsed, and attributes created corresponding to the header information
  - Messages in multiple "takes" are automatically re-assembled into a single message, using the cross-reference information in the headers

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FBIS BUREAU MONITOR/EDITOR OPERATIONS

Network Services Enhancements

- Autodin "Mail Gateway"/Autodin Interface (cont.)
  - If a specific individual is named as the recipient of a message, it should be routed to that individual's mailbox; otherwise it should be sent to a "well-known" mailbox
  - A log is kept containing copies of all incoming traffic; this is periodically purged

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FBIS BUREAU MONITOR/EDITOR OPERATIONS

Basic Workstation Enhancements

- Edit Trace (automatically)
  - The requirement is to show, on the screen and printed copy, the editing changes which have been made from one version of a document to a subsequent version
  - As a corollary, the entire edit trace within a version must be suppressed as a subsequent version is created
  - The edit trace should not be present within the final Autodin message sent
  - Edit Trace should, however, remain within messages sent between Editor and Monitors on the local Ethernet

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FBIS BUREAU MONITOR/EDITOR OPERATIONS

Basic Workstation Enhancements

- Edit Trace (automatically) (cont.)
  - It is suggested that Edit Trace can be shown by marking all characters selected for deletion (or removed by moving to another location) as strikeout-type, rather than removing them from the screen/printout, and that all characters entered (via either typing, copying, or moving) shall be displayed in an alternate typestyle
  - When a new version is created, all deletions will actually occur, and the alternate typestyle will be converted to the normal typestyle

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FBIS BUREAU MONITOR/EDITOR OPERATIONS

Basic Workstation Enhancements

- Database Interface(s) from the Workstation

  (For the present, we are assuming that the VT100 emulation window will satisfy this requirement -- this implies that completed documents must be explicitly entered into the Full-Text Database.)

- Very frequent "New Mail" checking
  - This simply requires that the time interval at which the workstation checks the Mail Service for new mail should be changed to (say) 15 seconds, rather than the current 5 minutes

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FBIS BUREAU MONITOR/EDITOR OPERATIONS

Basic Workstation Enhancements

- Alerts to urgent incoming messages/wire traffic, and English Press Agency
  - In addition to checking for new mail, the workstation must also check for incoming messages from Autodin (in the "well-known" Mailbox) and English Press Agency copy (in the "well-known" File Drawer or Mailbox); the time interval should be the same as for new mail checking

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FBIS BUREAU MONITOR/EDITOR OPERATIONS

VAX software developments

- Remote Viewing (and Scrolling) of Running Summary
  - This requires page-level access from the workstations (in VT100 emulation mode) to the VAX
  - For a given session, a single designated workstation/user is permitted to write into the running summary file on a continuous basis
  - Other workstations/users may view any or all pages of the running summary file, except the one currently being written by the designated workstation/user, but may not write on the file; full scrolling capabilities must be available to these users

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FBIS BUREAU MONITOR/EDITOR OPERATIONS

VAX software developments

- Remote Viewing (and Scrolling) of Running Summary (cont.)
  - After the designated user logs-off at the conclusion of the session, the running summary file remains until specifically deleted by the responsible editor
  - Specifics such as the identities of the designated user for writing, the responsible editor for deletion, and the file name are set up on each occasion prior to starting the running summary

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FBIS BUREAU MONITOR/EDITOR OPERATIONS

Risk

- **Technology**

  The technology risk in 8000 Network System interface and software developments is low, since the technology is established, and is controlled by Xerox

- **Cost**

  Costs present a manageable risk, because the developments involved, while substantial, are comparable to developments which have already taken place, and have known solutions and available modules on which to build

- **Schedule**

  Schedule maintenance depends on the continued availability of a sufficient number of skilled programmers who are knowledgeable in the system; this presents some level of risk, since the Xerox programming language (Mesa) is not widely available elsewhere

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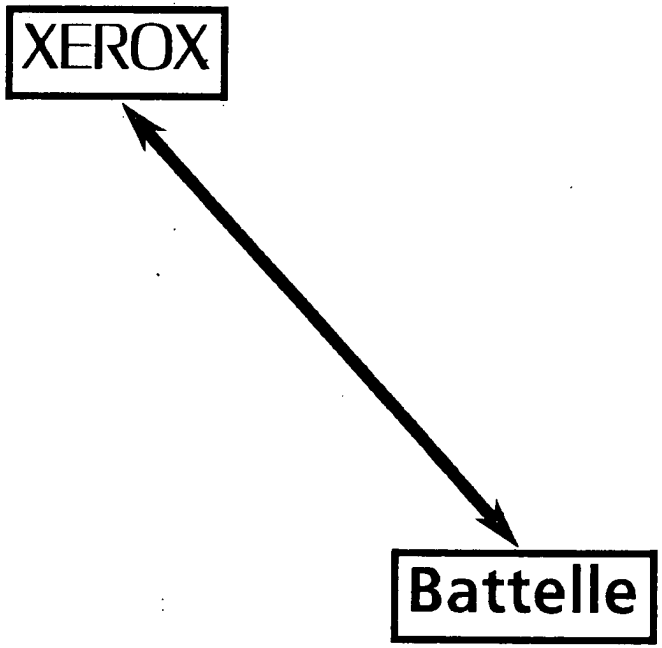
BUREAU DBMS SELECTION PROCESS

XEROX - Battelle

- In 1946 Haloid Company sponsored xerography research at Battelle
- Long association between Xerox and Battelle
- Comfortable exchange of information



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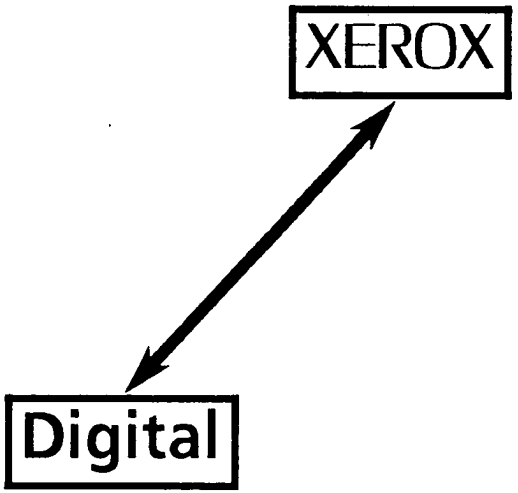
BUREAU DBMS SELECTION PROCESS

XEROX - Digital

- DEC processors are imbedded in some Xerox products
- DEC processors are imbedded in most XSIS custom systems
- DEC is a co-sponsor, together with Xerox and Intel, of Ethernet
- DEC processors are integrated into the Xerox Ethernet
- Long association between Xerox and Digital Equipment Corporation
- Comfortable exchange of information



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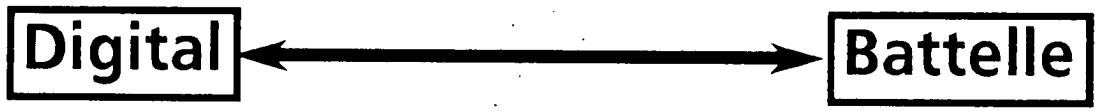
BUREAU DBMS SELECTION PROCESS

Digital - Battelle

- Battelle software runs on DEC processors
- Battelle does its software development on DEC processors
- DEC has marketing agreement with Battelle to sell BASIS
- DEC and Battelle are working together on some new technology to be announced next year
- Good association between DEC and Battelle
- Comfortable exchange of information



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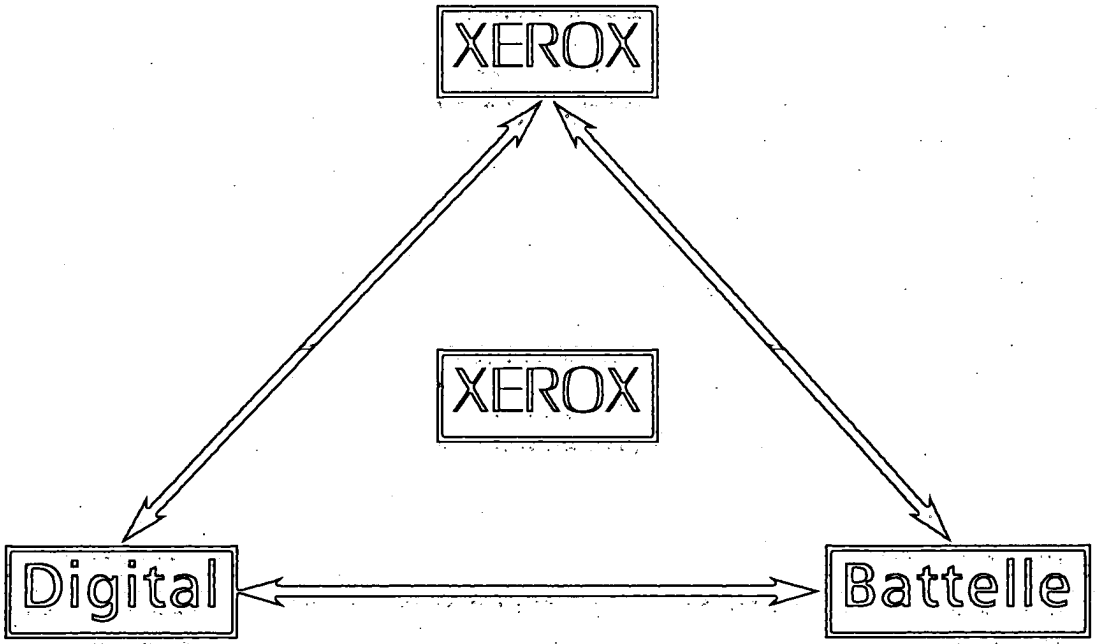
BUREAU DBMS SELECTION PROCESS

XEROX - The logical system integrator

- Used to working with DEC and Battelle
- Comfortable with exchange of information between all three companies
- This three company association is not a creation just for FBIS



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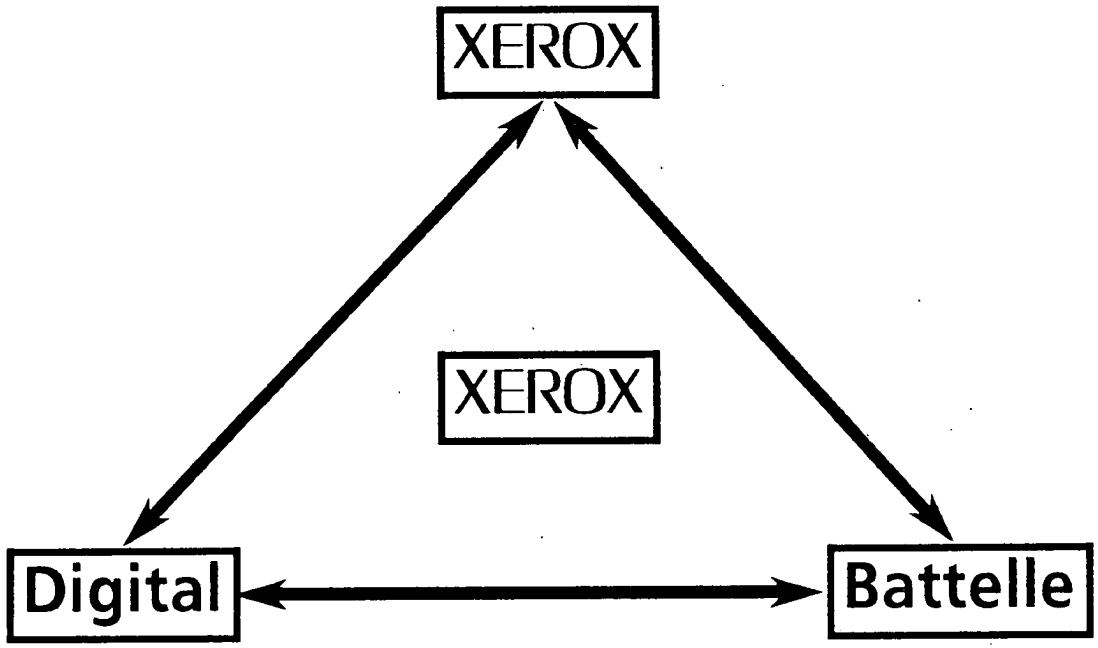
BUREAU DBMS SELECTION PROCESS

XEROX - The logical system integrator

- Xerox has proposed this three company cooperation to Voice of America



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BUREAU DBMS SELECTION PROCESS

DBMS Company and Product Issues	Xerox Approach	
	Digital's VAX Rdb/VMS	Battelle's BASIS
No. years company in business	27	55
Company willingness to work with us on product modifications	None	High
Company willingness to write custom software	High	High
Number of years product in marketplace	2 Months	Internally 15 Commercially 11

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BUREAU DBMS SELECTION PROCESS

- Many other products were considered
- These are the companies that work best together
- Their products meet the requirements
- Their willingness to cooperate with each other aids the overall success of the program

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BUREAU DBMS SELECTION PROCESS

ADVANTAGES OF BACKUP STRATEGY

- *Minimum* operator activity
- *No* mounting of disks
- *No* storage of disk packs or magnetic tapes
- *No* storage and maintenance of backup copies is required
- Operator activity only in event of disk failure

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BUREAU DBMS SELECTION PROCESS

ADVANTAGES OF BACKUP STRATEGY

- 1 disk failure = > no loss of functionality (even backup may continue)
- 2 disk failure = > some backup capability is lost and data may be lost

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BUREAU DBMS COMMERCIAL PRODUCTS

Digital Equipment Corporation (DEC)

- Hardware
  - VAX
  - Disk storage
- Software
  - VAX/VMS
  - Common Data Dictionary
  - VAX Rdb/VMS
  - DATATRIEVE
  - TDMS

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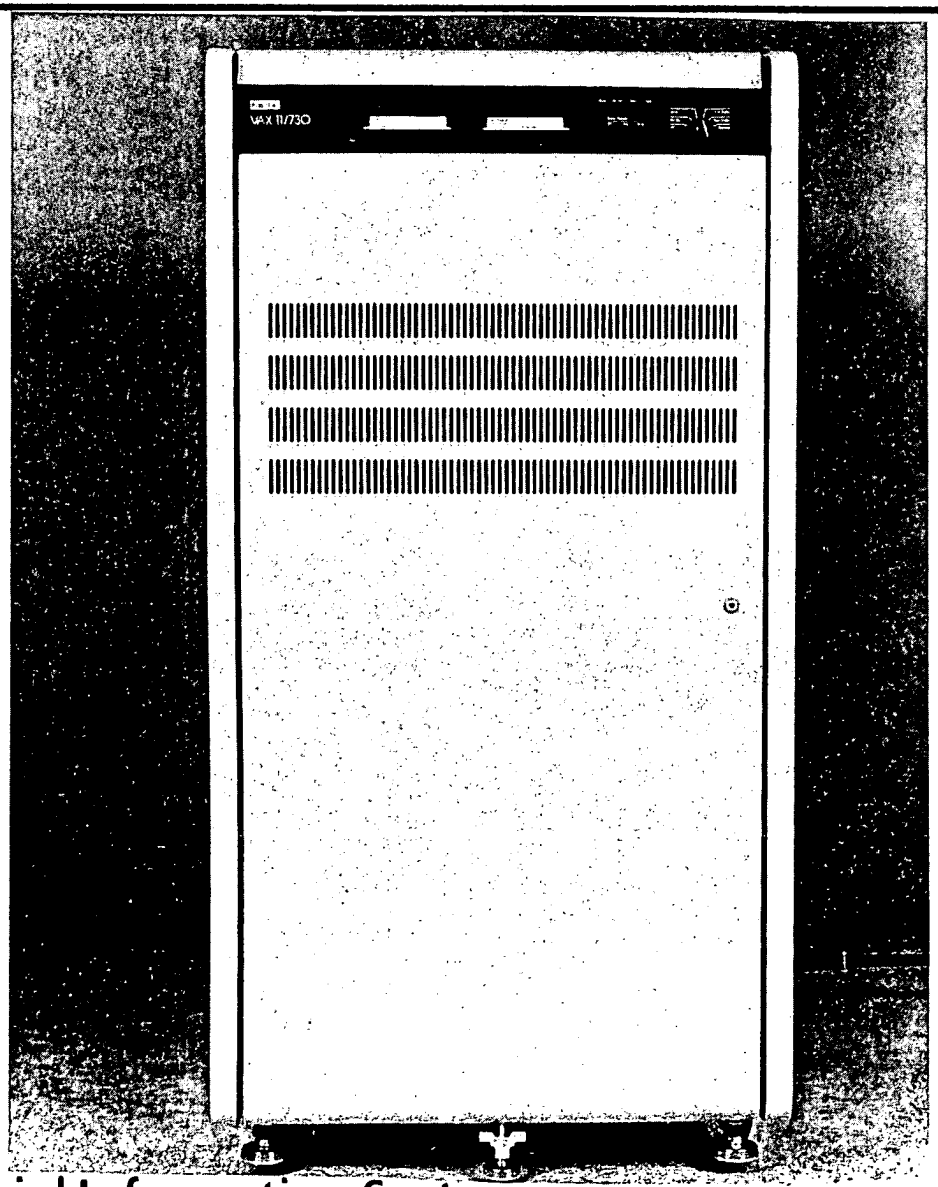
BUREAU DBMS COMMERCIAL PRODUCTS

- DEC VAX 11/730



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BUREAU DBMS COMMERCIAL PRODUCTS

DEC VAX 11/730

- One member of the low-end VAX family of computers
- 32-bit architecture
- 4 gigabytes of virtual addressing space
- Up to 5 megabytes of physical memory
- Remote diagnosis available
- Supports Ethernet interface with XNS protocols
- Can add expansion cabinet

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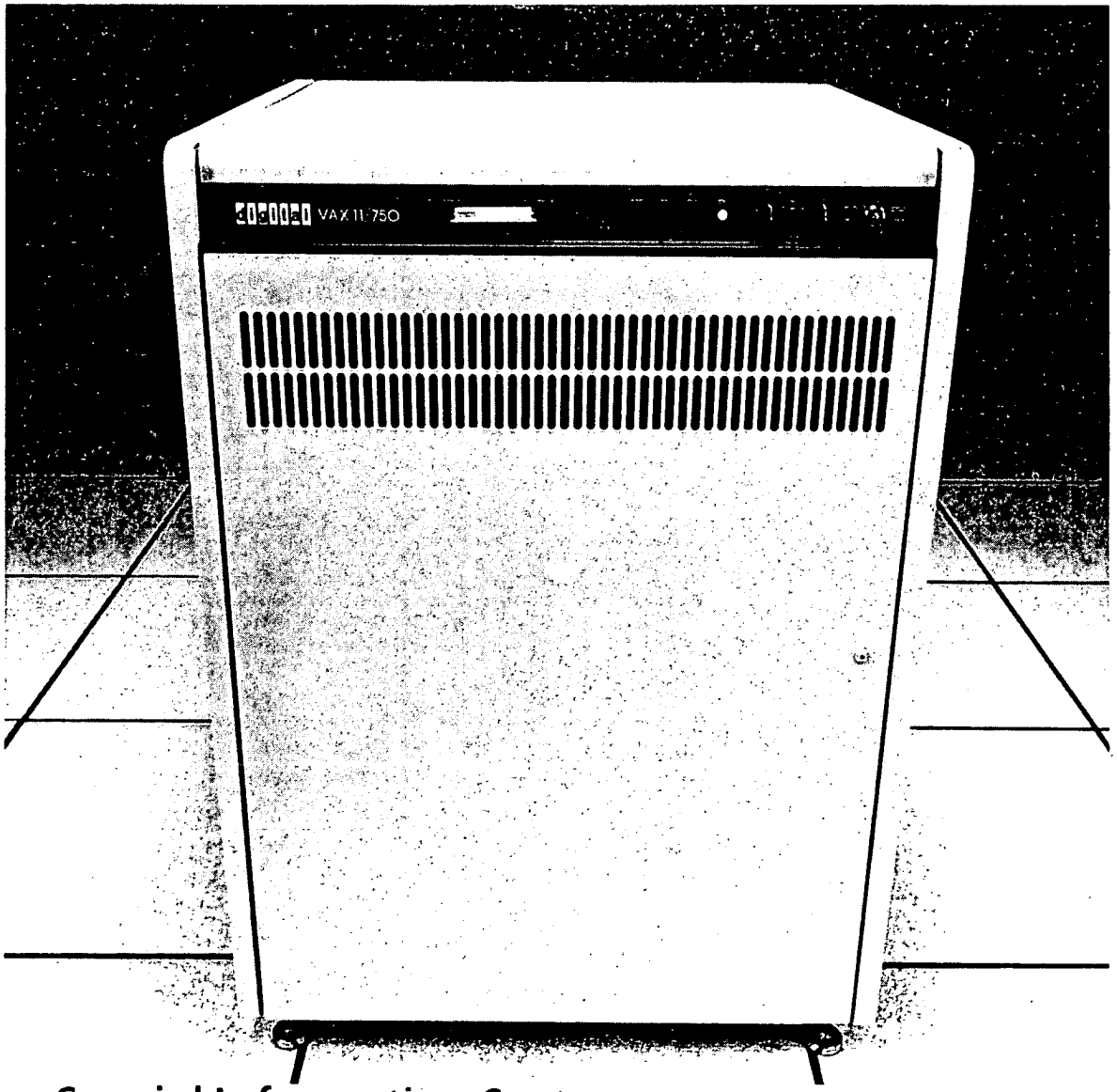
BUREAU DBMS COMMERCIAL PRODUCTS

- DEC VAX 11/750



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BUREAU DBMS COMMERCIAL PRODUCTS

DEC VAX 11/750

- Mid-range of the VAX family of computers
- 32-bit architecture
- 4 gigabytes of virtual addressing space
- Up to 8 megabytes of physical memory
- Remote diagnosis available
- Supports Ethernet interface with XNS protocols
- Can add expansion cabinet

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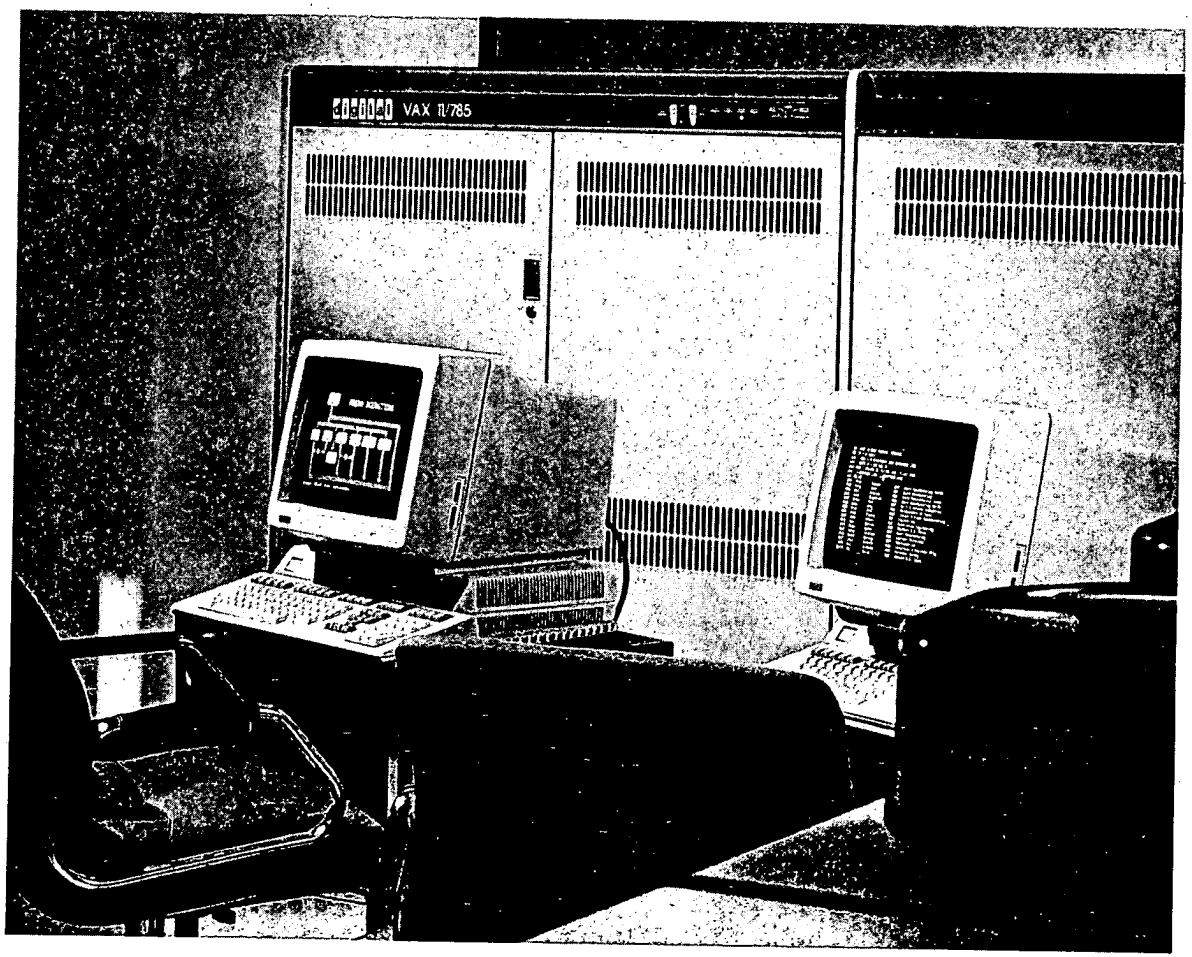
BUREAU DBMS COMMERCIAL PRODUCTS

- DEC VAX 11/780



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BUREAU DBMS COMMERCIAL PRODUCTS

DEC VAX 11/780

- High-end member of the VAX family of computers
- 32-bit architecture
- 4 gigabytes of virtual addressing space
- Up to 16 megabytes of physical memory
- Remote diagnosis available
- Supports Ethernet interface with XNS protocols
- Can add expansion cabinet

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BUREAU DBMS COMMERCIAL PRODUCTS

DEC MASS STORAGE DEVICES

- Add DBMS data will be stored on RA81 disk drives
- Rack mounted Winchester disk
- Formatted capacity of 456 Megabytes
- Can be combined 3 per rack to give almost 1.4 Gigabytes usable data

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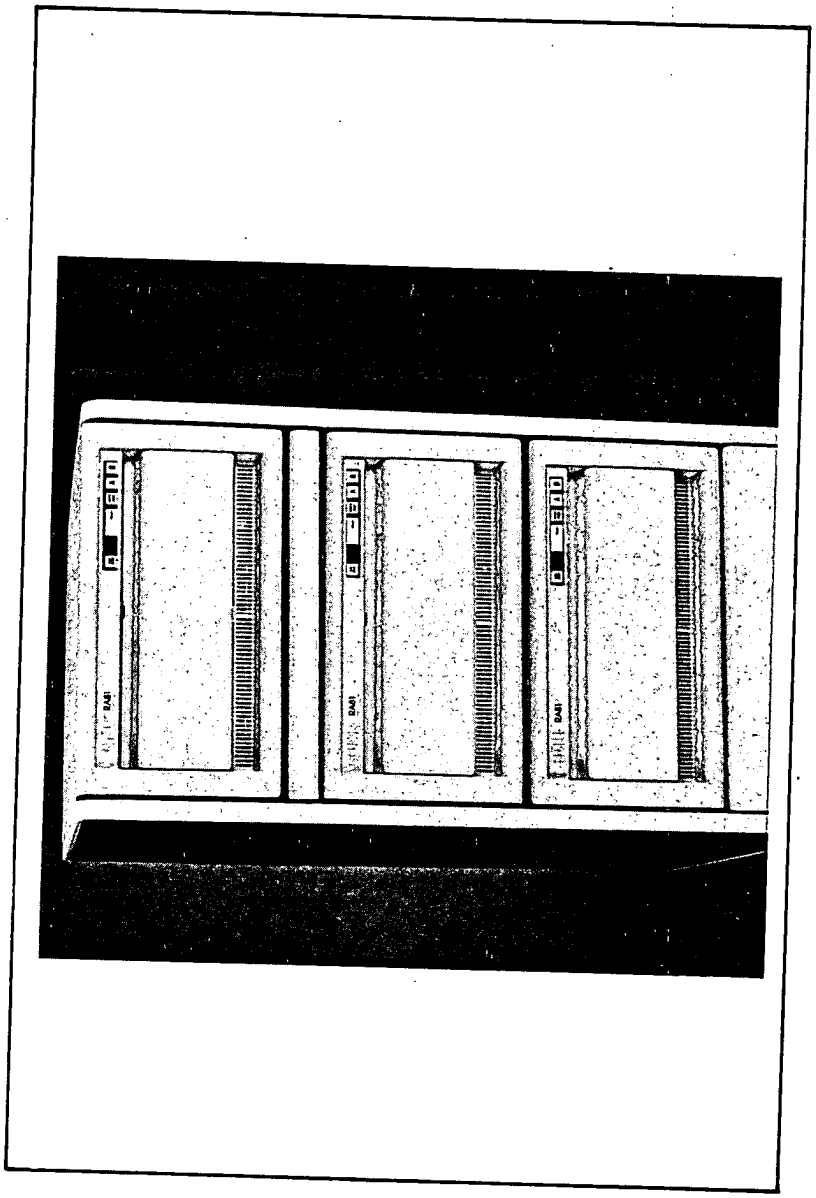
DEC RA 81 DISK DRIVE 3-PACK



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BUREAU DBMS COMMERCIAL PRODUCTS

RA81 ERROR CORRECTION AND DETECTION FEATURES

- 170 bit error correction code (ECC) detects and corrects up to eight independent 10-bit error bursts
- Redundant (4 times) header addresses
- Over 17,000 spare sectors for dynamic defect re-allocation
- Error detection code checks controller memory and data path errors as well as ECC hardware operations
- All errors are reported to VAX/VMS to be logged in the error log, enabling detection and preventive action before subsystem failure

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BUREAU DBMS COMMERCIAL PRODUCTS

RA81 PERFORMANCE FEATURES

- Seek ordering
- Overlapped seeking
- Rotational optimization
- Express queue
- Speed matching buffers

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BUREAU DBMS COMMERCIAL PRODUCTS

BATTELLE SOFTWARE - BASIS

- BASIS runs on many computers including the family of VAX computers
- Data Management System that is optimized for speed in text lookup operations
- Has its own query language
- Has a Thesaurus option
- Has data types and supports standard DBMS applications as well as text search
- Not recommended for extensive general DBMS applications

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BUREAU DBMS COMMERCIAL PRODUCTS

XEROX SOFTWARE - EVMS

- Allows a VAX to work on a Xerox Ethernet together with other Xerox products.
- Supports file transfer to and from VAX
- Supports virtual terminal emulation from workstations
- Allows remote login from the virtual terminals

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BUREAU DBMS DEVELOPMENT

- Integration of VAX Rdb/VMS and BASIS
- New icon
- TDMS screens

Xerox Special Information Systems

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BUREAU DBMS DEVELOPMENT REQUIREMENTS

Integration of VAX Rdb/VMS and BASIS

- Common user interface
- Promote "Ease of learning and use of the system"
- DEC has offered to write this software on a fixed price basis

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BUREAU DBMS DEVELOPMENT RISKS

Integration of VAX Rdb/VMS and BASIS

- Cost - Low because of the fixed price approach
- Schedule - Low because of the fixed price approach
- Technology - Low because this development involves no new technology

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SELECTION PROCESS - BUREAU COMMUNICATIONS

COMMERCIAL PRODUCTS

- Items vs. functions
- Description of item
- Short specification/features
- Why this one?

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SELECTION PROCESS - BUREAU COMMUNICATIONS

AUTODIN INTERFACE

FEATURES VS. MFG.	INTEQ	ANALYTIC
Cat. I certified	+	+
All protocols	+	-
Performance	+	+
Reliability	+	+
Cost	+	-

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SELECTION PROCESS - BUREAU COMMUNICATIONS

DEVELOPMENT

- Requirements
- Description of item
- Short specification/features
- Risks
  - Technology
  - Schedule
  - Cost

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SELECTION PROCESS - BUREAU COMMUNICATIONS

DEVELOPMENT OF COMMO INTERFACE SOFTWARE

- Required to provide Commo MMI and traffic control
- Features
  - Integrated icon/window MMI
  - Provides full search, editing and distribution control
  - Interfaces to all traffic logs and files
  - Provides natural control and confirmation
- Risks
  - Technology - low - established techniques and tools
  - Schedule - low - relatively independent
  - Cost - low - established operation - good estimate possible

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FBIS HEADQUARTERS PROCESSING AND COMPOSITION

Selection Process

- Design Process
- Automation Boundaries

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FBIS HEADQUARTERS PROCESSING AND COMPOSITION

Design Process

- The most difficult requirement to meet is Multi-Lingual Display, Editing and Printing (accounting for half the HQ workstations)
  - this leads to the selection of the Xerox 8000NS, which provides the most multi-lingual character sets and the *only* full multi-lingual printing capability
- User-Interface consistency is required throughout the system (for ease of learning and use)
  - this leads to the choice of Xerox 8000NS workstations and architecture for all of HQ, including JPRS.
- Xerox 8000NS, an Ethernet-based system inherently meets the criteria for Adaptability and Extensibility, and minimizes the impact of any single-point failure.

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FBIS HEADQUARTERS PROCESSING AND COMPOSITION

Design Process (cont.)

- Xerox 8000NS, an Ethernet-based system, is inherently an Open System as far as integration of other devices is concerned, because of the publication of the Xerox System Integration Standards. The forthcoming Basic Workstation makes the 8000NS an Open System at the user application level, also.
- Selection of the Xerox 8000NS architecture leads to the selection of the forthcoming Xerox approach to Composition and Typesetting.

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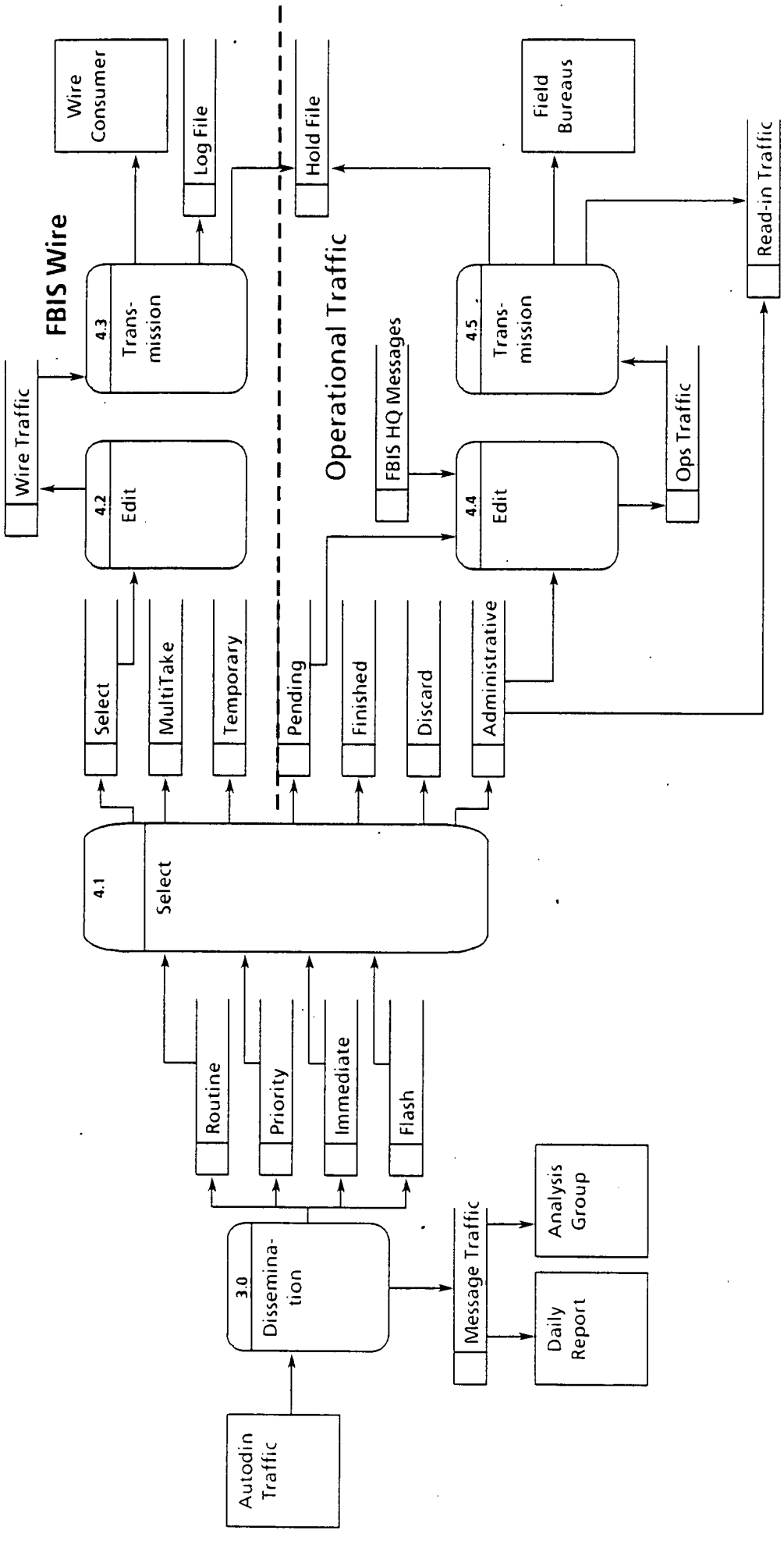
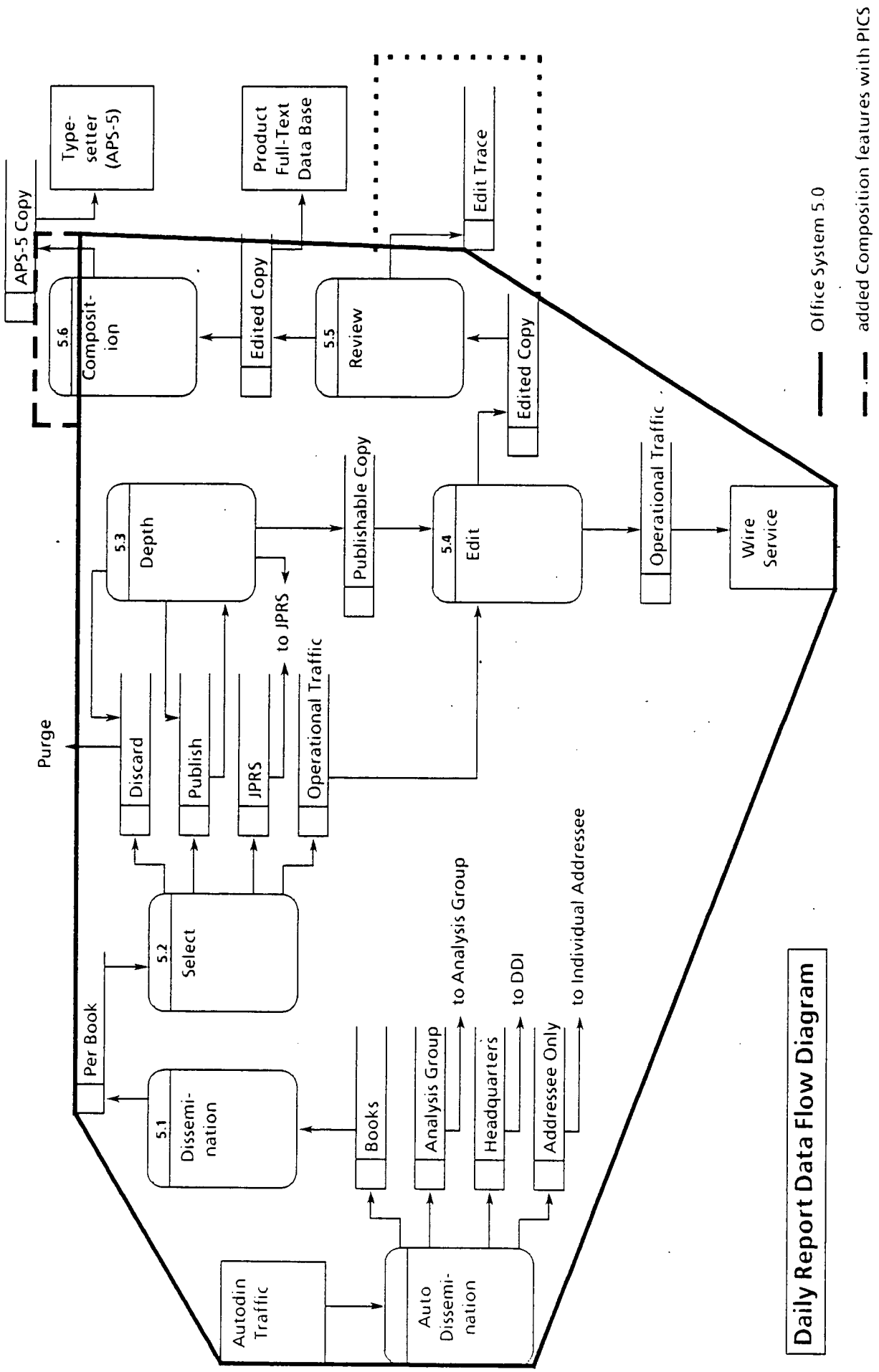
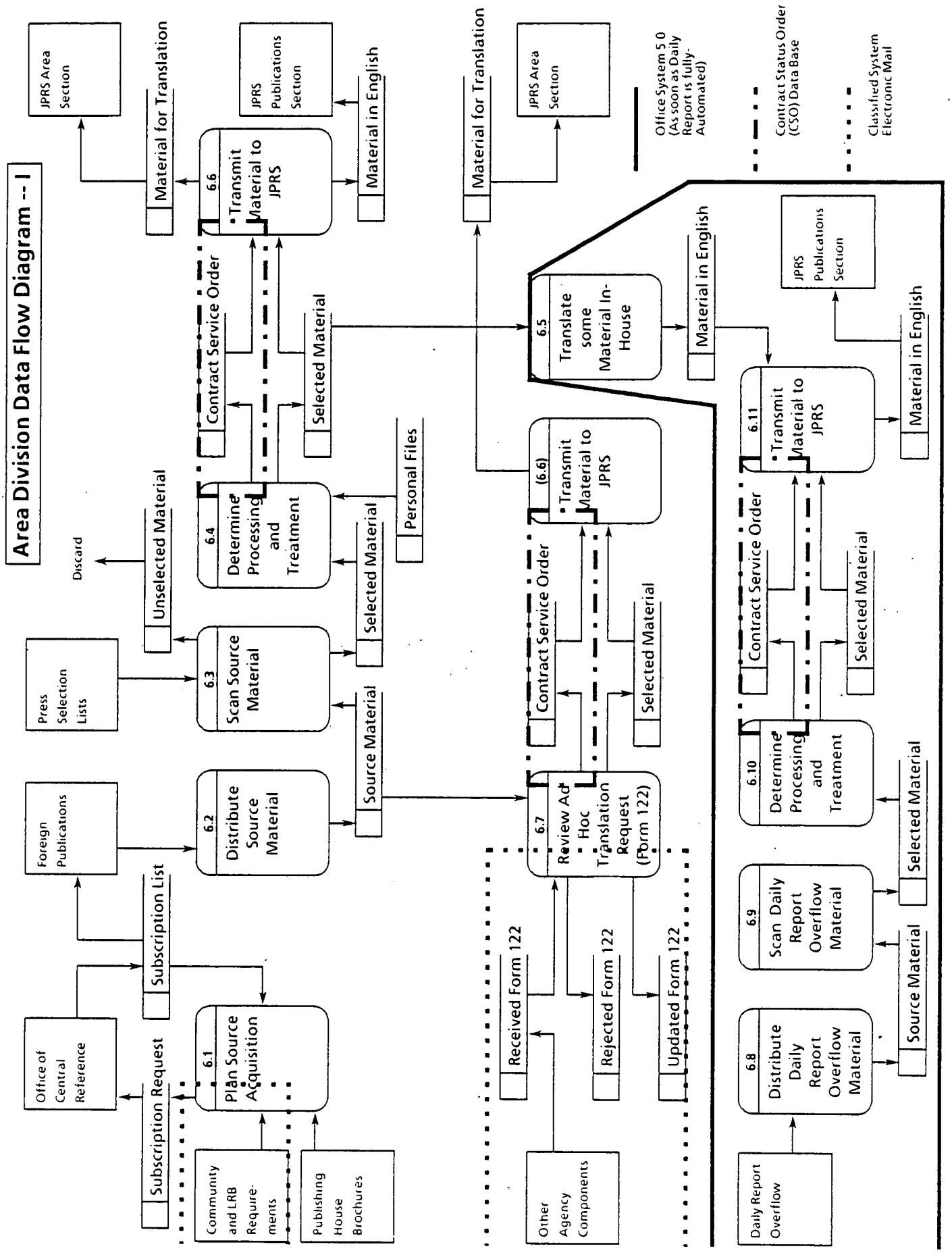


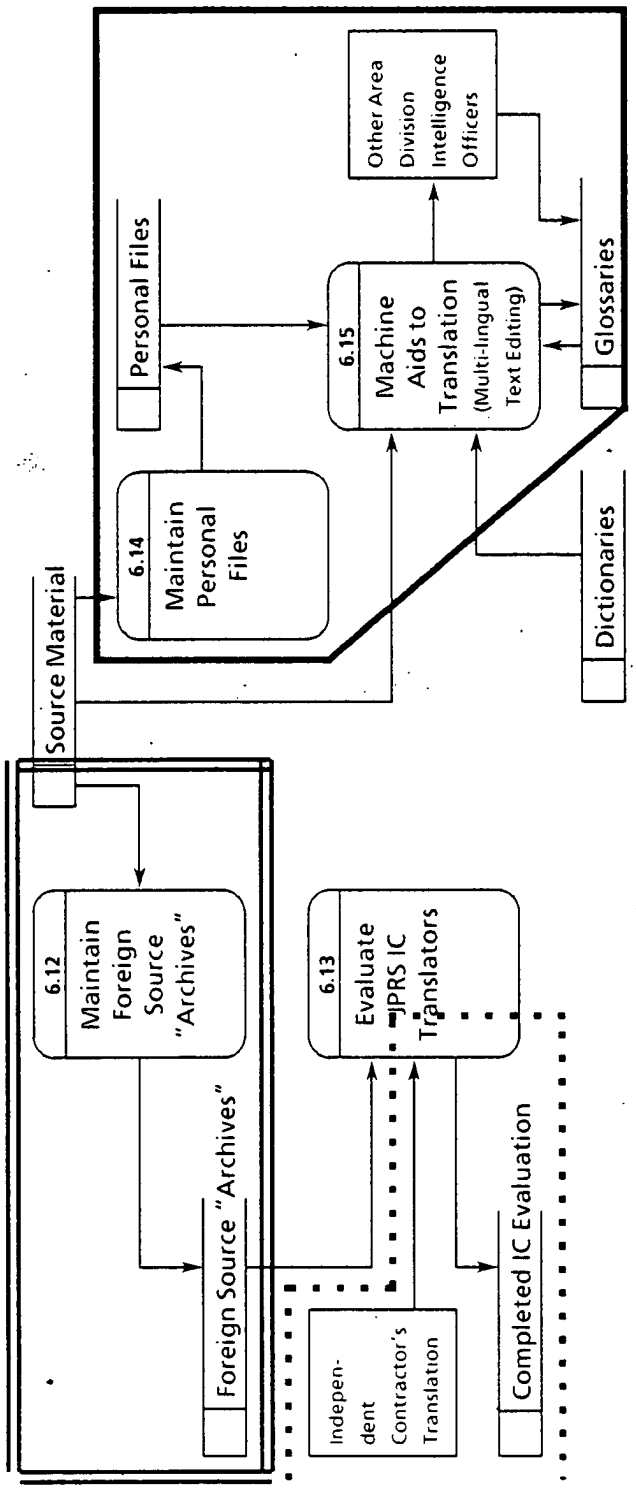
Wire Service Data Flow Diagram

This is currently fully-automated on MIDAS. This operation will be fully automated on the new system, but perhaps not in the first phase.





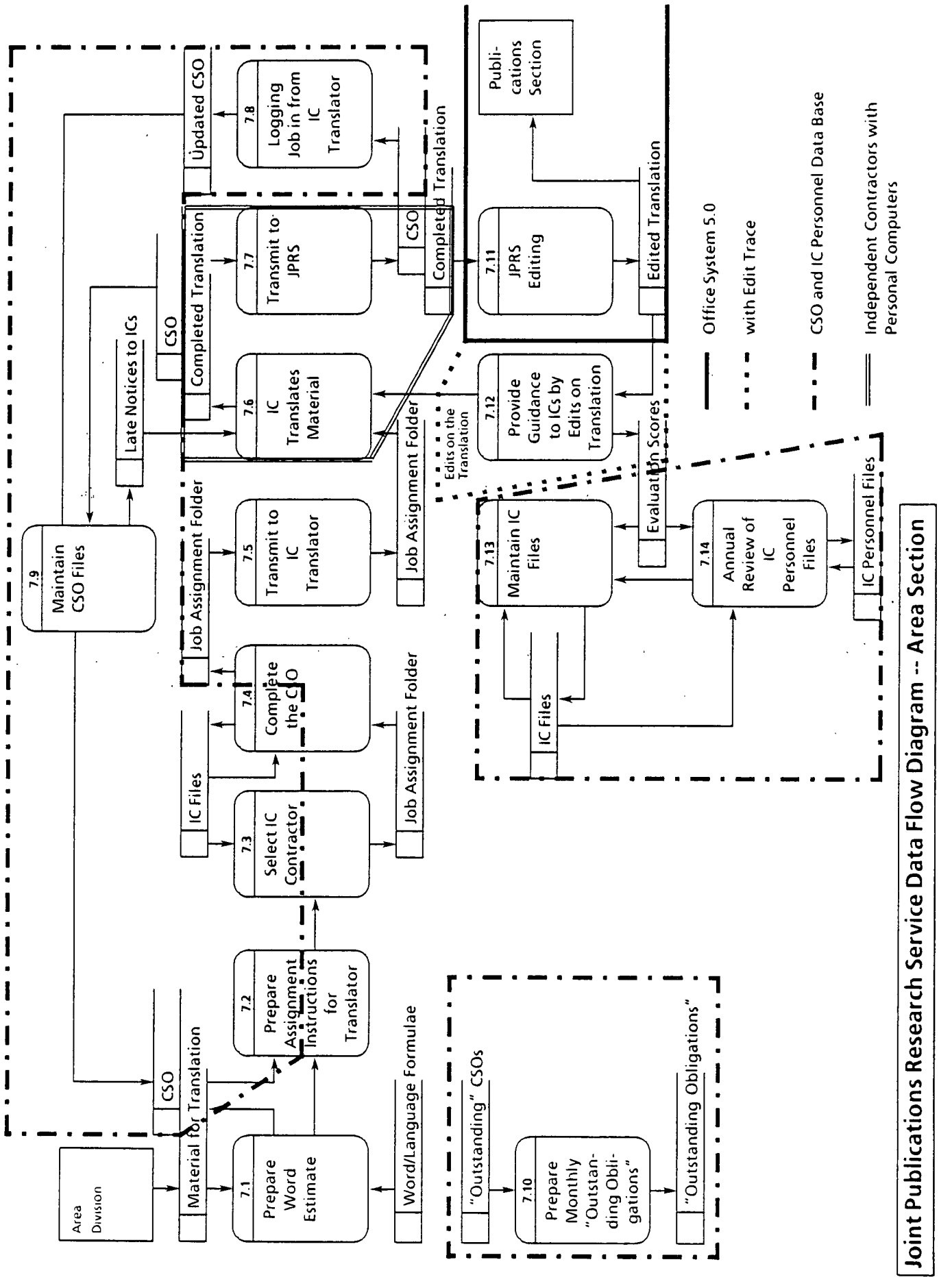
Area Division Data Flow Diagram -- II

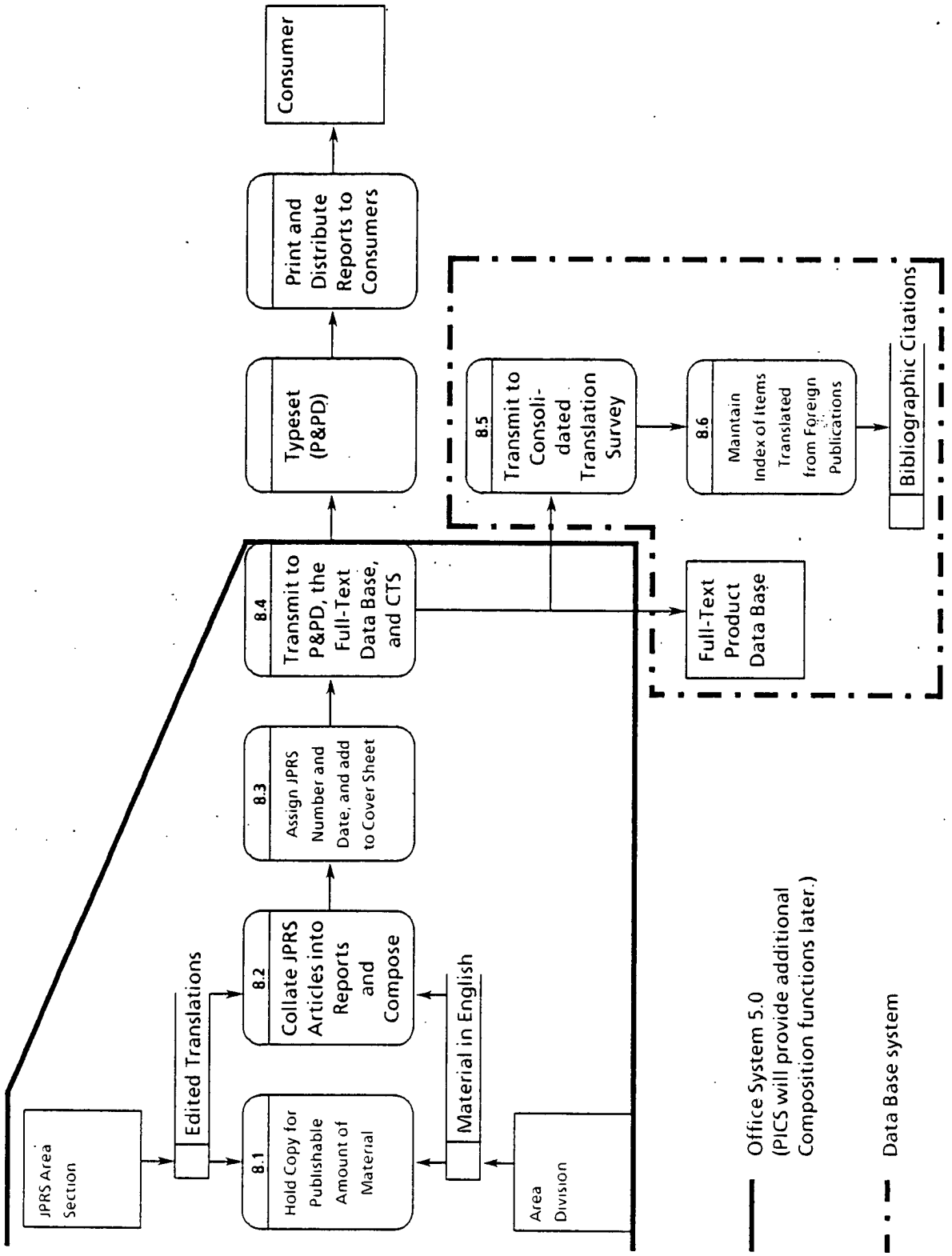


Multi-Lingual Office System 5.0

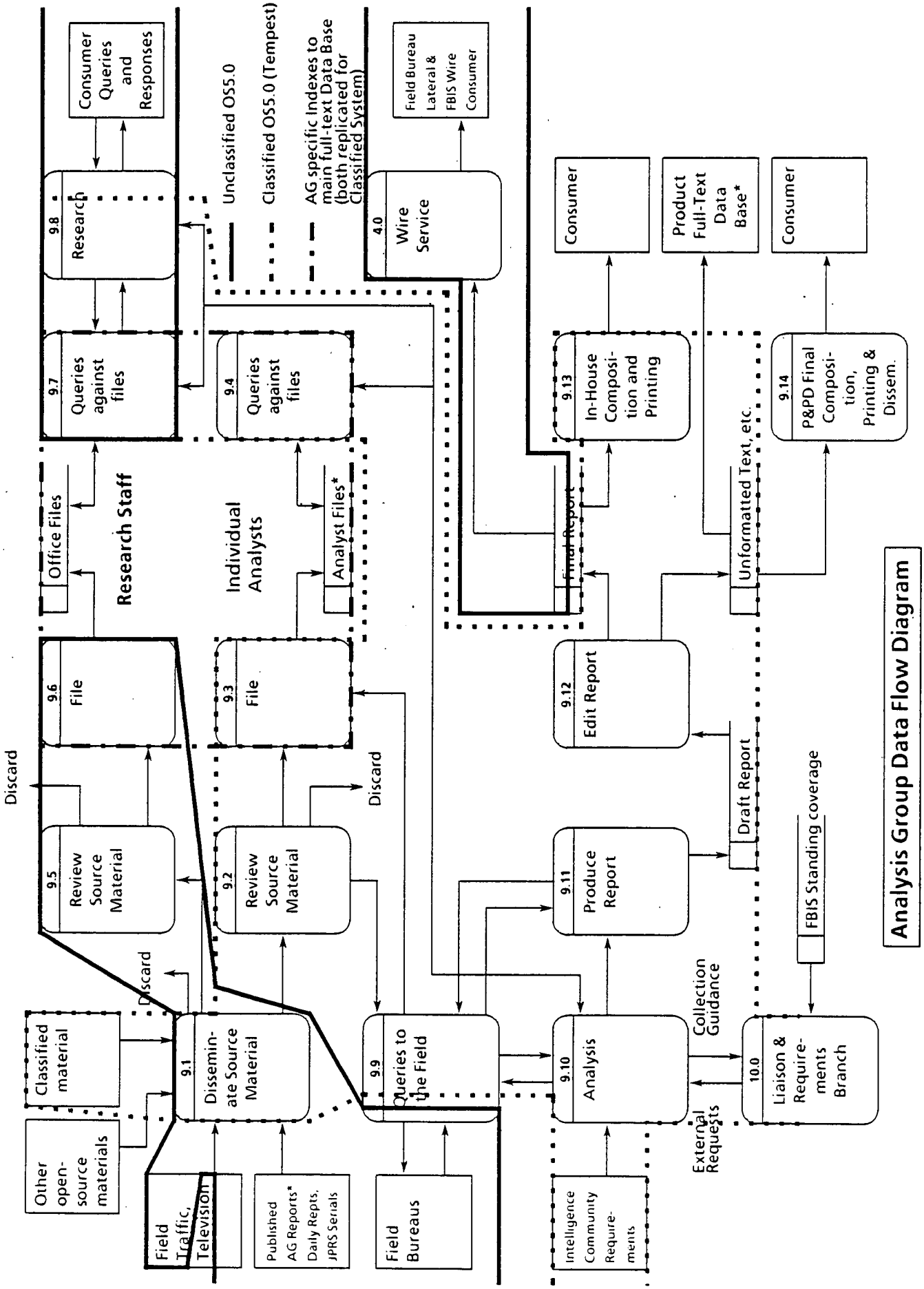
Office System 5.0, with Edit Trace

This is a potential application for scanners and optical disks





Joint Publications Research Service Data Flow Diagram -- Publications Section, etc.



*The main data base (or primary copy) contains Unclassified reports and files *only*

FBIS HEADQUARTERS PROCESSING AND COMPOSITION

Development Requirements

Enhancements to the Network Services

- Autodin Interface
- Autodin "Mail Gateway"
- FBIS Wire Service Interface/Automatic Service Message Generation
- Phototypesetter Interface for the Print Service

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FBIS HEADQUARTERS PROCESSING AND COMPOSITION

Development Requirements

Enhancements to the Basic Workstation

- Edit Trace (automatically)
- Text Processing Aids (such as Writer's Workbench)
- Composition Features, such as are planned for the Composition System
- Database Interface(s) from the Workstation
- Very frequent "New Mail" checking

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FBIS HEADQUARTERS PROCESSING AND COMPOSITION

Network Services Enhancements

- Autodin "Mail Gateway"/Autodin Interface
  - Autodin protocols on the RS232C port of the 8000 processor
  - Outgoing Autodin message (including the Autodin Headers and Routing Info.) is received over the Ethernet as the *text* of an NS message, addressed to one of four precedence queues
  - Outgoing message is stripped of its attributes, leaving plain text, and the text is forwarded to Autodin, with the queues being handled in precedence order
  - An outgoing message longer than 1000 words should be automatically broken up into "takes", with the (plain text) headers regenerated for subsequent takes, and appropriate cross-references added

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FBIS HEADQUARTERS PROCESSING AND COMPOSITION

Network Services Enhancements

- Autodin "Mail Gateway"/Autodin Interface (cont.)
  - The precedence queues must be manipulable from a workstation, using Remote Administration procedures; if a message is moved from one queue to another, its precedence code must be changed appropriately
  - A log is kept containing copies of all outgoing traffic; this is periodically purged
  - An incoming message text is parsed, and attributes are created corresponding to the header information
  - Messages in multiple "takes" are automatically re-assembled into a single message, using the cross-reference information in the headers

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FBIS HEADQUARTERS PROCESSING AND COMPOSITION

Network Services Enhancements

- Autodin "Mail Gateway"/Autodin Interface (cont.)
  - If a specific individual is named as the recipient of a message, it should be routed to that individual's mailbox; otherwise it should be sent to a "well-known" mailbox
  - At Headquarters, some further routing must be done: first, check for "publishable" messages -- these *all* go to "well-known" mailboxes for Analysis Group, Wire Service, and Daily Report; all others not addressed to specific individuals go into a "well-known" mailbox for Administrative messages
  - For the Daily Report, also check for which book(s) the messages are intended for, and forward to *specific* "well-known" mailboxes for each book
  - A log is kept containing copies of all incoming traffic; this is periodically purged

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FBIS HEADQUARTERS PROCESSING AND COMPOSITION

Network Services Enhancements

- FBIS Wire Service Interface/Automatic Service Message Generation
  - FBIS Wire Service protocols (TTY, all Upper-Case) on RS232C ports of Communications Interface Unit(s)
  - Outgoing Wire Service message is received over the Ethernet as the *text* of an NS message, addressed to "Wire Service"
  - Outgoing message is stripped of its attributes, leaving plain text, and the text is forwarded to the FBIS Wire; outgoing items are separated by two carriage returns and ten line-feeds
  - An outgoing message longer than 100 lines should be automatically broken up into "takes", with the (plain text) headers regenerated for subsequent takes, and appropriate cross-references added; the notation (MORE) will be added at the end of all except the last take

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FBIS HEADQUARTERS PROCESSING AND COMPOSITION

Network Services Enhancements

- FBIS Wire Service Interface/Automatic Service Message Generation (cont.)
  - A log is kept containing copies of all outgoing traffic; this is periodically purged
  - At the beginning of the day, and after 60 minutes of idle time, "service messages" must be generated (automatically) and sent out over the FBIS Wire, so that consumers know their equipment is working

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FBIS HEADQUARTERS PROCESSING AND COMPOSITION

Network Services Enhancements

- Phototypesetter Interface to the Print Service
  - Documents for typesetting are received over the Ethernet in Interpress format
  - A decomposer is needed to convert from Interpress to APS-5 typesetting control commands, rather than laser printer control
  - A driver is needed to send the resulting APS-5 compatible files over the RS 232C port for transmission to the typesetter located elsewhere
  - The workstation must know about the character widths of the fonts on the APS-5

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FBIS HEADQUARTERS PROCESSING AND COMPOSITION

Basic Workstation Enhancements

- Edit Trace (automatically)
  - The requirement is to show, on the screen and printed copy, the editing changes which have been made from one version of a document to a subsequent version
  - As a corollary, the entire edit trace within a version must be suppressed as a subsequent version is created
  - The edit trace should not be present within the final or composed and published file
  - Edit Trace should, however, remain within messages sent between users during the editing and publishing process

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FBIS HEADQUARTERS PROCESSING AND COMPOSITION

Basic Workstation Enhancements

- Edit Trace (automatically) (Cont.)
  - It is suggested that Edit Trace can be shown by marking all characters selected for deletion (or removed by moving to another location) as strikeout-type, rather than removing them from the screen/printout, and that all characters entered (via either typing, copying, or moving) shall be displayed in an alternate typestyle
  - When a new version is created, all deletions will actually occur, and the alternate typestyle will be converted to the normal typestyle

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FBIS HEADQUARTERS PROCESSING AND COMPOSITION

Basic Workstation Enhancements

- Text Processing Aids (such as Writer's Workbench)

  (For the present, we are assuming that Writer's Workbench will operate on a VAX-based server, and that documents for analysis will be placed in a "File Drawer" on that VAX, with control instructions entered into a VT100 window; if this procedure is deemed to be too cumbersome, some development at the workstation may be required.)

- Composition Features, such as are planned for the Composition System

  (We have received assurances that the Composition System itself will satisfy this requirement in a time suitable for the FBIS Modernization Program.)

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FBIS HEADQUARTERS PROCESSING AND COMPOSITION

Basic Workstation Enhancements

- Database Interface(s) from the Workstation

  (For the present, we are assuming that the VT100 emulation window will satisfy this requirement -- this implies that completed documents must be explicitly entered into the Full-Text Database.)

- Very frequent "New Mail" checking
  - This simply requires that the time interval at which the workstation checks the Mail Service for new mail should be changed to (say) 15 seconds, rather than the current 5 minutes

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FBIS HEADQUARTERS PROCESSING AND COMPOSITION

Risk

- **Technology**

  The technology risk in 8000 Network System interface and software developments is low, since the technology is established, and is controlled by Xerox

- **Cost**

  Costs present a manageable risk, because the developments involved, while substantial, are comparable to developments which have already taken place, and have known solutions and available modules on which to build

- **Schedule**

  Schedule maintenance depends on the continued availability of a sufficient number of skilled programmers who are knowledgeable in the system; this presents some level of risk, since the Xerox programming language (Mesa) is not widely available elsewhere

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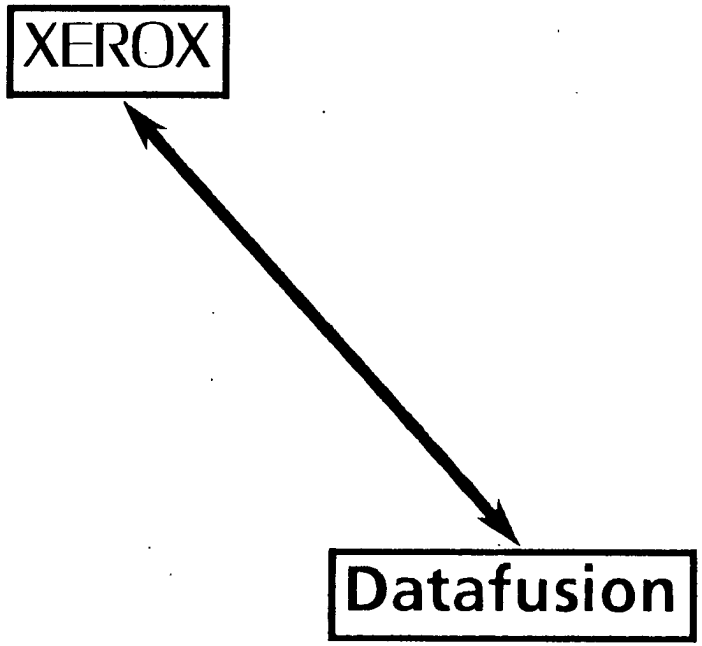
HEADQUARTERS DBMS SELECTION PROCESS

XEROX - Datafusion

- Datafusion technology synergistic with Xerox approach to networking
- Willingness to work together
- Comfortable exchange of information



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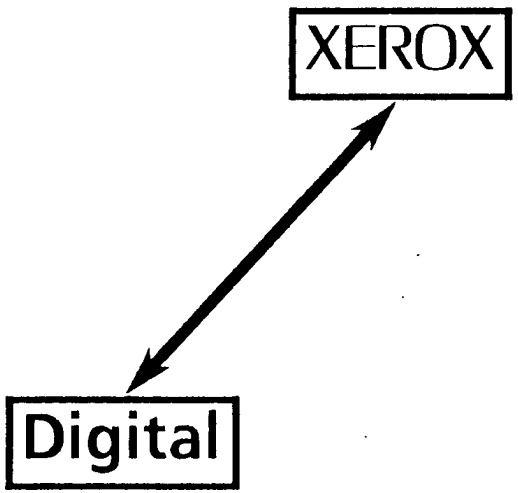
HEADQUARTERS DBMS SELECTION PROCESS

XEROX - Digital

- DEC processors are imbedded in some Xerox products
- DEC processors are imbedded in most XSIS custom systems
- DEC is a co-sponsor, together with Xerox and Intel, of Ethernet
- DEC processors are integrated into the Xerox Ethernet
- Long association between Xerox and Digital Equipment Corporation
- Comfortable exchange of information



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HEADQUARTERS DBMS SELECTION PROCESS

Digital - Datafusion

- TSP has DEC processor imbedded in it
- Datafusion does its software development on DEC processors

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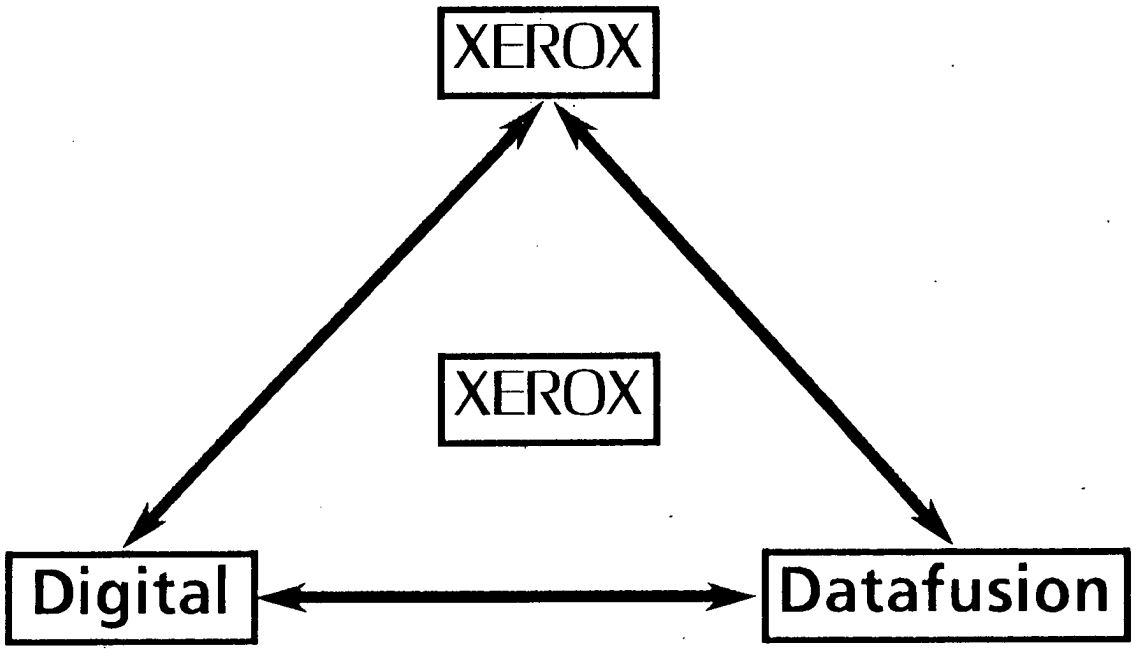
HEADQUARTERS DBMS SELECTION PROCESS

XEROX - The logical system integrator

- Used to working with DEC
- Comfortable with exchange of information between all three companies
- Datafusion is familiar with FBIS data base and its opportunities



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HEADQUARTERS DBMS SELECTION PROCESS

- Many other products were considered
- These are the companies that work best together
- Their products meet the requirements
- Their willingness to cooperate with each other aids the overall success of the program

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HEADQUARTERS DBMS SELECTION PROCESS

- It was felt that a software solution to the text search problem would not have the necessary performance for the headquarters
  - Particularly as the data base grew
  - Particularly as the number of queries grew
  - Particularly if the number of users grew

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HEADFQUARTERS DBMS SELECTION PROCESS

DBMS Company and Product Issues	Xerox Approach	
	DEC's VAX Rdb/VMS	Datafusion's TSP
No. years company in business	27	7
Company willingness to work with us on product modifications	None	High
Company willingness to write custom software	High	High
Number of years product in marketplace	2 Months	4 or 5

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HEADQUARTERS DBMS SELECTION PROCESS

ADVANTAGES OF BACKUP STRATEGY

- *Minimum* operator activity
- *No* mounting of disks
- *No* storage of disk packs or magnetic tapes
- *No* storage and maintenance of backup copies is required
- Operator activity only in event of disk failure

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HEADQUARTERS DBMS SELECTION PROCESS

ADVANTAGES OF BACKUP STRATEGY

- No need to backup text search "overhead" data
  - The software solution does not separate the index information from the data
  - A software solution to text search would require backing-up the index information as well as the data
  - The data in the TSPs can easily be reconstructed from the text stored on the VAX
  - The data in the TSPs is partitioned from the text data
  - The data in the TSPs will not be backed-up directly

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HEADQUARTERS DBMS SELECTION PROCESS

ADVANTAGES OF BACKUP STRATEGY

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HEADQUARTERS DBMS COMMERCIAL PRODUCTS

Digital Equipment Corporation (DEC)

- Hardware
  - VAX Cluster
  - VAX 11/785
  - Intelligent I/O Server
  - Disk storage
- Software
  - VAX/VMS
  - Common Data Dictionary
  - VAX Rdb/VMS
  - DATATRIEVE
  - TDMS

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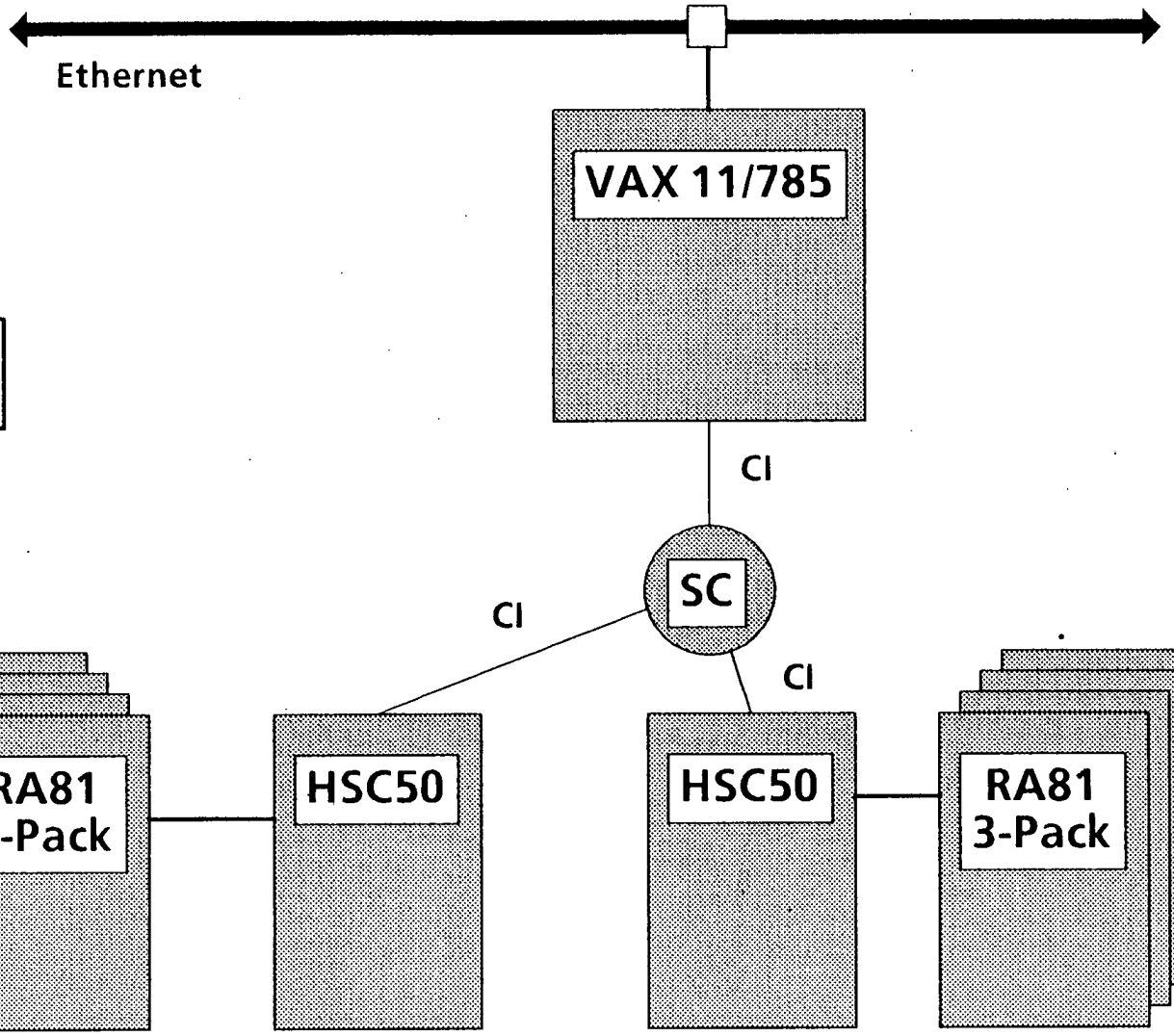
HEADQUARTERS DBMS COMMERCIAL PRODUCTS

- DEC VAX Cluster



SC = Star Coupler
CI = Computer Interconnect

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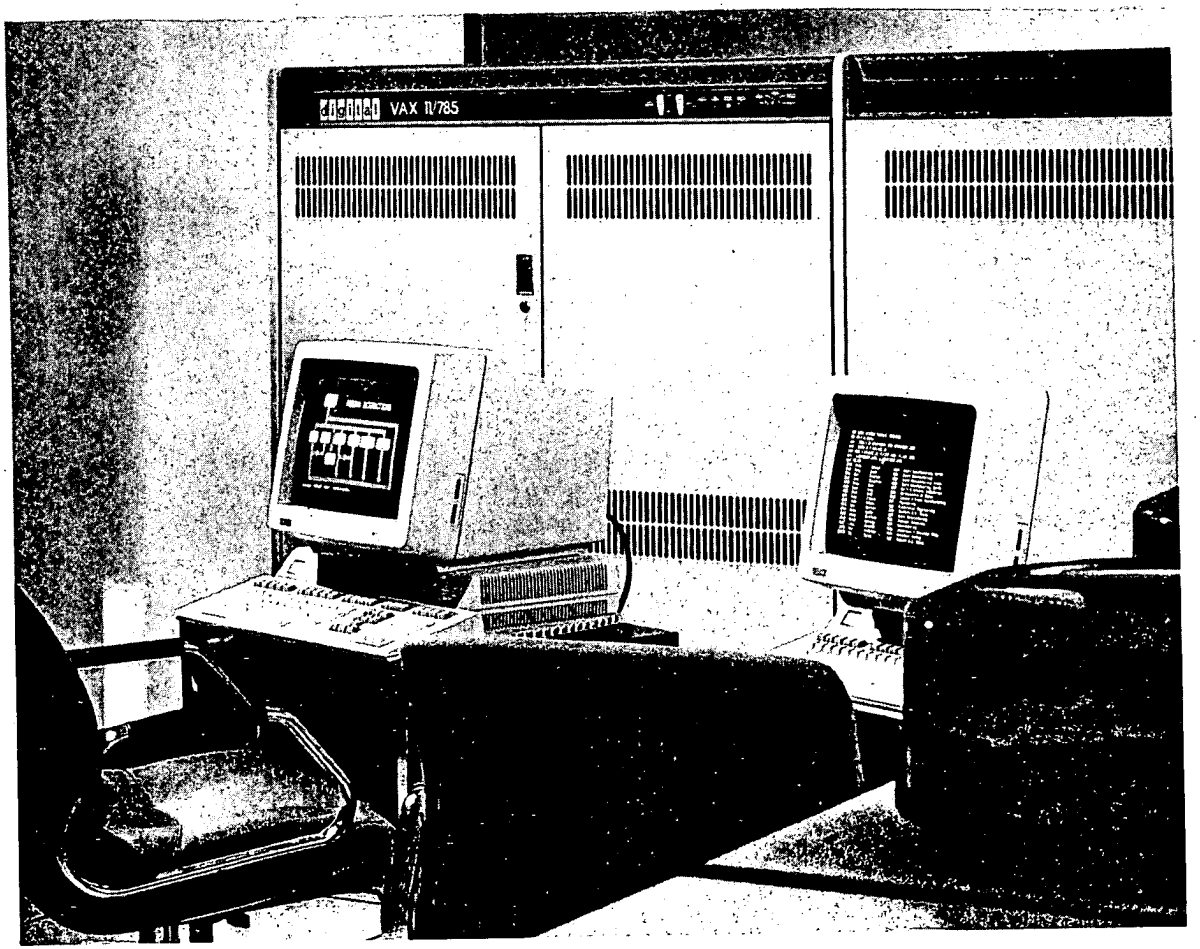
HEADQUARTERS DBMS COMMERCIAL PRODUCTS

- DEC VAX 11/785



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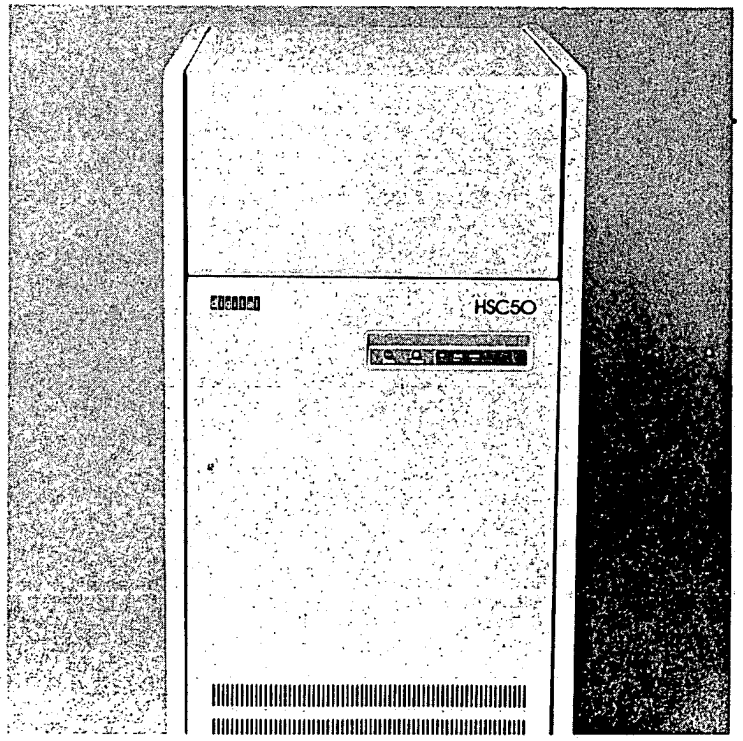
HEADQUARTERS DBMS COMMERCIAL PRODUCTS

- **DEC HSC50**
  Intelligent I/O Server



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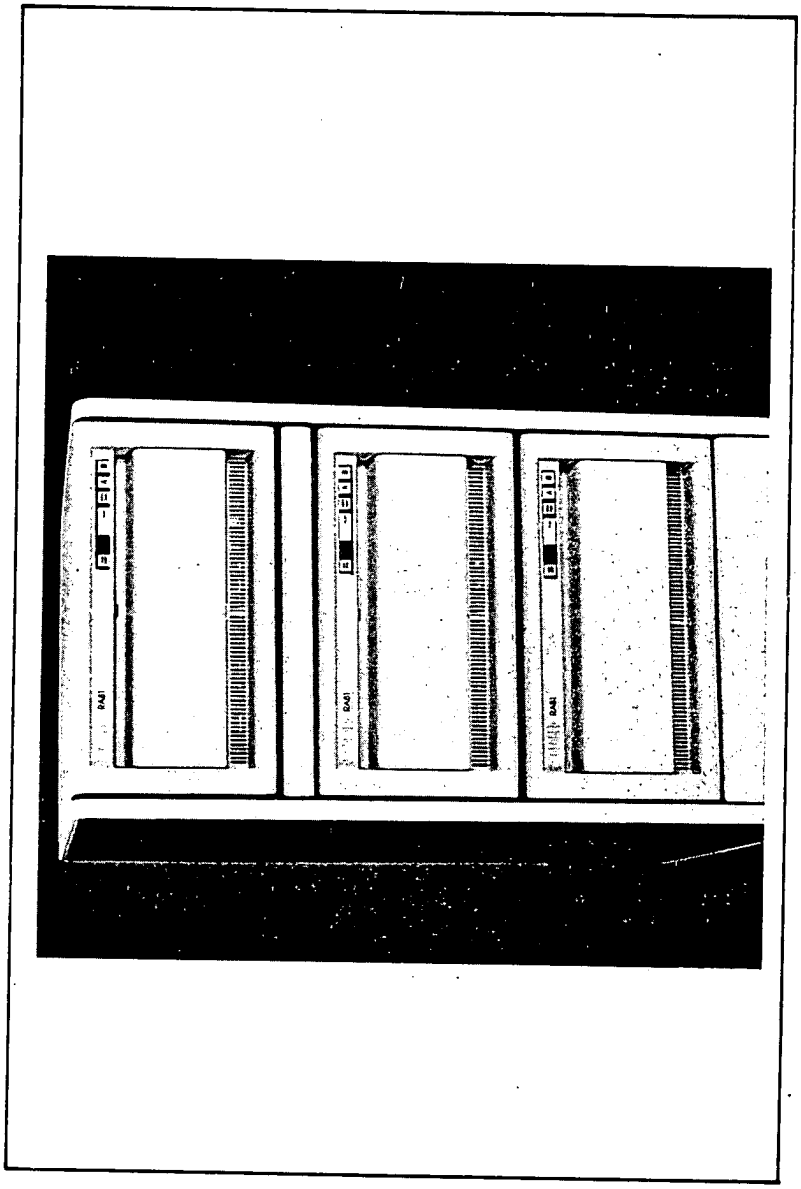
DEC RA 81 DISK DRIVE 3-PACK



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HEADQUARTERS DBMS COMMERCIAL PRODUCTS

DEC VAX 11/785

- High-end member of the VAX family of computers
- 32-bit architecture
- 4 gigabytes of virtual addressing space
- 32 KB cache memory
- Up to 16 megabytes of physical memory
- Remote diagnosis available
- Supports Ethernet interface with XNS protocols
- Can add expansion cabinets

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HEADQUARTERS DBMS COMMERCIAL PRODUCTS

DEC Intelligent I/O Server

- Is a node on a VAX Cluster
- Command queue stores up to 120 I/O requests for disk seek optimization
- Data buffering of up to 128 KB of data (256 disk sectors)
- Self contained diagnostics
- Host-independent diagnostic and maintenance
- Off-line utilities
- Supports up to 24 RA81 disk drives

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HEADQUARTERS DBMS COMMERCIAL PRODUCTS

DEC MASS STORAGE DEVICES

- Add DBMS data will be stored on RA81 disk drives
- Rack mounted Winchester disk
- Formatted capacity of 456 Megabytes
- Can be combined 3 per rack to give almost 1.4 Gigabytes usable data

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HEADQUARTERS DBMS COMMERCIAL PRODUCTS

RA81 ERROR CORRECTION AND DETECTION FEATURES

- 170 bit error correction code (ECC) detects and corrects up to eight independent 10-bit error bursts
- Redundant (4 times) header addresses
- Over 17,000 spare sectors for dynamic defect re-allocation
- Error detection code checks controller memory and data path errors as well as ECC hardware operations
- All errors are reported to VAX/VMS to be logged in the error log, enabling detection and preventive action before subsystem failure

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HEADQUARTERS DBMS COMMERCIAL PRODUCTS

RA81 PERFORMANCE FEATURES

- Seek ordering
- Overlapped seeking
- Rotational optimization
- Express queue
- Speed matching buffers

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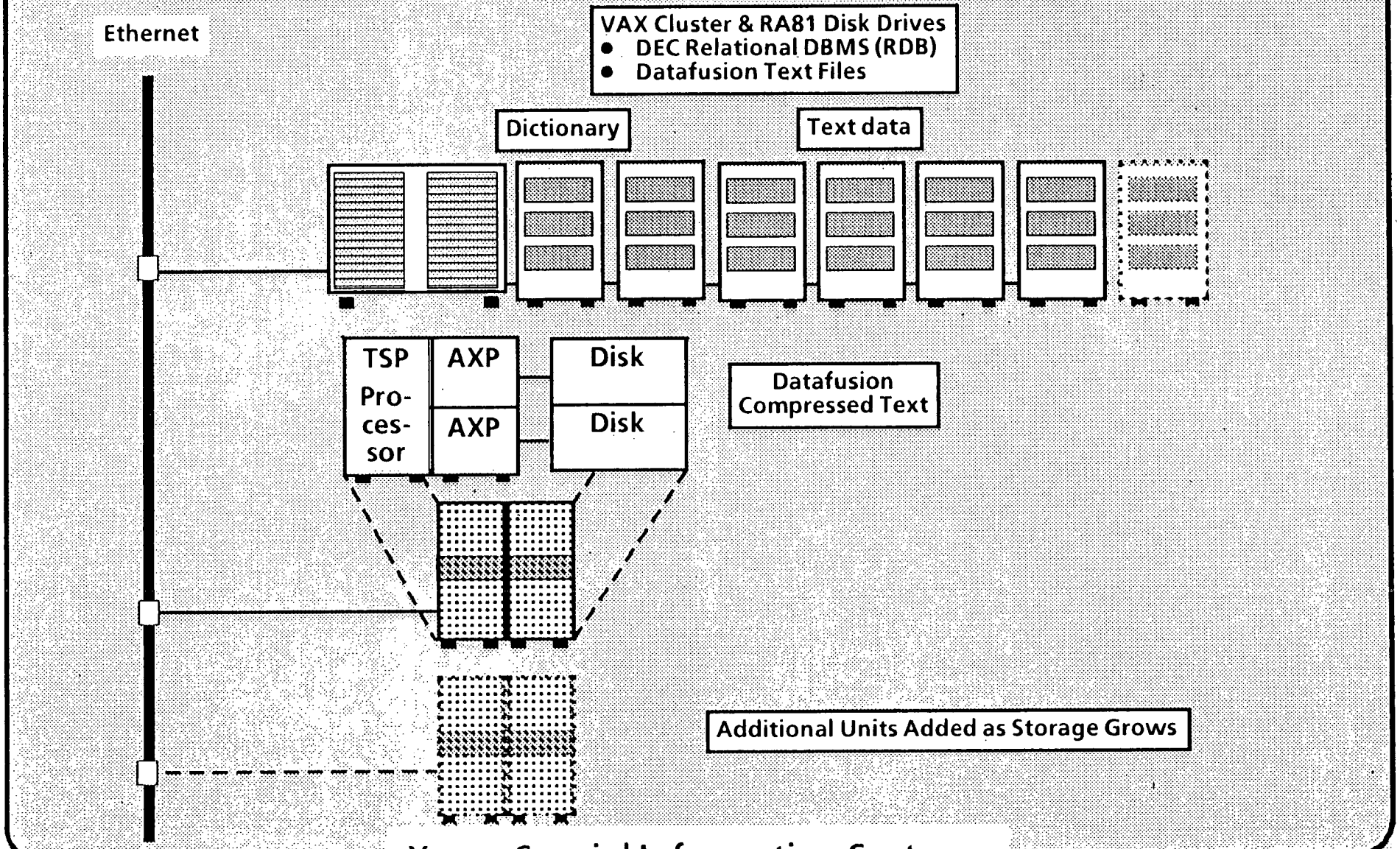
DATAFUSION ARCHITECTURE



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HEADQUARTERS DBMS COMMERCIAL PRODUCTS

Datafusion TSP PERFORMANCE FEATURES

- The data that is searched is compressed to 5 - 10 % of original size
- Multiple searches occur in parallel (up to 8 KB of query at a time)
- "Hits" are returned as they are found
- Regardless of the size of the data base, a search will be completed in 3 - 5 minutes
- There is virtually unlimited expansion capability

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HEADQUARTERS DBMS COMMERCIAL PRODUCTS

Datafusion Software

- All systems are custom, but based on prior systems
- Software can be done on a fixed price basis

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HEADQUARTERS DBMS COMMERCIAL PRODUCTS

XEROX SOFTWARE - EVMS

- Allows a VAX to work on a Xerox Ethernet together with other Xerox products.
- Supports file transfer to and from VAX
- Supports virtual terminal emulation from workstations
- Allows remote login from the virtual terminals

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HEADQUARTERS DBMS DEVELOPMENT

- Integration of VAX Rdb/VMS and Datafusion TSP
- New icon
- TDMS screens

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HEADQUARTERS DBMS DEVELOPMENT REQUIREMENTS

Integration of VAX Rdb/VMS and Datafusion TSP

- Common user interface
- Promote "Ease of learning and use of the system"
- Based on the software written by DEC to integrate VAX Rdb/VMS and BASIS

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HEADQUARTERS DBMS DEVELOPMENT RISKS

Integration of VAX Rdb/VMS and Datafusion TSP

- Cost - Medium
- Factors are
  - Datafusion will quote a fixed price for the control and front end software
  - Xerox will write back end software
  - Xerox will integrate the two
- Schedule - Medium because of the two companies doing the work
- Technology - Low because this development involves no new technology

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SELECTION PROCESS - HEADQUARTERS COMMUNICATIONS

COMMERCIAL PRODUCTS

- Items vs. functions
- Description of item
- Short specification/features
- Why this one?

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SELECTION PROCESS-HEADQUARTERS COMMUNICATIONS

X4127

AUTODIN INTERFACE

FEATURES VS. MFG.	INTEQ	ANALYTIC
Cat. I certified	+	+
All protocols	+	-
Performance	+	+
Reliability	+	+
Cost	+	-

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SELECTION PROCESS - HEADQUARTERS COMMUNICATIONS

DEVELOPMENT

- Requirements
- Description of item
- Short specification/features
- Risks
  - Technology
  - Schedule
  - Cost

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SELECTION PROCESS - HEADQUARTERS COMMUNICATIONS

DEVELOPMENT OF COMMO INTERFACE SOFTWARE

- Required to provide Commo MMI and traffic control
- Features
  - Integrated icon/window MMI
  - Provides full search, editing and distribution control
  - Interfaces to all traffic logs and files
  - Provides natural control and confirmation
- Risks
  - Technology - low - established techniques and tools
  - Schedule - low - relatively independent
  - Cost - low - established operation - good estimate possible

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SECURITY IMPACT ON DESIGN

PRINCIPAL SECURITY CONSTRAINTS:

- One-way-only computer-to-computer communication from unclassified to classified system.
- Classified queries against unclassified database must be performed on classified workstations.

RESULT:

- Database queries cannot propagate from classified workstations to unclassified DBMS.
- Unclassified database must also be available on classified system.

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SECURITY IMPACT ON DESIGN

DESIGN SOLUTION:

- Provide separate systems for classified and unclassified work.
- Replicate the unclassified database on the classified system.
- Provide classified-system functionality for receiving messages, database query, retrieval and update, report editing, composing, and phototypesetting.
- Provide one-way computer-to-computer communication link from unclassified to classified system using fiber optics. Provide return communication via flexible disks under control of Security.
- Provide communication capability with agency computers.

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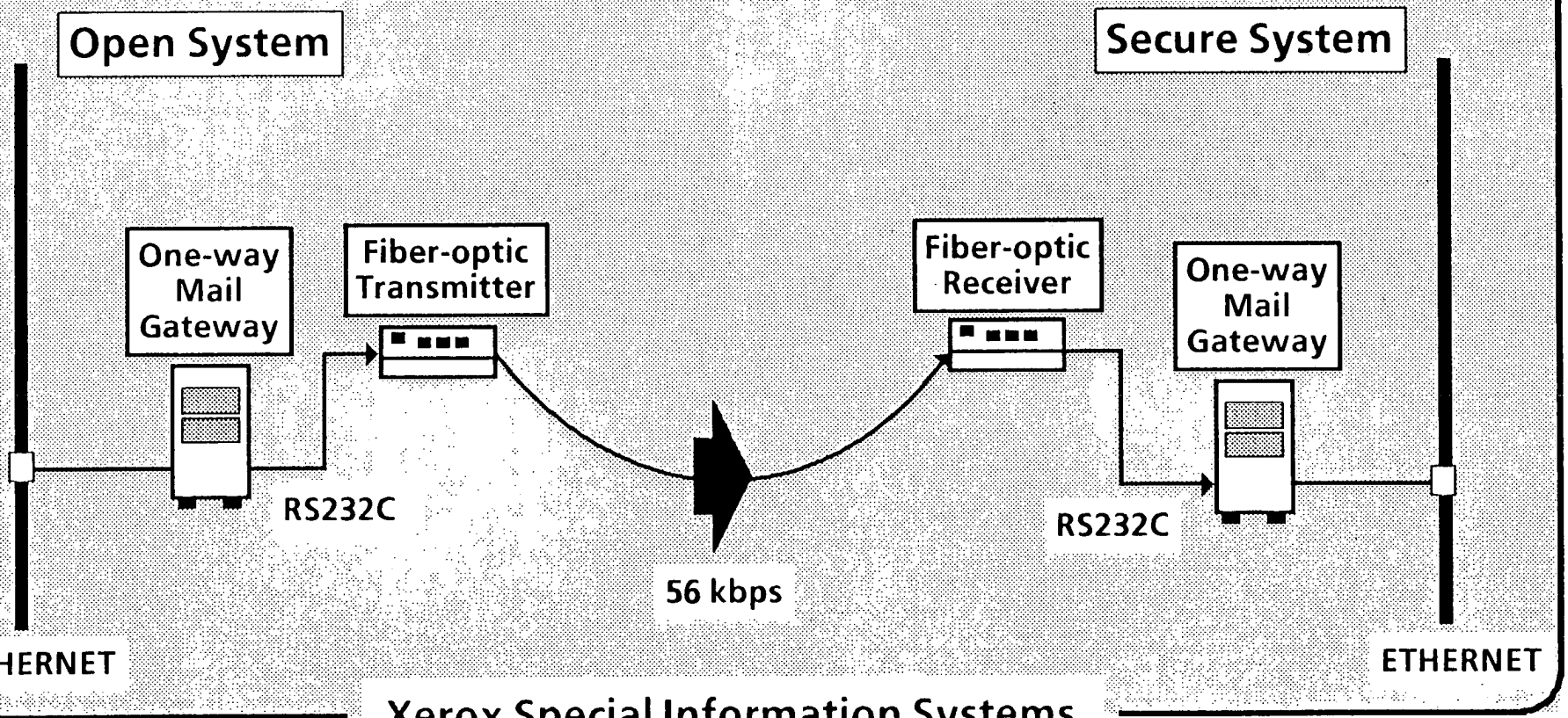
COMMUNICATION BETWEEN OPEN & SECURE SYSTEMS

Approach to Communication from Open to Secure System

- One-way only connection guaranteed by fiber-optic link
- Documents sent as mail messages via one-way mail gateways
- Less than 1 hour needed to transmit 1 million words per day.



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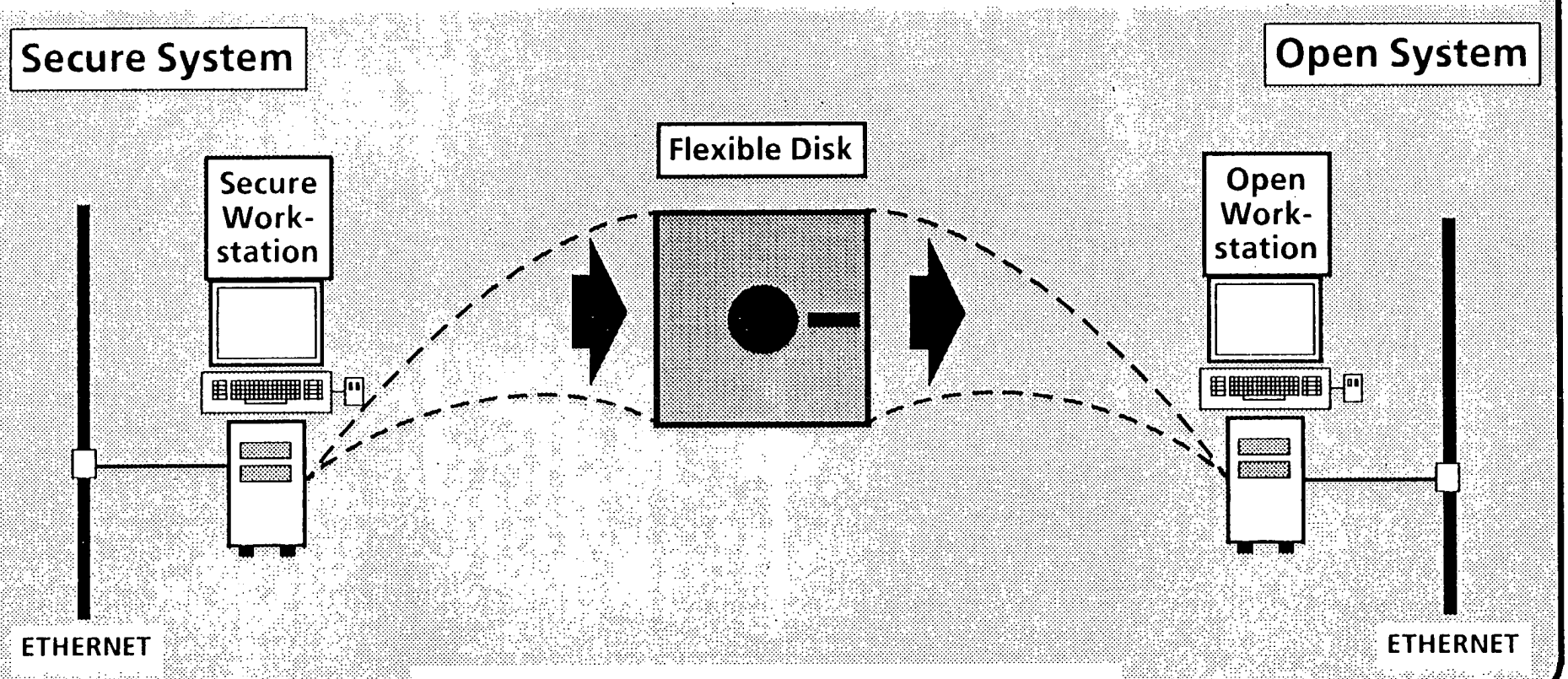
COMMUNICATION BETWEEN SECURE & OPEN SYSTEMS

Approach to Communication from Secure to Open System

- Documents transported via flexible disk.
- Sanitized documents written to floppy on secure workstation.
- Floppy read by workstation on open system.
- Floppies under control of Security and kept in vault for audit.



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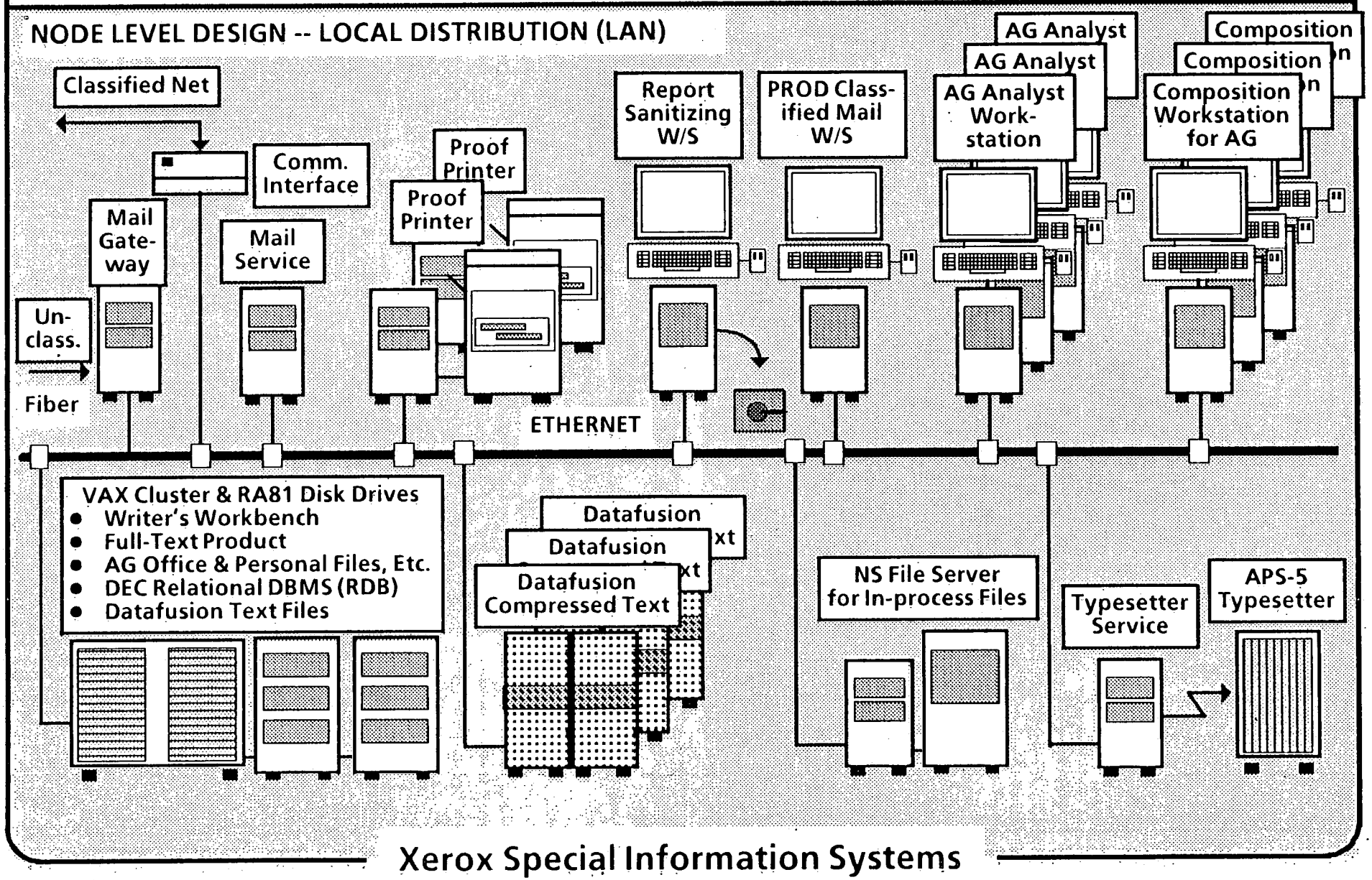
HEADQUARTERS CLASSIFIED SYSTEMS ARCHITECTURE



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SCHEDULE OVERVIEW

- Task accomplished over six year period to:
  - Accomodate existing funding
  - Reduce development manpower levels
  - Improve development effectivity

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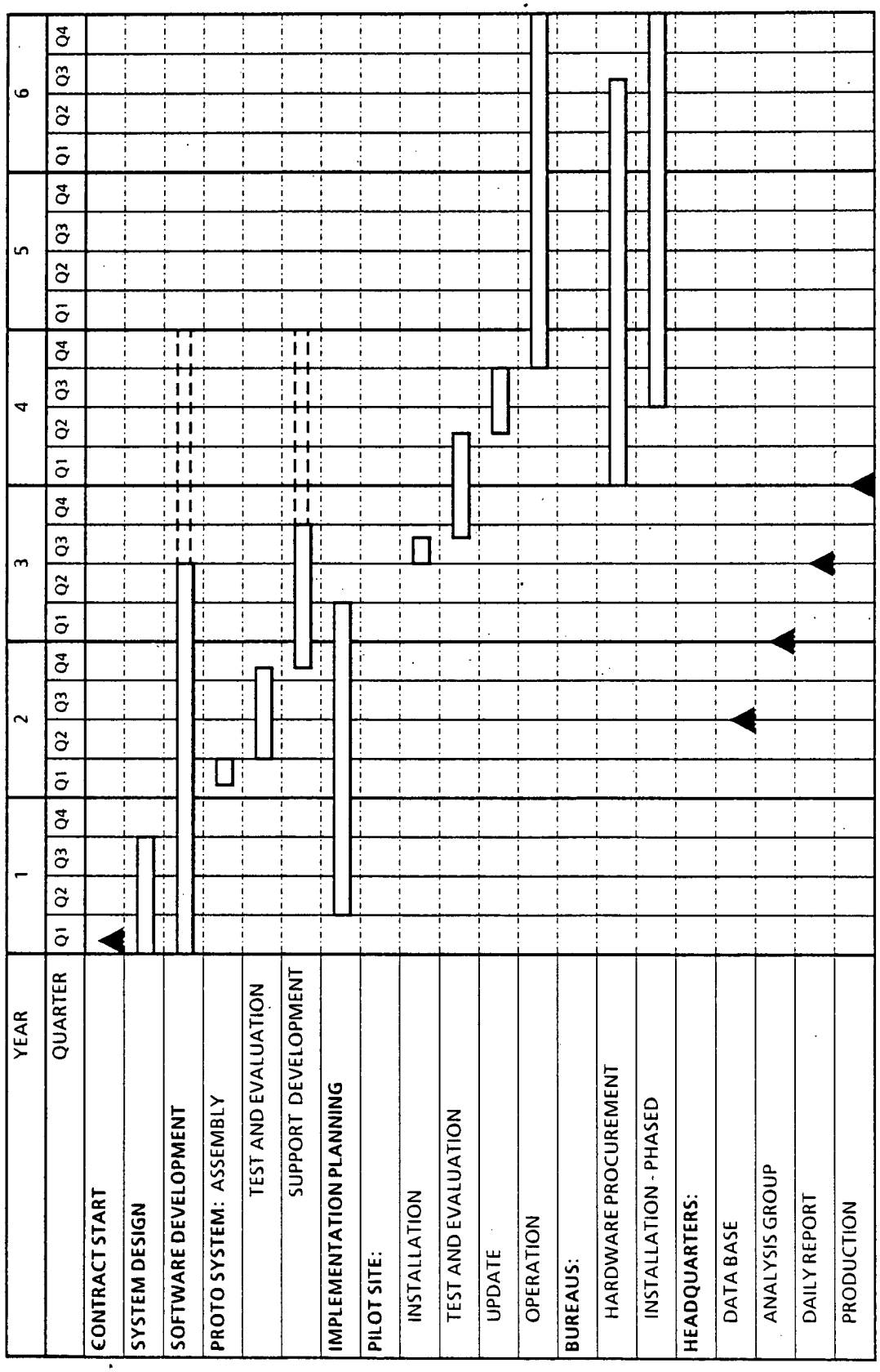
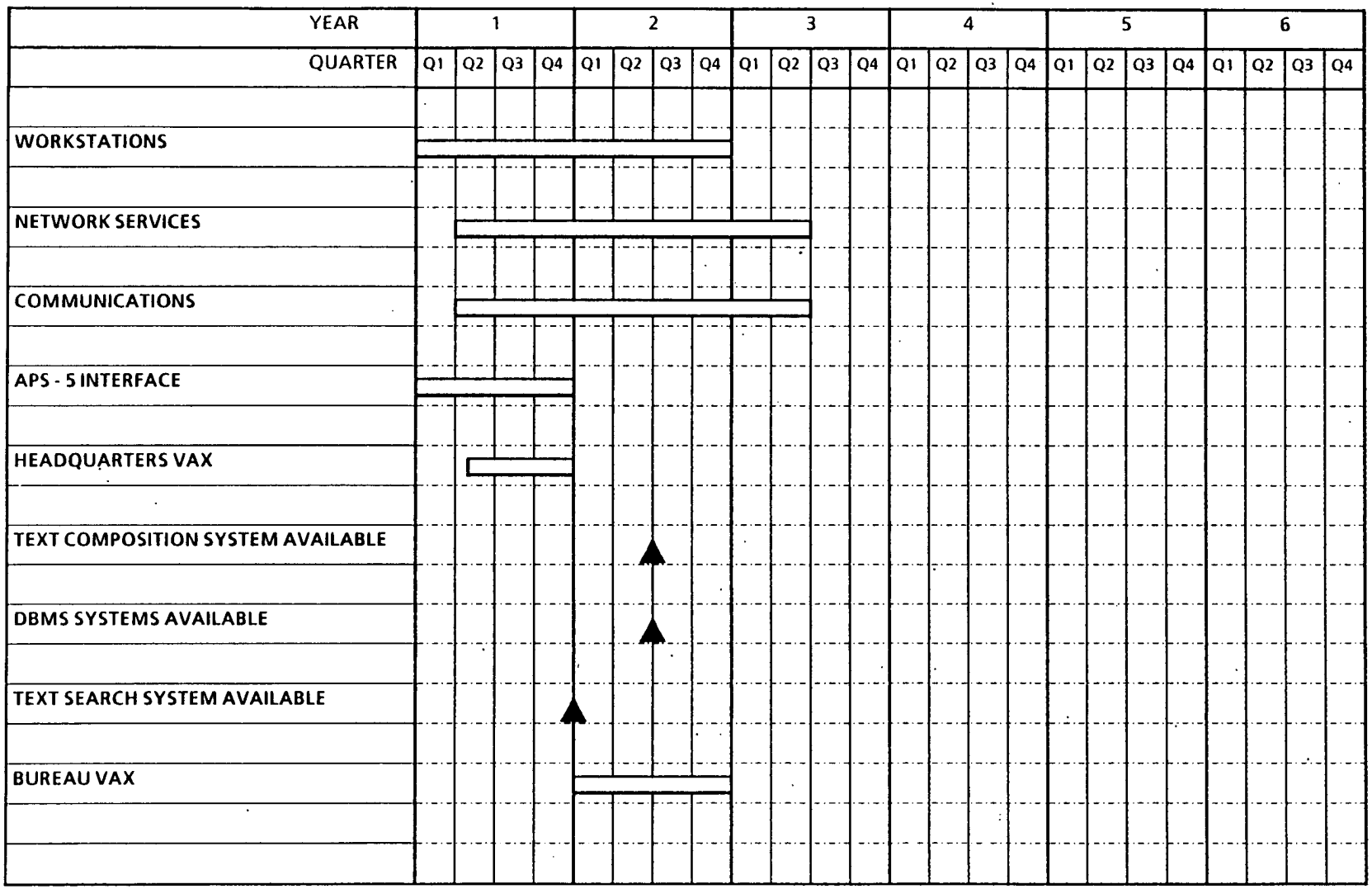
FBIS MODERNIZATION PROGRAM - OVERVIEW



FBIS MODERNIZATION PROGRAM - SOFTWARE DEVELOPMENT



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PROTOTYPE SYSTEM

- Demonstrate system concepts
- Development testbed
- Small system configuration
  - Workstations
  - File server
  - Print server
  - Communications server
  - Simulated Autodin and Press Agency
  - VAX testing prior to delivery
- Remains at XSIS throughout development

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PILOT SYSTEM

- Small Brueau configuration
- Installed at agreed-upon site
- Tests full Bureau features
- Provides feedback for software development
- Updated prior to final installation
- Converted to operating Bureau

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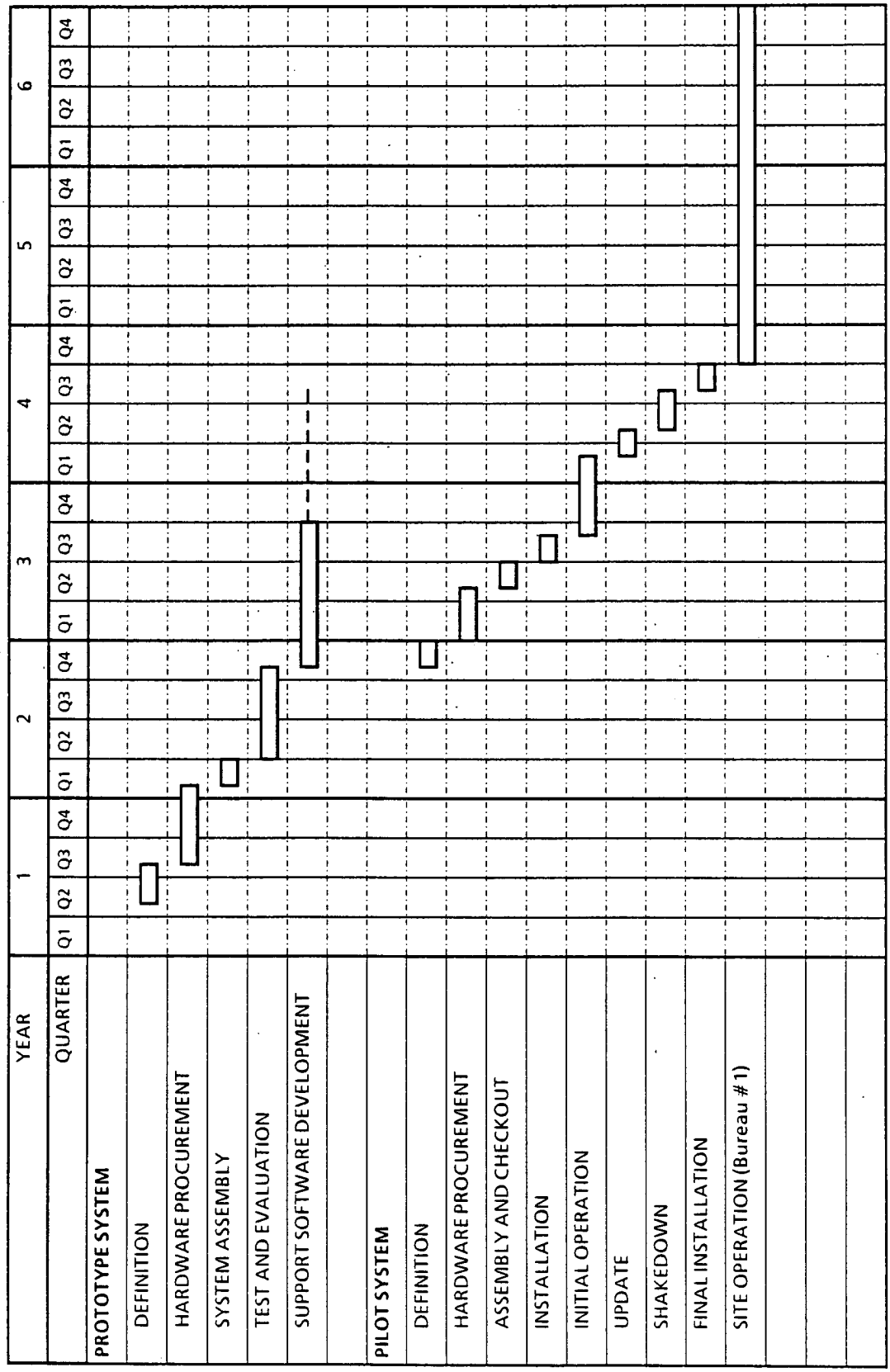
FBIS MODERNIZATION PROGRAM - PROTOTYPE AND PILOT SYSTEMS



INSTALLATION

- Phased system installations
  - Headquarters - 21 months
  - Bureaus - 27 months
    - 90 days each
    - Start at 60 day intervals

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TRAINING

- Selected training staff
- Course material prepared during development
- Resources of Xerox Training Center available
- Training teams sent to sites during final installation
- Training at the user level

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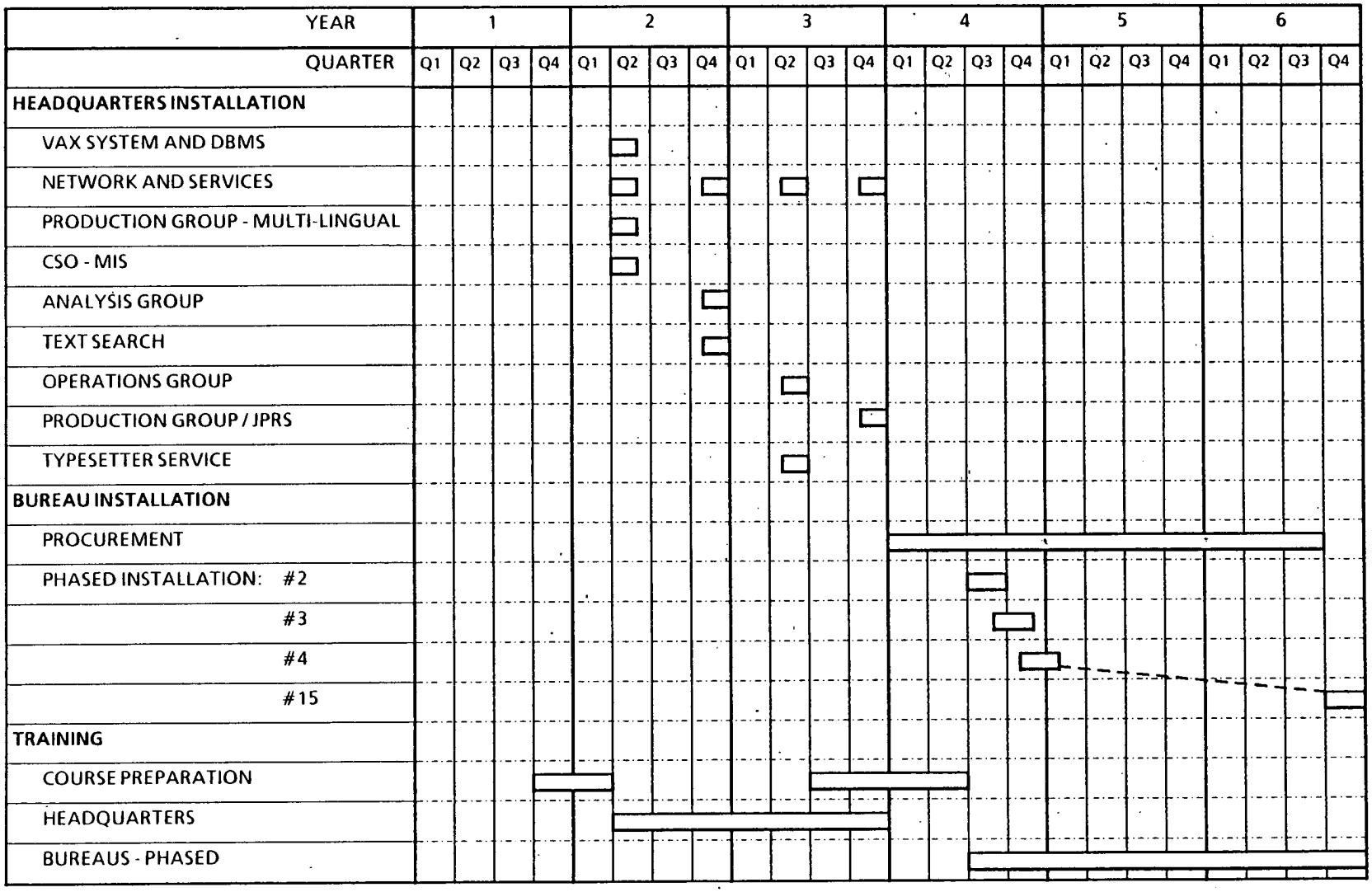
FBIS MODERNIZATION PROGRAM - INSTALLATION AND TRAINING



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DOCUMENTATION

- INSTALLATION
  - Physical
  - Power, A/C
  - 6 - 9 months prior to installation
- SYSTEM
  - Operation Procedures
  - Feature descriptions
  - Organized by User function
  - On-line "Help"
  - System Administrator manual
  - Available with hardware delivery
- MAINTENANCE
  - Standard Product
  - Special Features
  - Available at installation

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MAINTENANCE APPROACH

XSIS will use the organizational model and expertise of Field Engineering and Systems Support (FESS) group to develop a maintenance plan:

- Cost-effective approach to FBIS system maintenance
- Monitor and support system operation for 5 years

Use top-down approach to issues and areas of concern. Propose

- Site survey of each major location to
  - Determine operational environment
  - Determine available resources
- Preventive maintenance plan and schedule
- Plan to ensure consumables supplies
- Plan and schedule for preventive maintenance

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MAINTENANCE APPROACH (2)

Maintenance approach also includes:

- Plan to provide on-going corrective maintenance
- Effective maintenance strategy for each equipment type by location
- A system logistics support plan
- Initial system, operations and maintenance documentation
- Spares, repair and inventory control
- Hardware and software change documentation
- Sustaining Field Engineering Support
- Monitoring of vendors/subcontractors/suppliers
- On-going training; customer and support personnel
- Hardware and software configuration control
- System performance analysis
- Support requirements forecasting
- On-going software support plan

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MAINTENANCE APPROACH (3)

Maintenance approach also includes:

- Quality assurance procedures and control of
  - Inventory
  - Sparing levels
  - Repair activities
  - Suppliers deliveries and services
  - MTBF analysis
  - Preventive and corrective maintenance effectiveness
  - Response time

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MAINTENANCE APPROACH (4)

- The development of the plan will minimize
  - System/unit downtime
  - Customer resource requirements
  - Labor/travel cost
  - Spares requirements
  - Mean time to repair
  - On-going maintenance and support costs

Effective training, preventive maintenance, and the establishment of a Logistic Support Function will achieve maximum:

- System availability
- Mean time between failures
- System throughput
- Customer/user satisfaction

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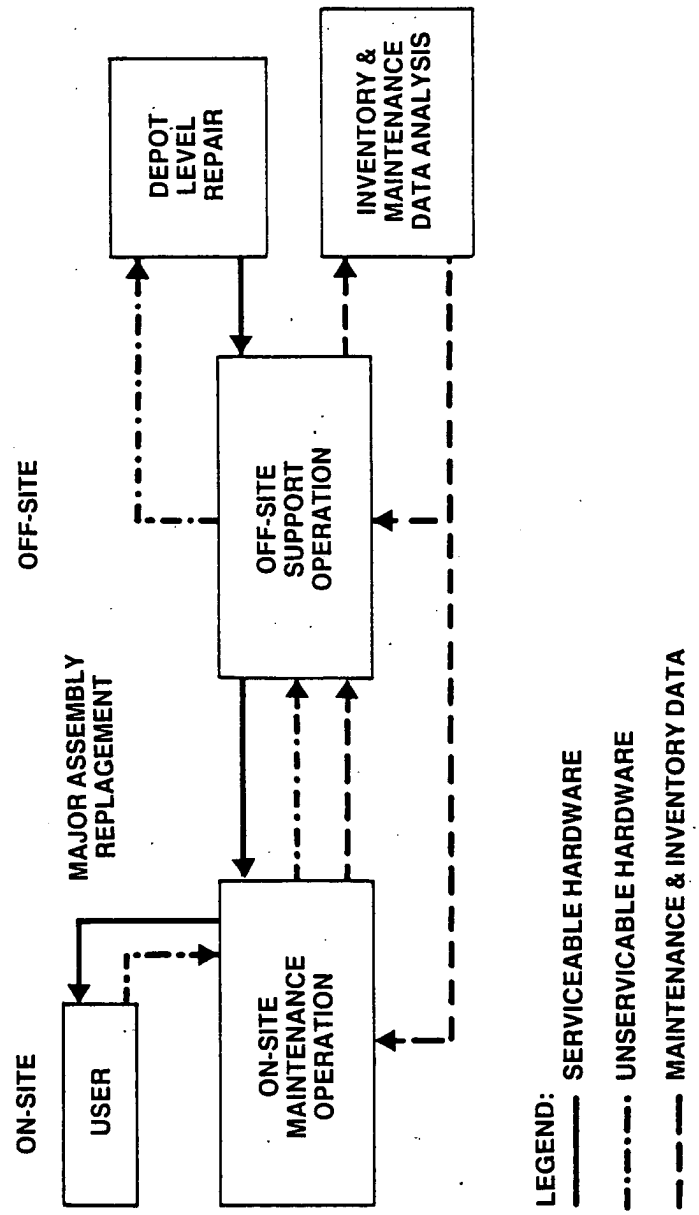
MAINTENANCE FLOW CHART



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PRELIMINARY RECOMMENDATIONS

On-site XSIS Field Engineering at FBIS HQ

- Provides on-site service
- Communicates with Bureaus
- Manages logistics support
- Customer support center

Backup on-call from XSIS/FESS, Washington

- Depot repair USA, Latin America
- 90-day USA and Latin America schedule

On-site XSIS Field Engineering, Okinawa

- on-site service, Okinawa
- Depot repair facility--Far East
- 90-day visit schedule--Far East
- Customer support center--Far East
- Backup possible by XSIS in Korea

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PRELIMINARY RECOMMENDATIONS (2)

On-site XSIS Field Engineering, London

- On-site service, London
- Europe, Middle East, Africa depot support
- 90-day site visit schedule
- Customer support center
- Backup possible by XSIS in Europe

10% spare equipment and assemblies

- no less than one of each unit
- 5% spare parts
- mailers and containers

Local Xerox and other vendor support, where available

Spare units, assemblies and parts at each depot

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