AXE Operation & Maintenance Platform

Basic Operation Activities

Module 1

Help	Exit

ERICSSON ⧤

PREFACE

Target Audience

This book is preliminary intended to be used as a course manual in the
Ericsson AXE Operation and Maintenance training program. The book is
a training document and is not to be considered as a specification of any
Ericsson language or system.

Identification

EN/LZT 101 105 /1, R1A

Responsibility

Training Supply

ETX/TK/XM

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1. Introduction

1.1 Module Objectives

┌─ **Module Objectives** ────────────────────────────┐

After completing this module the participant will be able to:

- Describe what is meant by AXE 10 System Operation and Maintenance Activities

- Describe the general structure of the Exchange Library and maintain the library through the use of the OPI "Handling of the Exchange Library"

- Describe the layout and contents of the B-Module and its use

- Understand the AXE 10 document numbering

- Understand the basic principles of AXEUSE, FIOL and DocView

- Describe the AXE 10 command structure

- Identify the operational activities that are to be performed based on information that is supplied in a specific work order and the contents of the associated B-module

- Understand the basic principles of operator-system communication and the role of I/O devices enabling such communication

- Understand the purpose of using communications programs FIOL and AXEUSE

- Communicate with the AXE system with the help of FIOL and AXEUSE

- Locate hardware units in the exchange through the use of commands.

└──┘

Figure 1.1
Module Objectives

1.2 **General**

AXE 10 Operation and Maintenance training consists of three courses.

AXE 10, Operation and Maintenance Platform. .... LZU 108 1451
AXE 10, Operation Handling................................ LZU 108 1452
AXE 10, Hardware Maintenance .... LZU 108 1453

This document describes the basic operational and maintenance activities that are related toAXE 10 exchanges. The information included corresponds to the AXE 10, O&M Platform course, LZU 108 1451. The course is intended to be used as a platform for the majority of AXE job-categories.

After completing this course, the participants will have a basic understanding of the most frequently performed activities at AXE 10 exchanges. They can thereafter continue their training by attending either the Operation Handling or the Hardware Maintenance course, or both.

2. Introduction to Operation and Maintenance Activities

Chapter Objectives

After completing this chapter the participant will be able to:

- Describe what is meant by AXE 10 Operation and Maintenance Activities.

Figure 2.1
Chapter Objectives.

2.1 APT Source System

This document deals with the new overall source system which is called APT 210 12.
The differences between APT 210 08/R5 and APT 210 12 are also pointed out when applicable.

APT 210 12 (see figure 1.2) contains the functionality of :

- APT 210 08 R5   POTS (Plain Ordinary Telephone Service)

- 4/APT 210 10 R3   ISDN (Integrated Services Digital Network)
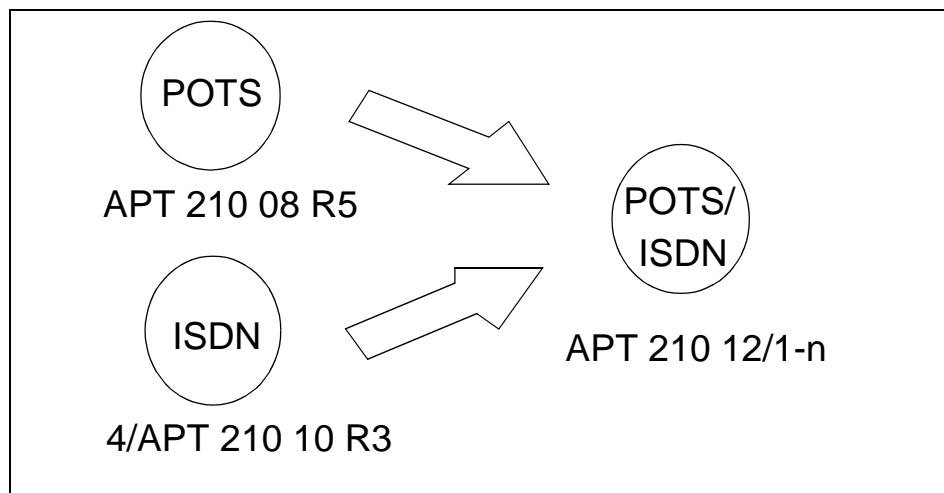
Figure 2.2
APT 210 12

Three variants have been developed:

- APT 210 12/1 R1   for France.
- APT 210 12/2 R1   for Norway and Spain.
- APT 210 12/3 R1   for the Netherlands and Switzerland.

Note that the countries referred to above were the first to implement the system. Numerous other countries have subsequently selected AXE local exchanges.

APT 210 12/1

APT 210 12/1 was originally developed for the French market. It is used when installing new local AXE exchanges or when upgrading existing local AXE switches requiring ISDN functionality integrated with POTS.

APT 210 12/2

APT 210 12/2 is a general application, developed initially for the Norwegian and Spanish markets. It is used when installing new local AXE exchanges or when upgrading existing local AXE exchanges requiring ISDN functionality integrated with POTS.

In terms of ISDN, both basic rate access (BA) and primary rate access (PRA) are provided.

APT 210 12/3

APT 210 12/3 is the latest release of the source system APT 210 12 marketed under the product name AXE Local 12.3. Close to complete back-

ward compatibility with the earlier released source systems (APT 210 08 R1-R5 and APT 210 12 R1-R2) has been maintained.

2.2   Description of Operational Activities

Operation is the normal, everyday running of the exchange when everything is working as it should. The purpose of the tasks included in the operational activities is to adapt the exchange to the continuously changing demands placed on it.
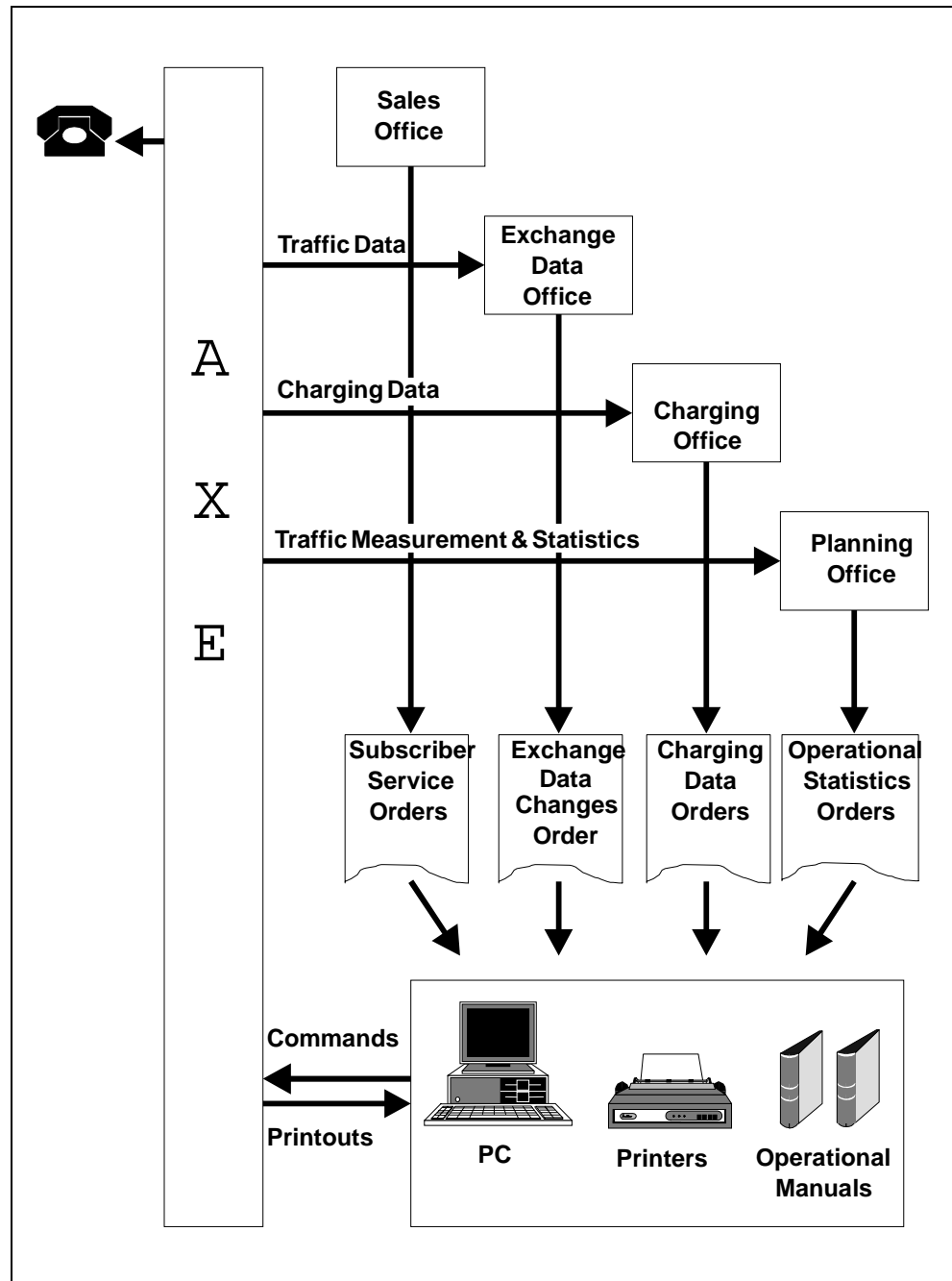
Figure 2.3
Operational Activities

Operational activities, (see figure 2.3), are normally initiated by work orders. Work orders may be the result of operator or subscriber demands.

In either case, a work order instructs the AXE staff to carry out modifications to the exchange, that are required for its adaption to the newly arisen needs.
Work orders are executed in accordance with the procedures defined in the AXE B-Module exchange documentation.

Operation staff communicate with the exchange by means of the AXE Input/Output system.

The following are a number of examples of operational activities:

- Changing subscriber data, e.g. activating a new subscriber line, providing a new service or changing the subscriber class of an existing subscriber

- Changing routing data, e.g. initiating a new route

- Recording statistics, e.g. traffic recording, such as monitoring of traffic measurements for a period and reporting or, in some cases, evaluating the result.

2.2.1 Maintenance Activities

The purpose of *maintenance* activities is essentially the prevention and correction of faults.

One can subdivide maintenance activities into two types:

1. *Preventive Maintenance* entails the performance of a set of routine tasks that involves checking for suspected fault sources of faults and their neutralization before such sources give rise to serious system consequences.

2. *Corrective Maintenance* involves responding to actual faults by removing or repairing their immediate causes. Upon the occurrence of a fault, the system will notify the staff by generating an alarm and alarm printouts.

Staff may also be notified of the exsistence of a fault as a result of subscriber complaints. Information relating to faults external to the exchange may also be received from subscribers.

The Ericsson Maintenance Philosophy, *Controlled Corrective Maintenance* (CCM), seeks to achieve a balance between these two types of maintenance.

Whatever the source of information, once the existence of a fault is known, action must be taken to eliminate it. Maintenance Staff use the B-Module of the exchange documentation to interpret fault information.The B-Module also contains the procedures, Operational Instructions (OPIs), required when dealing with faults, (see figure 2.4).
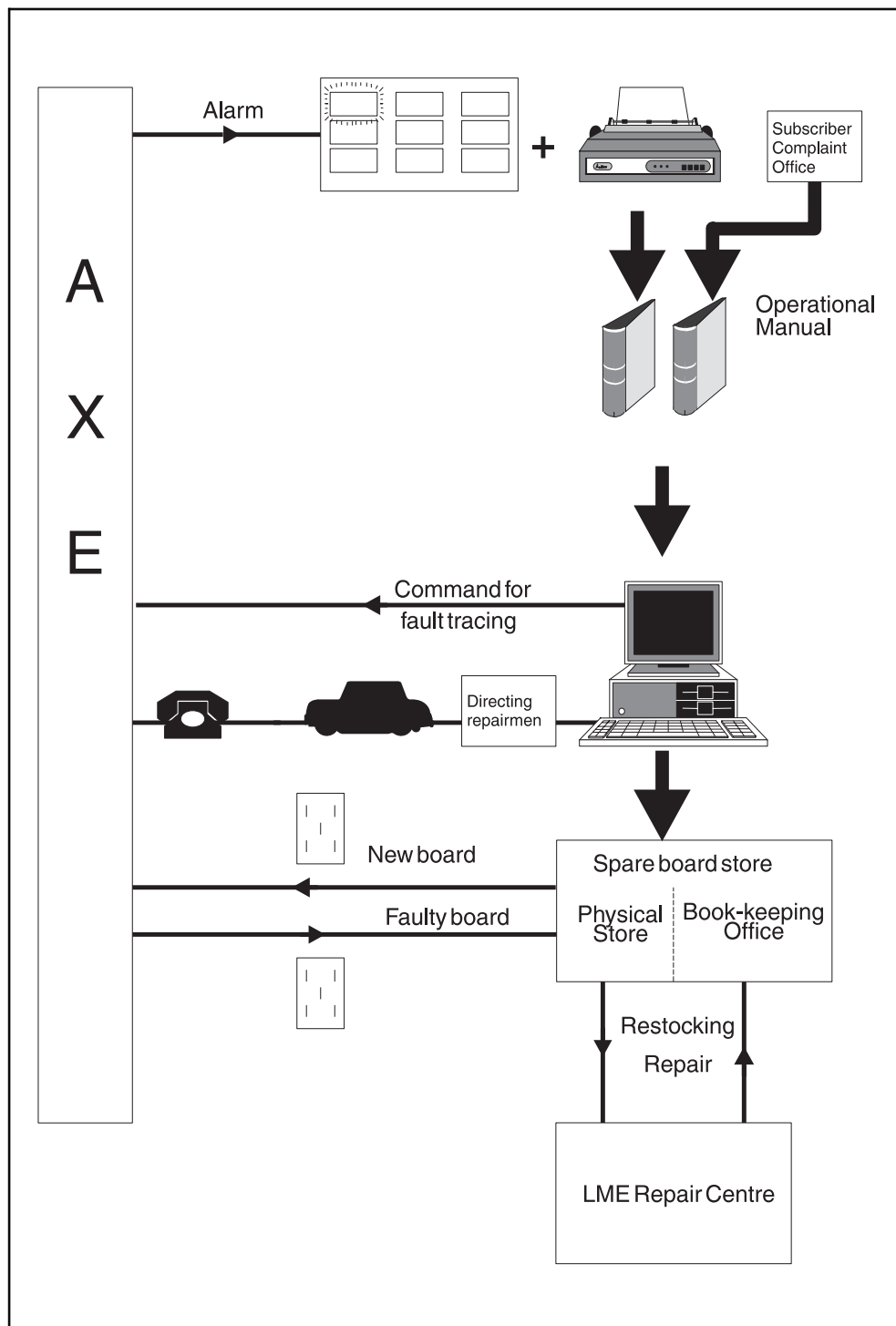
Figure 2.4
Maintenance Activities

When performing the tasks outlined by an OPI, Maintenance Staff communicate with the exchange using the AXE command language, often referred to as the Man-Machine Language (MML).

The following are a number of examples of various maintenance tasks:

- Fault-finding, testing and repair of subscriber lines
- Fault- finding, testing and repair of trunks
- Fault-finding, testing and repair of the GSS and SSS units
- Maintenance of the AXE power supply and power distribution system
- APZ Maintenance.

2.3 Chapter Summary

APT 210 12/1
Used when existing local AXE switches requiring ISDN functionality integrated with POTS.
Only PRA, Primary Rate Access is provided..

APT 210 12/2
Used when existing local AXE switches requiring ISDN functionality integrated with POTS.
In terms of ISDN both BA and PRA are provided.

APT 210 12/3
Marketed under product name AXE Local 12.3.
Backward compatibility with APT 210 08 R1 - R5 and APT 210 12 R1- R2.

By Operational Activities is meant normal everyday running of the switch when everything is working as it should.

By Maintenance Activities means prevention and correction of faults within the exchange with the help of relevant OPIs.

3. Exchange Handling Basics

Chapter Objectives

After completing this chapter the participant will be able to:

- Describe the general structure of the Exchange Library and maintain the library through the use of the OPI "Handling of the Exchange Library"

- Describe the layout and contents of the B-Module and its use

- Understand AXE 10 document numbering

- Understand the basic principles of AXEUSE, FIOL and DocView

- Describe the AXE 10 command structure

- Identify the operational activities that are to be performed based on information that is supplied in a specific work order and the contents of the associated B-module.

Figure 3.1
Chapter Objectives

3.1 Overview of the Exchange Library

3.1.1 AXE 10 Documentation Principles

Before proceeding with the description of the exchange library and its contents, a summary of the main principles employed in AXE 10 documentation are provided below.

The system employed for document identification is built on a close relation between the products found in the system and the documents associated with each product.
The system hierarchy defines the products found at the different levels. From the point of view of documentation identification, all products from the system level to the individual printed circuit board level are treated equally, (see figure 3.2).
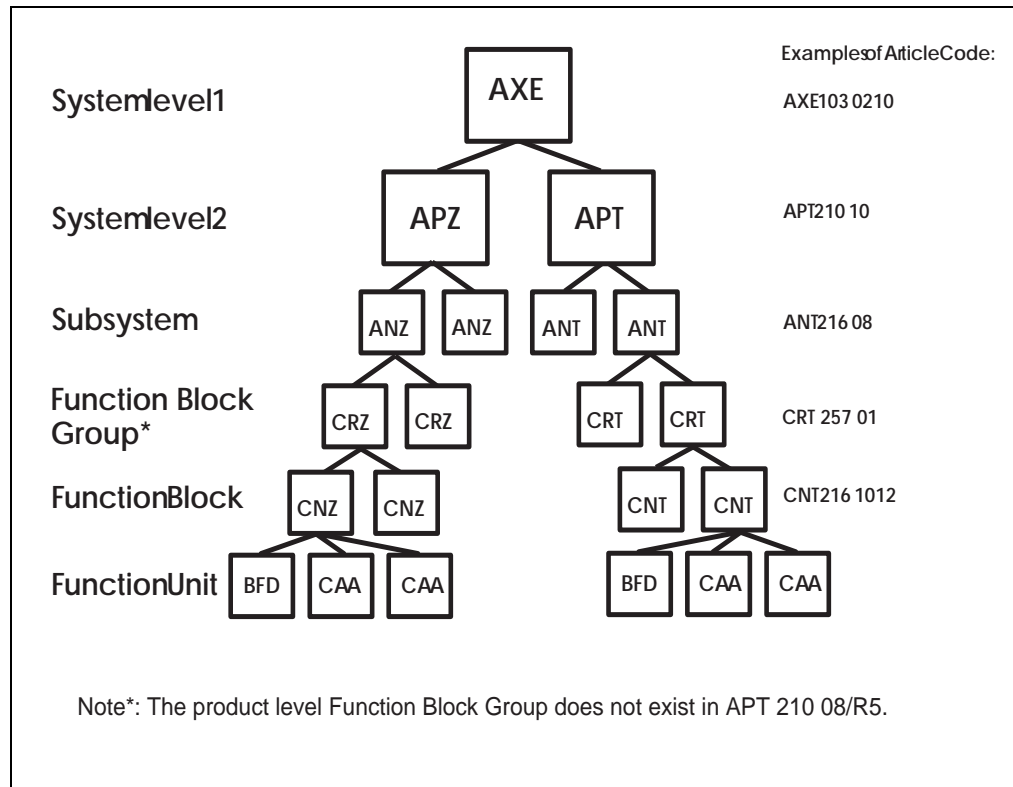
Figure 3.2
System Structure

A product is identified by a unique Article Code. An individual Article Code or individual identity consists of a number of letters and digits that are combined in accordance with the numbering system rules. The numbering system classifies and groups the products and documents in accordance with their use, system association, their location in the product hierarchy and their factual contents. Pre-defined basic numbers and classes are registered in a database which is continuously updated to include new items.

Figure 3.2 illustrates the hierarchial construction of the system and displays some examples of the logical construction of the identification system:

- The AXE system has article codes including APT and APZ codes.
- All APT subsystems have article codes including ANT prefixes and all APZ subsystems have article codes including ANZ prefixes.
- The Function Block Group represents a recent addition to the product level structure in which Function blocks having related functionality are grouped together, (CRT and CRZ). The Function Block Group level does not exist in APT 210 08/R5.
- All APT function blocks have article codes including CNT prefixes and all function blocks in APZ have article codes including CNZ prefixes.
- All function blocks in subsystem ANT 216 xx have article codes CNT 216 yy zz.

AXE10 1 XX yy

APZ 210 = 1   ex   APZ210 03   ex   APT210 05
APZ 212 = 2   -"-   04   -"-   06
APZ 211 = 3   -"-   05   -"-   07
APZ 213 = 4   -"-   06   -"-   08

Example:

AXE102 0108 { APZ212 01
              APT210 08

AXE 103 0210 { APZ 211 02
               APT 210 10

AXE 104 0108 { APZ 213 01
               APT 210 08
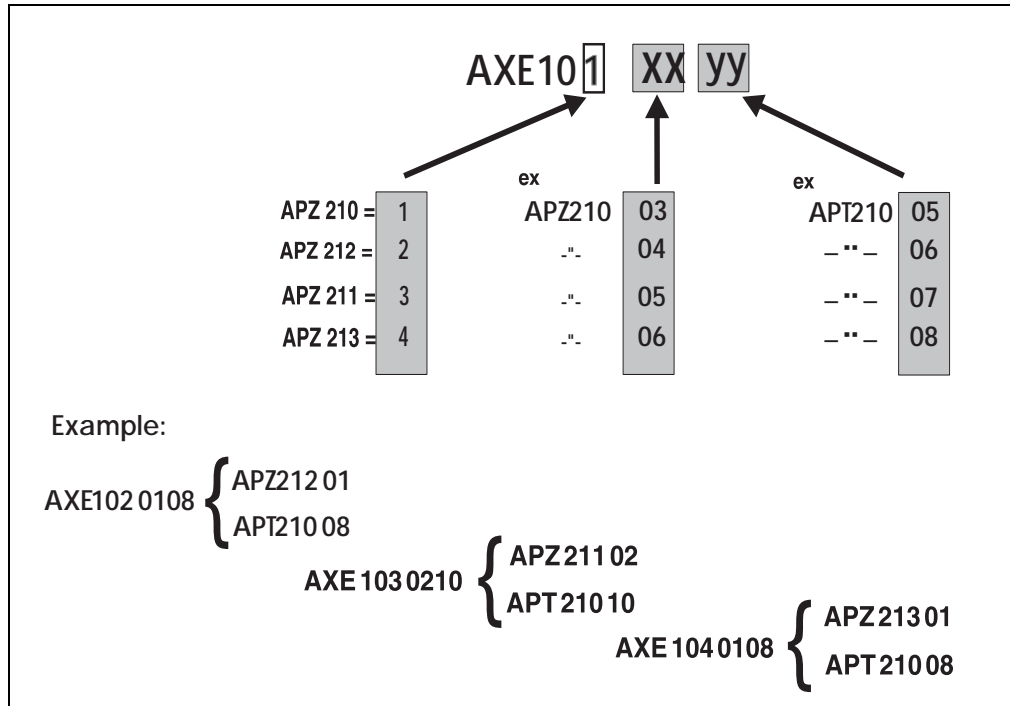
Figure 3.3
AXE Product Number, includes APT and APZ codes

Different versions of the same product are distinguished by the Revision State. Revision states are advanced in accordace with a given set of rules and is related to an important product, namely interchangeability, e.g. Article Code: CNT 216 1012, Rev. State: R3.

A document is identified by a prefix and an unique number. Different versions of the same document are distinguished by a revision letter. Document numbers for documentation relating to products usually consist of the decimal class and the article code.

The *decimal class* indicates the type of document, and the *article code* indicates the product associated with the document , (see figure 3.4).

Document	Document number	Revision
1. Description of subsystem OMS	1551 - ANT 216 08	A
2. Description of function block ROSA	1551 - CNT 216 10 12	B
3. Description of a command that belongs to function block ROSA	1/190 82 - CNT 216 10 12	A

Decimal Class   Article Code
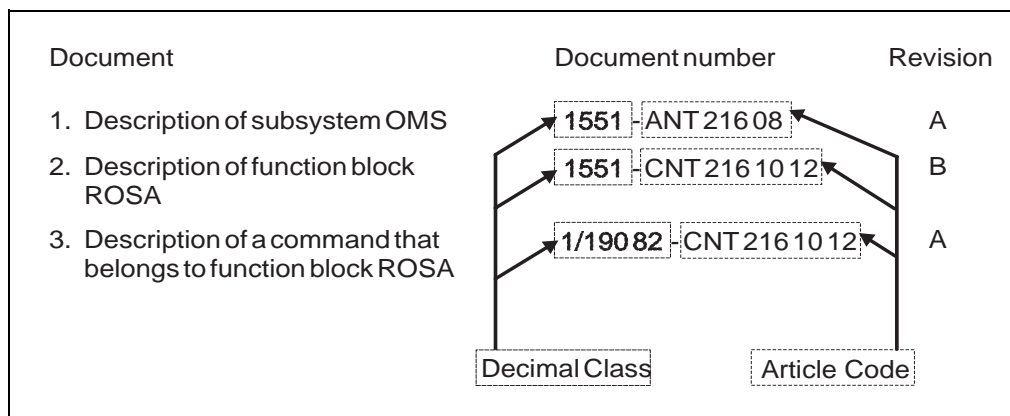
Figure 3.4
Example of Document Numbering

A document structure exists for each product category which specifically states the documentation required by the different product handling phases, i.e. design, manufacturing, etc.

Certain document types are mandatory for every product. Others are drafted when necessary, depending on the product's functions, design and characteristics. Figure 3.5 shows an example of document structure for a function block.
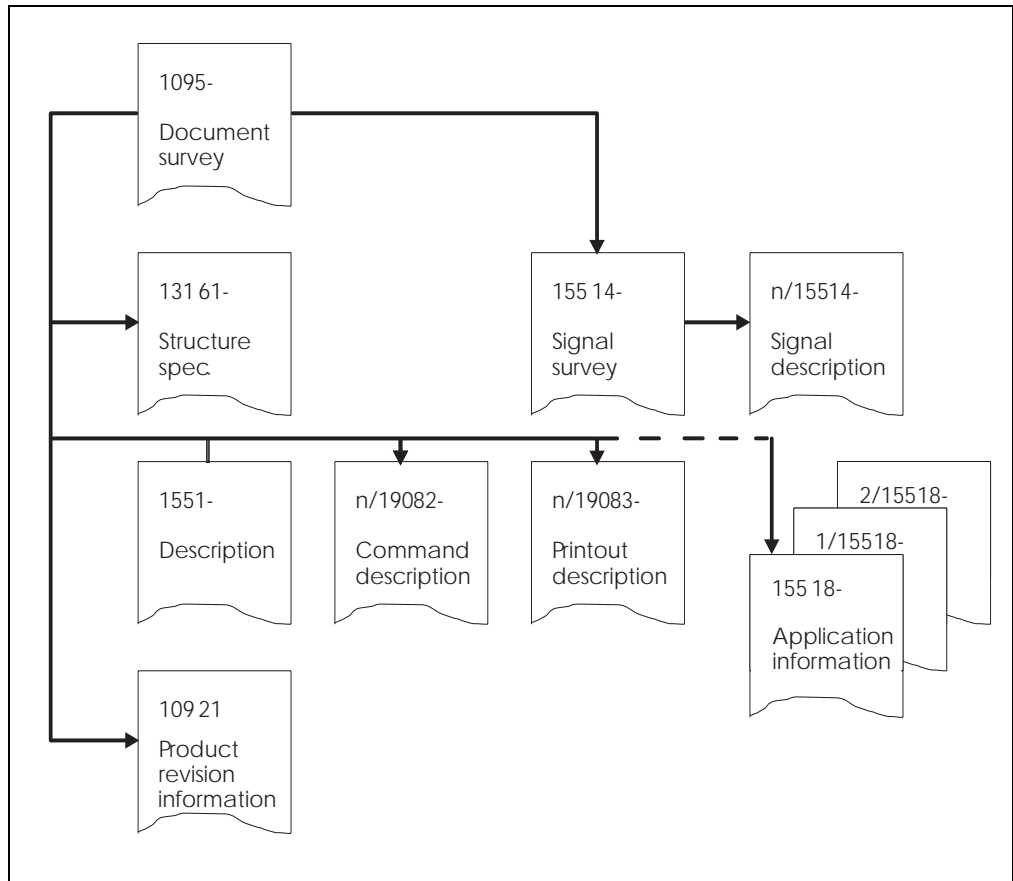
Figure 3.5
Document Structure for a Function Unit

Table 3:1 (shown on the next page) contains a list of the most frequently used decimal classes and their contents.

Decimal class	Contents of document
107 39	Wiring information
107 5	Cabling tables
107 8	Mounting drawings for printed circuits
109 21	Product revision information
109 5	Document surveys
130 1	Article, type and class specification
131 22	Article lists
131 32	Manufacturing specifications
151 80	General instructions
151 87	Mounting drawings
151 88	Assembly drawings
154 31	Operation directions
155 1	Description of articles
155 16	Function description
155 17	Function specification
155 18	Application information
155 19	Interworking description
155 42	Conditions information
155 61	List of contents and documents
190 55	Program source document
190 59	Parameter list
190 72	Signal distribution
190 74	Commands
190 82	Command descriptions
190 83	Printouts
190 84	Command parameter descriptions
190 92	Program information
191 1	Circuit diagrams
193 01	Trunking diagrams
193 04	Block diagrams
193 05	Floor plan drawings
193 06	Floor plan specifications
193 10	Cable group lists
193 11	Cabling tables
193 15	Cabling lists
193 17	Programming documents
193 19	Allocation documents (MDF)
193 25	Allocation documents (Power)
195 1	Allocation documents
195 2	Numbering documents

Table 3.1

Decimal Classes

3.2   The Structure of the Exchange Library

All documents relating to the exchange are gathered together to form the exchange library. The contents range from descriptions of the layout of the building and floor plans for the exchange equipment to instructions on how to trace and eliminate software faults. Such a wide range of material obviously requires some sort of structure so that the information is easily accessible by AXE staff.

The documents are distributed throughout a set of functionally defined modules, each of them being contained in one or more binders. Some of the longer, less frequently used modules may be stored in microfiche format to save space. Today, it is all stored on CD-ROM.

With reference to the basic operation and maintenance of the exchange, the modules vary a great deal in terms of importance; some will be consulted daily, others never. With this in mind, we will now describe the modules to a degree of detail corresponding to their importance as regards the O&M job:

Four of the modules, likely to be used by AXE staff on daily basis, will be are fully described. They are:

A-Module	Library Survey.
B-Module	Operation and Maintenance Manuals (Operational Instructions, Command Descriptions, Printout Descriptions and Application Information).
C-Module	Exchange Description (hardware, cabling etc.).

Another three modules are used occasionally by the O&M staff and hence are dealt with more briefly. They are:

D-Module	Functional Product Documents (software descriptions and flowcharts).
E-Module	Software Documents (source and assembly codes).
F-Module	Hardware Documents (magazine and circuit layouts).
I-Module	Exchange Data (MML commands configuring an exchange), also known as the Data Transcript.

Finally, there remain six modules which are practically never needed by the staff dealing with basic O&M. They are listed below:

G-Module	Mounting Details.
H-Module	Installation Test Instructions.
K-Module	Power Supply Documents.
M-Module	Signalling Inter-work Information.
S-Module	Software Fault Location.
T-Module	Correction of Central Software.

3.3 Handling the Exchange Library

The OPI "Handling of the Exchange Library" found in sub-module B01, deals with the procedures for:

- Checking documents received
- Inserting and replacing documents
- Filing delivery notes
- Borrowing documents from the exchange library.

Library maintenance may at first glance appear to be a trivial task. Reality is however quite the contrary. The complexity of the information coupled with the need for its frequent updating would quickly lead to complete chaos without the existence of and compliance with strict document maintenance procedures.

Electronically stored information, (e.g. DocView, AXEUSE) allows the saving of countless hours of work each time the documentation requires updating. Instead of thumbing through reams of paper you simply load a new CD- ROM disk into your PC.

3.4 B-Module Overview

The B-Module *(OPERATION AND MAINTENANCE MANUALS).*

The B-Module is the most frequently consulted module in the library. It consists of instructions for administrative routines, product handling, man-machine communication, supervision, fault reporting, fault location and elimination, exchange data modification, spare-part handling, operational reporting, etc.

The information contained in this module is used both by O&M staff in their daily work and by the operator when, for example, modifying exchange data.

The major portion of the B-Module concerns the Operational Instructions (OPIs) which guide the staff in carrying out their various tasks.

Operational instructions generally refer the staff-member to Command and Printout Descriptions. Although the experienced user usually manages with the Operational Instructions alone, others require the help of the Command and Printout Descriptions.

Because the instructions and descriptions are of a comprehensive nature and handle a variety of different functions, the B-Module is subdivided into seven sub-modules. These are listed below:

B01   General Operational Instructions.

B02   Operations Instructions.

B03   Maintenance Instructions.

B04   Test Instructions.

B11   Command Descriptions.

B13   Printout Descriptions.

B14   Adaptation Directions, Application Information.

Note: In certain instances the B-Module is subdivided as follows:

- B03 contains B01 - B03
- B14 contains Adaptation Directions
- B15 contains Application Information.

3.5 Using the B-Module

3.5.1 O&M Documentation Structure

We have mentioned earlier that the B-Module is divided into seven sub-modules, B01 to B04, B11, B13 and B14. The major portion of these sub-modules is made up of Operational Instructions (OPIs). With the help of flow charts provided in the OPIs, the operator is guided through the operation and maintenance tasks in a step-by-step fashion. The information included in each submodule is summarized as follows:

Submodule B01 (General Operational Instructions):

- Administrative routines
- Product-handling instructions for magazines, printed board assemblies, cables, I/O devices and spare parts
- Man-machine Communications including operating instructions for panels, I/O devices and alarm system and command language rules.

Submodule B02 (Operations Instructions):

- Subscriber-associated changes
- Changes in the exchange data
- Collection of statistics
- Output of charging data
- Size alteration
- Functional changes.

Submodule B03 (Maintenance Instructions):

- Time schedule for inspection
- Instructions for performing inspection of panels, I/O devices, sub-

scriber line test-equipment

- Procedure in event of alarm
- Procedure in event of fault-observation
- Instructions for fault-localization and repair.

Submodule B04 (Test Instructions):

- Testing the APT, APZ, and power equipment in an in-service exchange.

Submodule B11 (Command Descriptions):

- Functional descriptions of commands
- Brief descriptions of parameters
- Parameter combinations and formats
- Examples
- Expected types of printout after command input
- Fault codes and their interpretations
- Command category numbers.

The commands are listed in alphabetical order.

Submodule B13 (Printout Descriptions):

- Functional descriptions of printouts
- Print headings
- Interpretations of abbreviations
- Procedure to be followed upon the receipt of a printout
- Printout groups.

The printouts are listed in alphabetical order.

Submodule B14 (Adaptation Directions):

- Adaptation Directions
- Application Information
- Command Tables
- Various lists including parameter lists, subscriber categories, alarm categories, size alteration events, end-of-selection codes (in both alphabetic and numerical order).

Adaptation Directions contain detailed functional descriptions of the commands and their parameters.

Application Information consists of documents which provide detailed information, for each function block, as to the allowable value ranges that may be assigned to parameters.

Command tables are rarely used.

3.5.2 Locating the Documentation

As we know now, the B-Module fills a big part of the exchange library.

Each B-submodule consists of one or several binders. They are divided into sections (grey dividers). Each section is divided into subsections (green dividers) and sometimes the subsections are divided into parts (orange dividers). The dividers are numbered from 0 to 9.

The first binder of each sub-module contains a document list. This list provides the contents of all the binders contained in the particular submodule.

3.5.3 Accessing Information in the B-Module

The steps involved in accessing information in the B-Module are as follows:

1.   Finding the Title of the Operational Instruction

There are two ways in which the operator is assigned a task and each way contains the relevant Operational Instruction.

- If the task is a response to an alarm, the operational personnel is to access the OPI containing the same title as that found on the Alarm Printout.
- All other tasks are initiated as the result of Work Orders, the contents of which will indicate the name of the necessary OPI.

Whatever the origin of the task, the OPI will be found in submodules B01 to B04:

Type of Task	Submodule
Administrative activities	B01
Handling I/O devices	B01
Operational tasks	B02
Maintenance	B03
Testing	B04

2.   Finding Additional Information

Operational Instructions direct the staff to Command Descriptions (CODs), found in B11, by listing the commands that may be needed. The Command Description usually suffices, but if more details are required, they are to be found in the Application Information document identified by the Command Receiving Block named in the COD.

This course includes a number of operational activity related exercises which will provide practice in the use of the B-Module.

3.6 Using FIOL / DocView

DocView is a document retrieval tool for EDML-based Ericsson documentation, such as the Operation and Maintenance (O&M) documents. EDML stands for Ericsson Document Mark-up Language. EDML was developed by Ericsson and is an internal documentation standard. DocView replaces the printed document binders and offers features for browsing, searching and printing. The application is intended for any user (designer, test and maintenance personnel) requiring flexible access to the documents stored in the DocView databases.

The information stored in this document databases is easily accessed. There are several hierarchical levels and a possibility to use context sensitive searches. Hypertext and Find features are provided to speed up access to requested document. Any portion of the information may be accessed at speeds that far surpass manual look-ups in printed binders. AXEUSE / Dynatex will replace DocView and FIOL in the future.

Chapter 4 describes in detatailed the handling of DocView.

3.7 Using AXEUSE / Dynatext

Up to now, Ericsson has provided FIOL as the only standard communication program for local AXE Operation and Maintenance. FIOL was originally designed as a test tool for internal usage within Ericsson, no focus was originally placed on the needs of AXE 10 end-users.

*AXEUSE (***AXE US**er **E**nvironment) is a Microsoft Windows application that provides multi-channel communication with target systems. It is a successor to FIOL and is a communication program combined with a "Browser" for an On-screen Operation and Maintenance manual, running under the MS Windows Graphical User Interface, GUI.
The AXEUSE package includes a copy of the Dynatext Browser, an application which enables the user to view "electronic books". Using the Dynatext Browser, the user can read documentation pertaining to the application system.
The approach used when designing AXEUSE was to create an environment which would increase the productivity of the Operation and Maintenance personnel. This is achieved by a graphical user interface designed in accordance with current standards that meet known customer needs. The environment also includes on-line documentation retrieval , Dynatext, which provides context-linked information retrieval removing the tedious task of browsing through the pile of binders just to perform a maintenance task.

AXEUSE is described in more detail in chapter 4.4 of this document.

3.8 The Exchange Log Book

AXE Operation and Maintenance Staff use the Exchange Log Book to record all important events.

The following are examples of occurrences that should always be recorded:

- High-priority alarms

- Operational disturbances

- Intervention and fault-repair performed on the APZ and common units of APT, e.g. the GSS

- Output of call-charging records and statistics

- Activation of new lines and extensions

- Activation of new traffic cases and routes

- Addition of new functions, programs or data.

Some occurrences and actions, such as the repair of faults - especially those which were traced to the exchange itself - need to be entered into the log book after the exchange is returned to service.

The log book should always contain information concerning the latest dump, together with details of any changes made in connection with the dump, and any other information that could be useful in restoring the exchange after a breakdown.

The OPI for using the Exchange Log Book is entitled "Keeping a Journal" and is located in submodule B01 of the B-Module.

3.9 The Command Language and Printouts

Communication between the AXE system and the AXE staff is carried out by means of commands and printouts.

The staff members enter commands to perform O&M tasks in the exchange and the exchange responds with printouts. In addition, the exchange will automatically generate printouts to indicate faults or other important events within the system.

The dialogue between the staff members and the AXE system requires a language. This language is called MML (Man-Machine Language) and is written in accordance with ITU-T recommendations.

3.9.1 Command Structure

In general, commands are structured in the following manner:

```
COMMAND CODE:PARAMETER NAME=PARAMETER VALUE;
```

Command Code

The command code defines the task to be executed. This code normally consists of 5 characters:

```
XXYYZ
```

XX indicates the function group, YY specifies the function, and Z is an abbreviation of the verb indicating which action will be taken, e.g. I for Initiate, P for Print etc.

Parameters

Parameters are supplied following the command code in order to specify how and where the order defined by the command code should be executed.

If more than one parameter is necessary, the parameters are separated by commas. The order in which different parameters within the same block are arranged is not significant.

Commands may be written:

- Without parameters   IOROP;
- With parameters (see below).

Commands requiring parameters may be written as follows:

- Without a value   IODAC:ATT;
- With a single value   EXRPP:RP=1;
                             STDEP:DEV=LI2-5;
- With several values   EXRPP:RP=1&3&5;
                             STDEP:DEV=LI2-1&-3&-5;
- With a range of values   EXRPP:RP=1&&5;
                             STDEP:DEV=LI2-1&&-5;

Square brackets [ ] denote optional parameters.

Braces { } enclose alternative parameters and indicate that one of the parameters must be entered when using the command.

Square brackets which enclose braces imply that it is not necessary to indicate any of the alternative parameters.

Command Descriptions (CODs), found in B11, are used to describe the parameter combinations that may be used in conjuction with a particular command.

Printouts

There AXE system incorporates two types of printouts:

Automatically initiated printouts and command-initiated printouts:

1.   Automatically Initiated Printouts

- Alarm Printouts

These are initiated either by a fault in the system or by supervision limits having been exceeded due to disturbances. The printout usually follows visual, or visual and audible alarms, depending on the alarm level.

- Alarm List Printouts

An alarm list printout is received automatically at intervals specified by command ALLTC. The alarm list output contains a list of all active alarms. The alarm list can be printed manually at any time by entering the command ALLIP.

- System Restart Printouts

A system restart printout is received after each system restart. The message SYSTEM RESTART will be printed on all terminals.

2.   Command-Initiated Printouts

This type of printouts can be divided into:

- **Check Printouts**

Check printouts repeat the command exactly as it is entered by the technician. The technician is required to confirm or inhibit the execution of the command. To confirm the command, a semi-colon (;) is entered. If any other characters are entered, the command will be inhibited. A check printout is given primarily by commands that could affect the traffic and by commands that have been corrected by the technician.

Example:

```
<SYREI:RANK=rank;
SYREI:RANK=rank;
```

```
<;                              (to confirm the command)
```

- **Procedure Printouts**

A procedure printout is received immediately after entering a command.

Examples:

```
EXECUTED
```

or

```
ORDERED
```
(F1 to release and wait for execution)

or

```
NOT ACCEPTED
```
(followed by the reason)

The procedure output acknowledges a command input or a cancellation. A command is always acknowledged by a procedure output or by a result or answer printout.

- **Answer printouts**

Answer printouts are received directly after a print command.

Example:

```
EXEMP:RP=40,EM=0;
```
(Print command)

```
EM DATA
```
(Answer printout)

```
RP   TYPE   EM  EQM             TWIN  CNTRL  PP  STATE
40   RPM6A  0   ET7-0&&-31      41    PRIM       WO

END
```


- **Result Printouts**

Result printouts are given as a result of a command but normally at a later time and always on a new page. The result printout is always preceded by the procedure printout "ORDERED".

Example:

```
ORDERED
```
(F1 to release)

```
SIZE ALTERATION RESULT
SAE      BLOCK     NI     FCODE    UCODE
504      BT2       6
END
```

The title of the result printout is provided for interpretation purposes, see binder B13.

3.10 Chapter Summary

- A product within the AXE system is identified by a unique article code e.g. ANT, CNT, CRZ etc.

- The decimal class indicates the type of document, and the article code indicates the the product associated with the document

- The function group CRZ is a new addition to the product level structure in AXE Local 12.4.

- A, B and C-modules are normally used by the AXE- staff on daily basis.

- D, E, F and J modules are used occasionally.

- G, H, K, M, S, and the T modules are practically never used by the O & M staff..

- If the task is a response to an alarm the operational staff is to access the OPI with the same title as that found on the alarm printout

- The log book should always contain the latest activities within the exchange and any other information that could be useful in restoring the exchange after a breakdown

- The command code defines the task to be executed. This code normally consists of 5 characters in accordance with the ITU-T standards.

4. Communication with the System

Chapter Objectives

After completing this chapter the participant will be able to:

* Understand the basic principle of how to communicate with the system with the help of I/O devices

* Understand the use of the communication programs FIOL and AXEUSE

* Communicate with the AXE system with the help of FIOL and AXEUSE.

Figure 4.1
Chapter objectives

4.1 AXE Terminal Controls

4.1.1 Making Contact with the System

The I/O system handles data to and output from the AXE system.

Examples of input data to the exchange include:

* Commands to change exchange data
* Commands to change exchange hardware
* Commands to generate statistics

Examples of outputs from the exchange include:

* Printouts in reply to commands
* Alarm printouts indicating faults in the exchange
* Alarm indications displayed on an alarm panel.

The I/O system consists of various types of hardware. These may include Hard Disks, Floppy Disks, Magnetic Tapes, Alpha Numerical Teminals, Visual Display units, Printers, Personal Computers, Alarm Panels and Data Links.

4.1.2 Seizure and Release of Terminal

When not in use, the terminal is normally in an idle state and data can neither be sent to nor received from the exchange.

The process of establishing a link between the terminal and the AXE system is called *seizure*.

The process of disconnecting the link between a seized terminal and the AXE system is called *release*.

Seizure and release can be performed manually or automatically. Manual seizure and release are performed either by using special keys or characters. Figure 4.2 illustrates a number of examples:

Device Function	TYPEWRITER BLOCK			Display Handler block
	PC	Facit	Philips or Siemens Typewr.	Hewlett Packard
Seizure	F5	Ctrl B	STX	$ Enter
Transmit	Enter	Ctrl C	ETX	Enter
Release	F1	Ctrl D	EOT	% Enter

Figure 4.2
Examples of Seizure and Release

4.1.3 The Label Printout

Immediately after manual seizure of a terminal, the system transmits a standard printout called *Label Printout* (also called the *Header*). As seen in figure 4.3, this Label Printout contains:

- The operational state of the processor, in the figure: WO means the central processors are working in parallel

- The exchange identity, in the figure: TRX A, i.e. Training Exchange A.

- The terminal identity, in the figure: AT-4

- The current date and time, in the figure: 951106 1545.
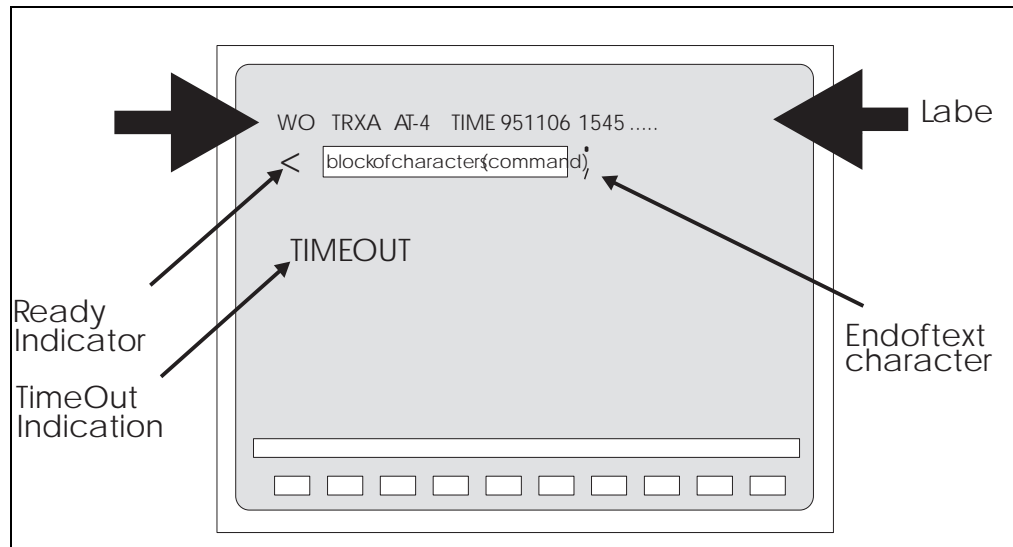
Figure 4.3
Label Printout

4.1.4 Ready Indicator

Immediately after the Label, the left bracket which is called *Ready Indicator* (also called *Cursor* or *Prompt*) is transmitted by the system to indicate that it is ready to receive a command.

4.1.5 End of Text Character

The end of a block of characters, i.e. the command, is indicated by the semicolon ";" which is called *End of Text Character.*

4.1.6 The Check Printout

When the AXE system receives a critical command, it sends the command back to the terminal where it is presented as a *Check Printout*. The staff member who entered the command can then confirm or inhibit it. The command is confirmed by a semi-colon.

4.1.7 Authority Check

Sometimes access is allowed to the system only by authorized persons. This is performed via the use of *Passwords*.

If an authority check is required, the system will automatically order the operator to enter a password.

Even if the check is not required, it may not be possible for everybody to use all existing commands. Each terminal can be given a key which limits the number of possible commands to certain groups. Only authorized persons will be allowed to change the key. An attempted execution of a restricted command results in the message "COMMAND RESTRICTED".

4.1.8 The Time-Out Printout

When a seized terminal is not used for a certain time (typically five minutes), the system releases the terminal automatically and transmits a *Time-Out Printout*.

4.1.9 Blocking and De-blocking of the Terminal

If the AXE system detects a fault in the I/O path, the terminal is automatically blocked, and an alarm is issued. The system will normally de-block the terminal when the fault is cleared.

Manual removal of the block is also possible from the blocked terminal by entering a character and then pressing ENTER. The character may be different for different terminals. For example, for the HP264 terminal, the character is a question mark "?".

Blocking may also be performed manually, via command. This is done e.g. before testing a terminal. After the test, the terminal has to be manually de-blocked.

4.1.10 Queue System

Some requested printouts are not generated immediately. In such cases, the system compiles the information and puts it in a queue for later output. Output of a queue starts automatically when the I/O device is released. Output may also be ordered when in command mode by sending a special character. Printouts may be sent to more than one terminal if needed.

4.2 Communication Program FIOL/DocView

4.2.1 Basic Functions of FIOL/DocView

FIOL is a program which makes it possible to use a personal computer as a terminal for communication with the AXE system. The main advantage of FIOL is that it simplifies command handling.
FIOL is an abbreviation of the program name, "**FI**le transfer and **o**n**l**ine editor".

DocView replaces the printed document binders and offers features for browsing, searching and printing the documents. This application is intended for any user needing a flexible access to the documents stored in DocView databases (CD-ROM).

4.2.2 Window Screen

A window appears on the screen when the program is started. Three lines are found at the bottom of the screen (see figure 4.4).

- The status line
- The command line
- The pre-defined main menu function-keys line.
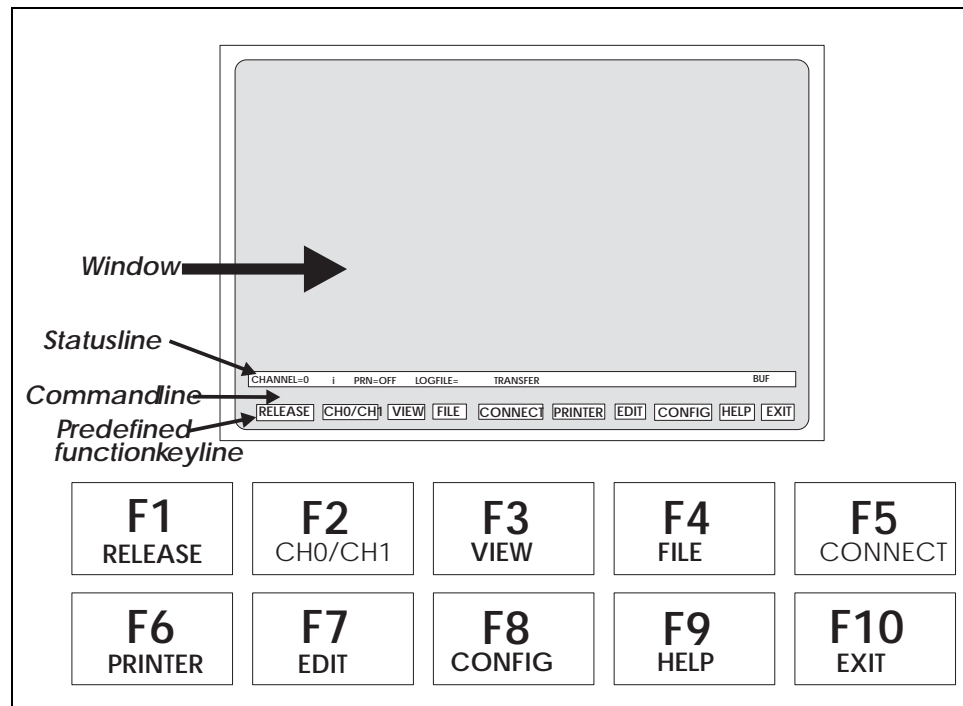
Figure 4.4
The FIOL Window

The window consists of a maximum of 22 lines which can be divided into two windows when the user is communicating with two channels at the same time.

4.2.3 The Status Line

The status line consists of the following information:

- Active channel   CH0/CH1
- Text mode   INSERT(i)/
                                            OVERWRITE(o)
- Printer status   ON/OFF
- Name of the log file
- Name of the transmit-file
- Communication mode   BUF/TTY

Communication may either be performed in BUFFER mode (BUF) or in ONLINE mode (TTY). In BUF mode it is possible to edit the command on the command line before it is sent into the system. In the TTY mode the characters are sent immediately to the system when entered.

4.2.4 The Command Line

The command line is a combined command and error-message line. All commands are entered from this line. The twenty latest commands sent are stored in a circular buffer. The commands can be reached with the up and down keys, and will be presented on the command line when they are stepped.

The function "END OF TEXT" is implemented in FIOL for entering commands by just pressing the ENTER key.

4.2.5 The Function Keys

The function keys are pre-defined in the *main menu* as follows:

F1: Release. This is the "END OF TRANSMISSION" function when it is implemented in FIOL. This function releases the terminal, i.e. marks a seized terminal as idle.

F2: This function key works as a switch between channel window 0 and window 1. The STATUS LINE displays the active channel. FIOL allows concurrent communication with two connected systems.

F3: Entrance to the VIEW MENU.

- Scroll up/down on the screen
- Page up/down
- Short commands
- Save
- Print, for further information use "help".

F4: Entrance to the FILE MENU. File menu functions are:

- Log and transmit file-handling
- Execution of DOS commands.

Pre-defined function keys in FILE MENU:

F1-DOS	Makes it possible to temporarily leave FIOL to execute DOS commands.
F2-CH0/CH1	Indicates which channel is active.
F3-LOGFILE	Supply name and start a log file.
F4-CLOSE	Close active log file.
F5-	No function.
F6-TRANSMIT	Transmits a file.
F7-STOP	Stop transmission of file.

F8-PAUSE	Pause. Active file transmission.
F9-HELP	
F10-RETURN	

F5: Connect is the "START OF TEXT" function when it is implemented in FIOL, i.e terminal seizure. This function returns the the LABEL and activates the READY INDICATOR.

F6: Printer ON/OFF, which is shown on the STATUS LINE.

F7: EDIT is a full-screen editor. This online editor allows you to:

- − Create and save command files
- − Edit command files
- − Transmit complete command files or sections of them to the AXE system.

The editor can only handle ASCII-files. If you temporarily leave the EDITOR, the cursor will be positioned where you left it.

Pre-defined function keys in *EDIT mode*:

F1-BLOCK ACTION	Mark beginning of a block.
F2-PRINT	Print the contents of the edit buffer.
F3-STOP	Stop transmission of edit buffer.
F4-SEND	Send edit buffer, the contents in the EDITOR will be sent as a transmit file.
F5-SENDLINE	You will automatically be returned to the main menu and the line pointed to by the cursor will be sent to the connected system.
F6-LOAD	Load a file to the edit buffer.
F7-SAVE	Save the contents of the edit buffer to a file. The file will be added to existing contents of the buffer.
F8-CLEAR	All lines from the top line to the bottom line will be deleted.
F9-HELP	
F10-RETURN	

F8: Entrance to the CONFIG MENU. This function is used when you install FIOL. It is here that the parameters are adapted to the connected system/systems, such as: window size, protocol name, baud rate, buffer size, language etc.

Pre-defined function keys in *CONFIG MENU*:

F1-COLOUR

F2-CH0/CH1

F4-PROTOCOL   Select parameters from the protocol list.

F5-FILES   Select parameters from the files list.

F7-SAVECNF   Save configuration parameters to a file.

F9-HELP

F10-RETURN

F9:   HELP gives you access to information about FIOL.

F10:   EXIT allows you to exit from FIOL.

4.2.6   Practical Examples of Using FIOL

1.   Transmitting a Command File

Perform the following to transmit a command file:

a)   Press the **F4**(FILE) key to enter the FILE menu

b)   Press the **F6**(TRANSMIT) key to transmit a command file

c)   Enter the name of the file to be transmitted

d)   Press the **F7** key to close the file and stop the transmission.

2.   Creating a Log file

Perform the following to create a log file:

a)   Press the **F4**(FILE) key to access the file menu

b)   Press the **F3**(LOGFILE) key

c)   Enter the name and location of a file e.g. A:EXCHDATA

d)   Enter the commands to be stored in the log file by transmitting a command file or by entering a number of commands from the main FIOL menu

e)   Press the **F4**(CLOSE) key on the file menu to close and store the log file.

4.3 Using the Communication Program FIOL / DocView

The DocView application is designed to replace the paper document binders in much the same way as does AXEUSE .

Any documentation available in EDML (Ericsson Document Markup Language) format can be handled electronically with DocView.

The DocView Browser allows one to easily browse through and search for information contained in Operation and Maintenance documents (B-Modules). Savings in time and effort are remarkable when using DocView in comparison with the handling of paper documents.

Figure 4.5 shows the hierarchy of the document information levels that are used in the DocView databases for an Application System, AS.
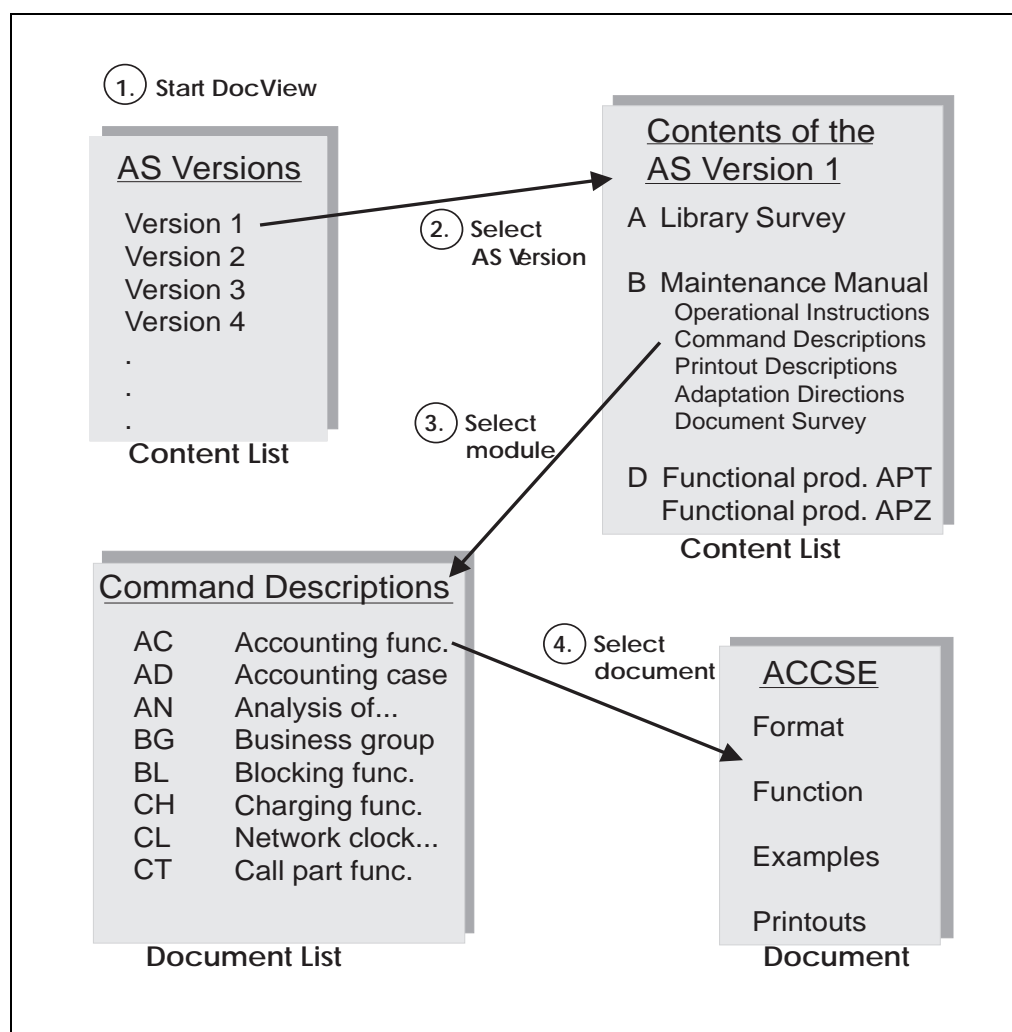
Figure 4.5

DocView Information Levels

Recent configuration changes make it possible to run DocView in a Windows environment. This way, you can have other tools (PlexView, FIOL etc.) running at the same time and maintain the adequate speed of operating. CD-ROM drives enable it to change the database beeing used quickly.

4.3.1 The User Interface

The following image is displayed when DocView is started, (figure 4.6):
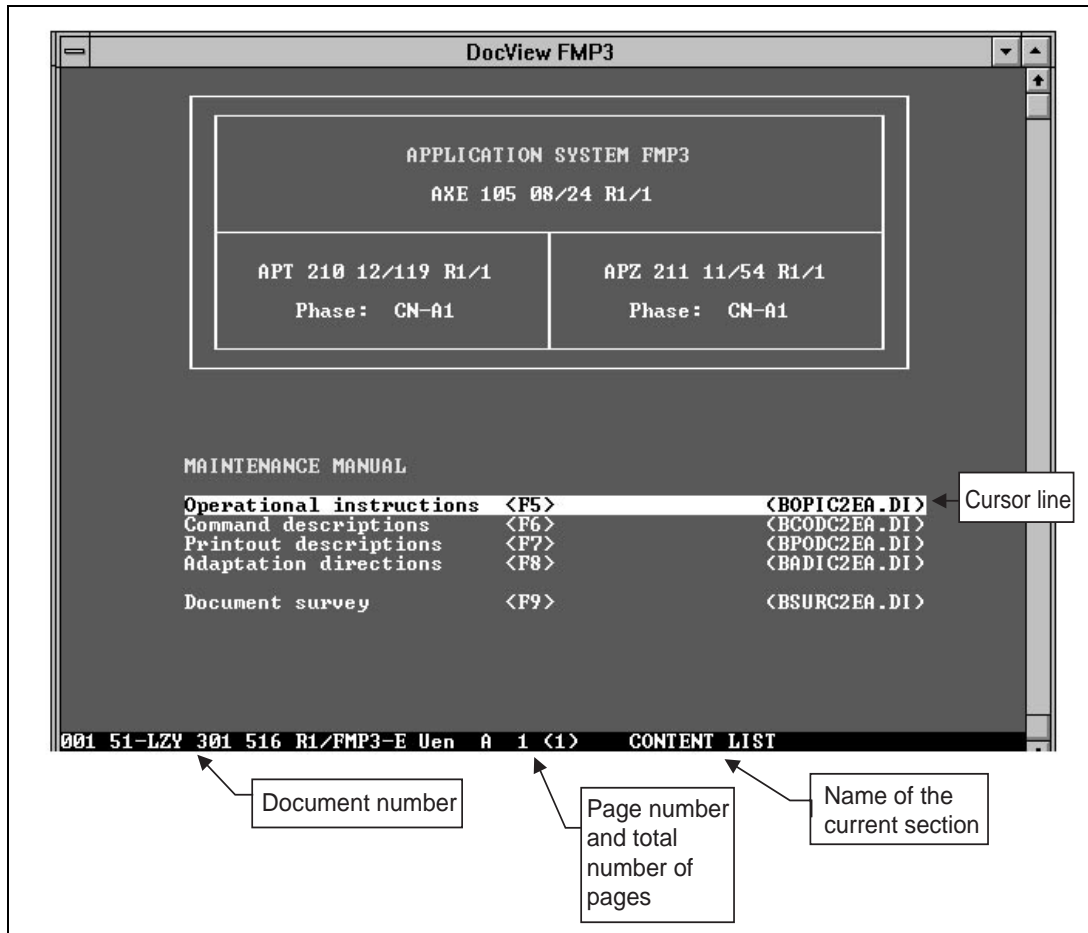
Figure 4.6
DocView User Interface

The DOS view only allows keyboard control. Help is available through the Help key <F1>. Pressing the <Alt> or the <Ctrl> keys will display the code executed by the function keys.
There are several pop-up windows that provide DocView operational information such as document information, previous documents, bookmarks and printing options.

4.3.2 Loading a Document from a Database

All documents are loaded for view directly or indirectly through an index (document list). The background is changed on a colour monitor when viewing the main (Content List) or another index for easy identification.

A document index is handled by DocView as an ordinary document except when a line containing a valid document or database reference is recognized. The line contents are then highlighted (Inverted) and act as a cursor.

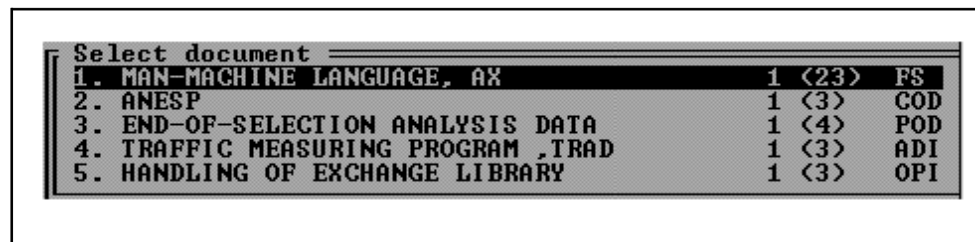Pressing the <Enter> key when the cursor is positioned to a requested document will cause the document to be loaded for viewing. If a database is selected, the corresponding index file is loaded. Any number of document databases can easily be accessed from DocView. The database files can be updated independently of each other. The maximum number of simultaneously loaded document files is set to 10.

<Shift> - Displays index of previously viewed documents

Pressing the <shift F10> keys will cause a pop-up menu to be displayed which contains references to previously viewed documents. The menu will display document title (as given in the document index), page reference and document type. Document type usually consists of two to three characters, e.g. COD=Command Description.

The display below is an example of the contents of the pop-up menu following the load of five database documents:

```
┌──────────────────────────────────────────────────────────┐
│  Select document                                          │
│  1. MAN-MACHINE LANGUAGE, AX            1 <23>    FS       │
│  2. ANESP                               1 <3>     COD      │
│  3. END-OF-SELECTION ANALYSIS DATA      1 <4>     POD      │
│  4. TRAFFIC MEASURING PROGRAM ,TRAD     1 <3>     ADI      │
│  5. HANDLING OF EXCHANGE LIBRARY        1 <3>     OPI      │
│                                                           │
└──────────────────────────────────────────────────────────┘
```

Figure 4.7
List of Previously Opened Documents

Enter the number of a document or use the arrow keys <↑↓> to make a selections from the menu. Then press the <Enter> key and the selected document is loaded and displayed.

<Shift-Home/End> - Switch to previously viewed documents

Pressing the <Shift-Home> or the <Shift-End> key-combinations will switch the currently displayed document to a previously viewed document, found in the list of currently loaded documents, i.e. previous/next document in the list. The current position in the document is retained when switching from document to document.
However, this function does not switch back to a directly accessible document index. These indexes are always easily accessed through function keys <F5...F10>.

<F10> - Return to main document index for the databases
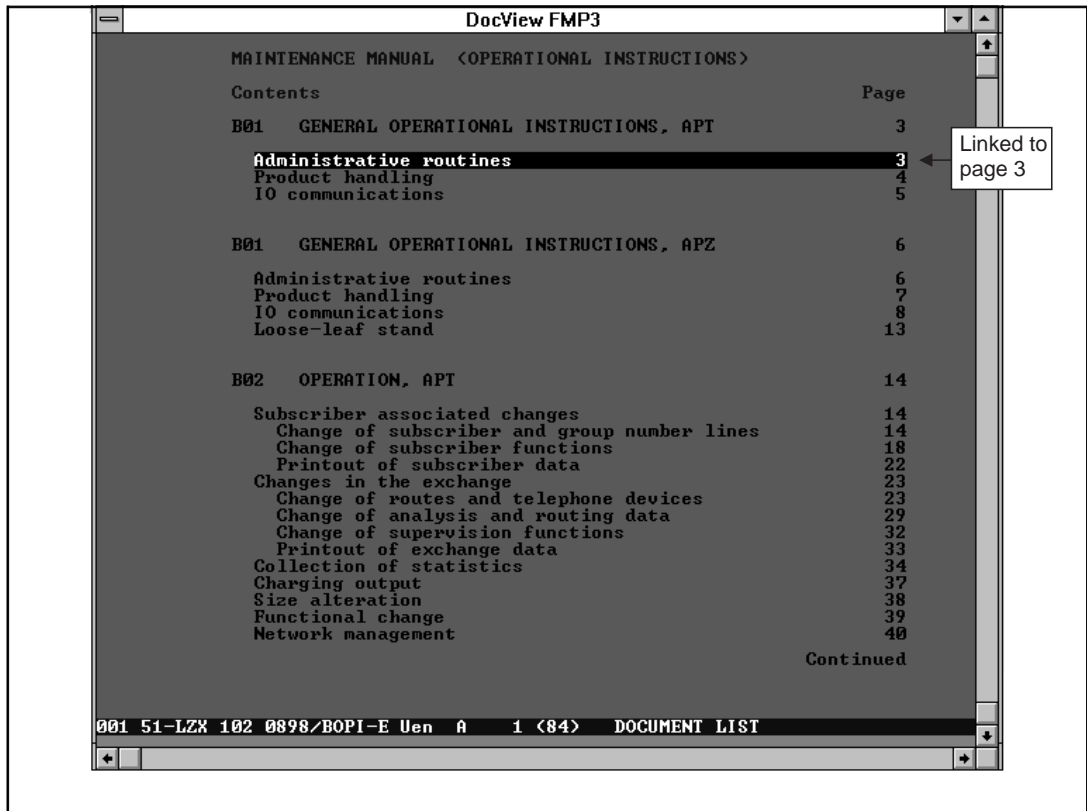
Pressing the <F10> function key will cause DocView to return directly to the main index, displaying the content list of the accessible document databases. As an option, FIOLSYSTEM features may optionally be listed in the main index and may be executed directly from that index.

4.3.3 Searching Functions

Page Search Using the Content List

When viewing a document with a content list, the list is recognized by DocView and can be used as a fast way of jumping to the correct page in a document. A cursor (inverted line), see figure 4.8, is visible on a line with a page reference. A direct jump to the page is launched with the <Enter> key.

```
┌─────────────────────────────────────────────────────────────────┐
│ ─                          DocView FMP3                    ▼ ▲    │
│                                                              ↕    │
│        MAINTENANCE MANUAL  <OPERATIONAL INSTRUCTIONS>             │
│                                                                   │
│        Contents                                       Page        │
│                                                                   │
│        B01    GENERAL OPERATIONAL INSTRUCTIONS, APT      3     ┌────────┐
│                                                               │Linked to│
│        Administrative routines                          3  ◄──│page 3   │
│        Product handling                                 4     └────────┘
│        IO communications                                5         │
│                                                                   │
│        B01    GENERAL OPERATIONAL INSTRUCTIONS, APZ      6        │
│                                                                   │
│        Administrative routines                          6        │
│        Product handling                                 7        │
│        IO communications                                8        │
│        Loose-leaf stand                                13        │
│                                                                   │
│        B02    OPERATION, APT                            14        │
│                                                                   │
│        Subscriber associated changes                   14        │
│            Change of subscriber and group number lines 14        │
│            Change of subscriber functions              18        │
│            Printout of subscriber data                 22        │
│        Changes in the exchange                         23        │
│            Change of routes and telephone devices      23        │
│            Change of analysis and routing data         29        │
│            Change of supervision functions             32        │
│            Printout of exchange data                   33        │
│        Collection of statistics                        34        │
│        Charging output                                 37        │
│        Size alteration                                 38        │
│        Functional change                               39        │
│        Network management                              40        │
│                                                   Continued      │
│                                                                   │
│ 001 51-LZX 102 0898/BOPI-E Uen  A    1 <84>   DOCUMENT LIST       │
│ ◄                                                           ►  ▼  │
└─────────────────────────────────────────────────────────────────┘
```

Figure 4.8
Page Search

Search for a String in a Document

A search is started by pressing **<F3>** and typing the search string into the search text field. Pressing the **<Enter>** key will initiate the search.

Note: a search for a string can only be performed inside one document at a time.

Remember the following rules when searching for document strings:

- The Search feature is not case sensitive

- The Search is started from the line following the current cursor position on the viewed page and continued until the end of the document is reached

- Search direction may be changed. Press the <**Shift**> key before press-

ing the <**Enter**> key to change search direction.

- The last ten strings searched are kept in a circular buffer and can be used again with the arrow keys <↑↓>

- The Search can also be started from the beginning of any directly accessible document index by selecting the appropriate index using the <**F5**> - <**F10**> function keys.

Find a Document from a Document Index

This feature is used for finding a specific document from one of the directly accessible document indexes. When a requested document title is known, the document title can be rapidly searched for in a selected document index.
The Search is performed as follows:

First press <**F4**> and type the searched title into the search text field. Then press <**Enter**> to search inside the current index or select the appropriate index using the <**F5**> - <**F10**> function keys.

When using the Search feature, keep in mind that:

- The search is started in a selected document index from the page following the Content List and continues until the end of the document is encountered

- The Find feature differs from the Search feature in that the Find feature skips the Content List and only the beginning of the line is matched with the string in the search text field.

<A...Z> - Find line in content list

The alphanumeric keys (**A...Z**) can be used in the content list as a fast search forward on a line starting with the same character(s) as pressed. Also the numeric keys (**0...9**) can be used when the find feature is activated.

The character find is not case sensitive and the entire content list is searched regardlessof the length of the list. When viewing the document index for a COD (Command Description), extra database options have been added to speed up COD document load time regardless of its position in the document index.

4.4 Using the Communication Program AXEUSE

4.4.1 General

AXEUSE is a Microsoft Windows application that provides multi-exchange communication to target systems, such as the Ericsson AXE 10 exchange. It offers the following communication features:

- Interactive communication through the use of command line, command history buffer and quick command files
- A facility for the recording and transmission of command files
- On-screen and printer logging of communications, and a communication log file recording facility.

In addition, AXEUSE provides the following range of support services:

- Access to on screen documentation using the included DynaText Browser application
- Access to TBT (Technology Based Training) sessions from within the application
- Online help and online tutorial.

4.4.2 The DynaText Browser

The AXEUSE package includes a copy of the DynaText Browser, an application which enables you to view "electronic books". If requested, the Browser is loaded on to your PC as part of the AXEUSE installation process. If installed, the Browser application will be loaded whenever you start AXEUSE. It runs in background mode until you select it.

Using the DynaText Browser, you can read documentation regarding your application systems, which is stored on the On-Screen Documentation CD-ROM.

4.4.3 The AXE Application Window

After you have started AXEUSE (double-clicked on AXEUSE), the application window will open and occupy part of your Windows desktop (see figure 4.9.).
The menu bar is located along the top of the application window and provides access to the AXEUSE command set. Many of these commands can also be activated by function keys.
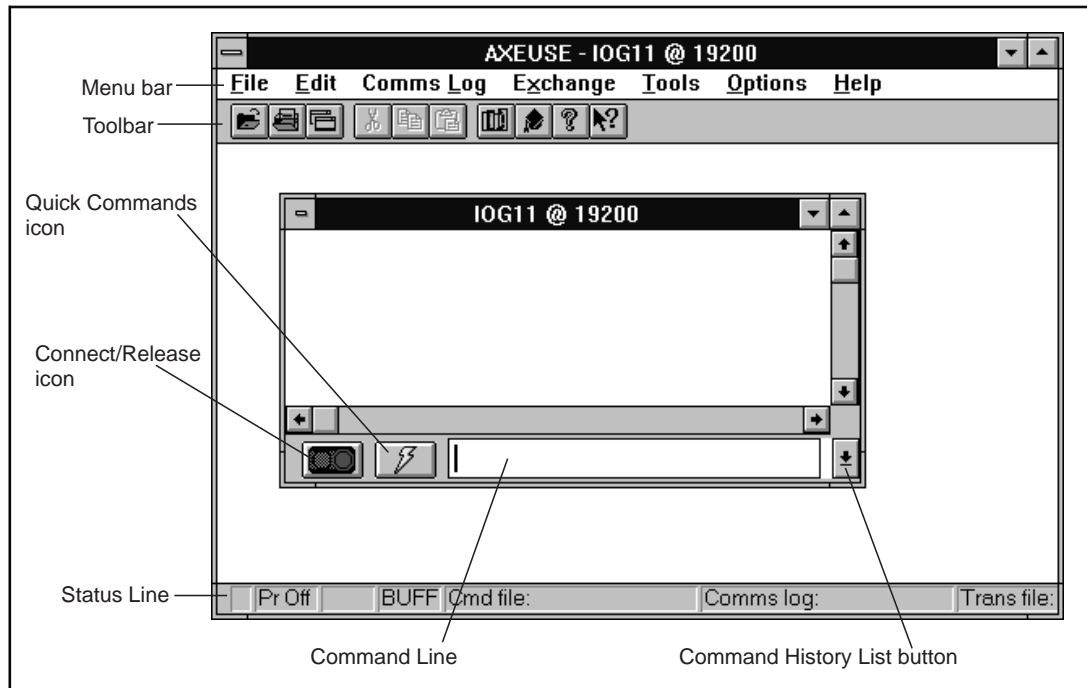
Figure 4.9
The AXEUSE Application Window

Beneath the ***Menu bar*** is the ***Toolbar***, a series of icons providing fast access to the most commonly used AXEUSE functions.
The *Quick Commands* icon is used to display the current quick command file.

Pressing the ***Connect/Release*** icon will cause the application to transmit the connect character to the AXE 10 system. Pressing the same icon while the exchange is connected will release the connection.

Along the bottom of the application window is the ***Status Line***, which displays a range of information regarding the currently active exchange window.

The ***Command Line*** may be used for direct entery of commands to the AXE 10 system.
The ***Command History List*** button recalls commands previously entered on the command line. Up to 40 commands may be stored in the history list.

4.4.4   Interactive Communication

Interactive communication with the AXE 10 system is performed via *Exchange Windows* (see figure 4.10). You may have up to nine exchange windows opened at the same time, one window for each of the ports COM 1-9.

After opening an exchange window you can then connect that window to the AXE 10 system, so that commands may be sent to that exchange port. When finished, you may release and close the relevant exchange windows

individually.
Exchange windows can be re-sized, re-positioned and minimized to icons
if required.

4.4.5 The Active Window

Although multiple exchange windows are opened and simultaneously con-
nected to the AXE system, only one of them can be the active window,
(see figure 4.10). The active exchange window is the one which may initi-
ate exchange-related commands or actions.
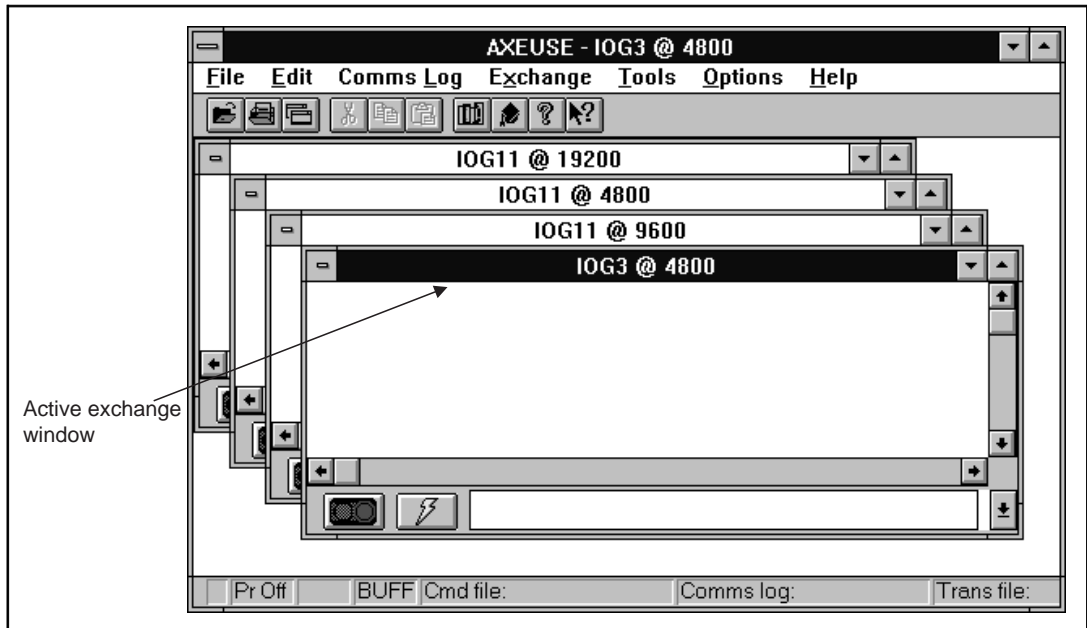
Figure 4.10
The Exchange Windows

You activate an exchange window by clicking on any part of it. The title
bar with the exchange name will then be highlighted.

4.4.6 The Command Line

AXEUSE allows you to type in commands and parameters, and send them
directly to the AXE 10 system. You input these on the command line of the
active exchange window, (see figure 4.11). Press the ENTER key to trans-
mit them. Command-line editing features are provided. The most recently
entered command is highlighted and can be copied to the command line.
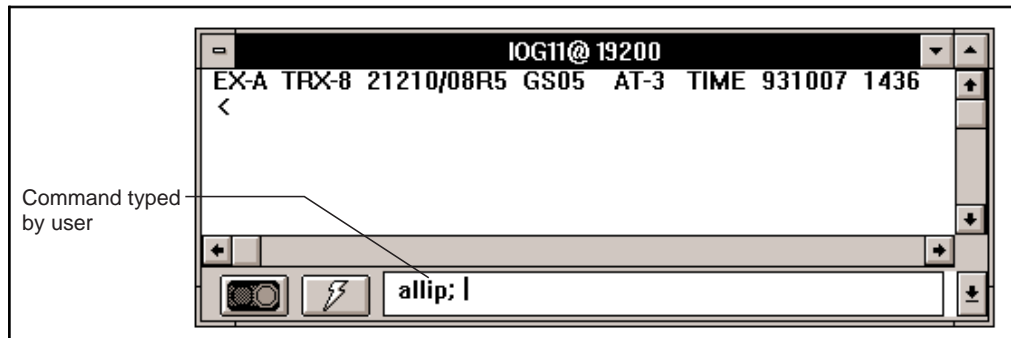
Figure 4.11
The Command Line

4.4.7 The Command History List

A *Command History List* is associated with a command line. The list is made up of a buffer which contains the last 40 commands you have entered on the command line.(see figure 4.12).

To open the command history list, click on the *Command History List Button* (see figure 4.9) at the bottom right hand corner of the exchange window. You can access the history list at any stage, and recall and re-transmit any previously entered command.
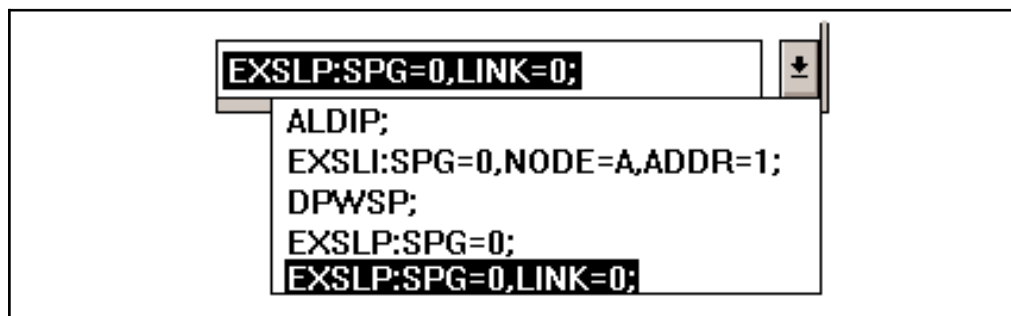
Figure 4.12
The Command History List

4.4.8 Quick Commands

The *Quick Commands* function enables you to store the most commonly used commands and parameters in one or a number of files. To access the quick commands function, click on the *Quick Commands Icon* (see figure 4.9).

Each file could represent a different task or job. While performing that job, you can pre-load the appropriate file into the quick commands dialog box. The file may be edited within the quick command dialog window.

4.4.9 Command Files - Recording and Transmission

AXEUSE enables you to record command files - ASCII files containing one or a sequence of AXE commands and any associated parameters - for transmission to the AXE 10 system.

Transmitting a command file to the AXE 10 system is faster and more convenient than typing the relevant commands and their parameters a second time on the command line of an exchange window.

You can create and edit command files within AXEUSE, or you can use a word processor or text editor which offers the option to save files in ASCII format code.

A command file is always transmitted from a connected exchange window, and the window responds to the transmission in the same way as it would had the contents of the command file been typed on the command line.

If the situation so requires, you can temporarily interrupt command file transmission to the AXE 10 system.

To facilitate automatic testing, command files can be created and sent to the AXE 10 system.

4.4.10 Logging Communication

AXEUSE offers three different options when logging communication with the AXE 10 system. In each case it is irrelevant how the communication takes place. Whether a command is entered on the command line, recalled from the command history list, selected from the quick commands file or transmitted from a command file, the full details of the communication are logged by AXEUSE.

Options for logging communications are briefly described below.

The Exchange Window

All commands sent from AXEUSE to AXE 10 pass via an open and connected exchange window, and that window always displays full details of the communication. (see figure 4.13).
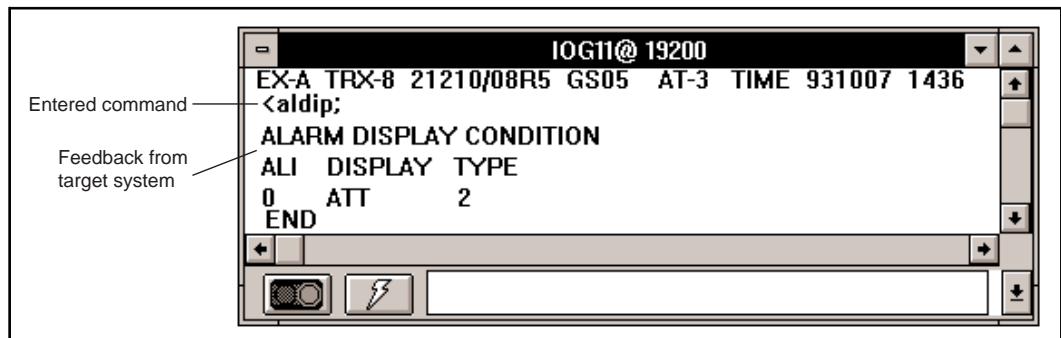
Figure 4.13.
Exchange Window

Vertical and horizontal scroll bars are provided with the exchange window to enable you to move through a list of communication details, particulary useful when the entire area of text does not fit within the window.

Printer Logging

At any stage of communication between an exchange and the AXE system, you can log details of the communication to a print spool. The information may then be printed directly.

Communication Logs

You can create a communication log file for recording the commands sent to the AXE system and the feedback generated by the system in response. The log file will record all commands and feedback, regardless of whether the commands are entered directly on the command line, recalled from the command history list, sent as quick commands, or transmitted within command files.

You can temporarily interrupt the recording at any stage and resume it again when appropriate (see figure 4.14).

It is recommended that you add the file extension `.log` to the name of your log file when saving it.

Once you have recorded and saved a communication log, you can display the log on the screen or output it to a printer.
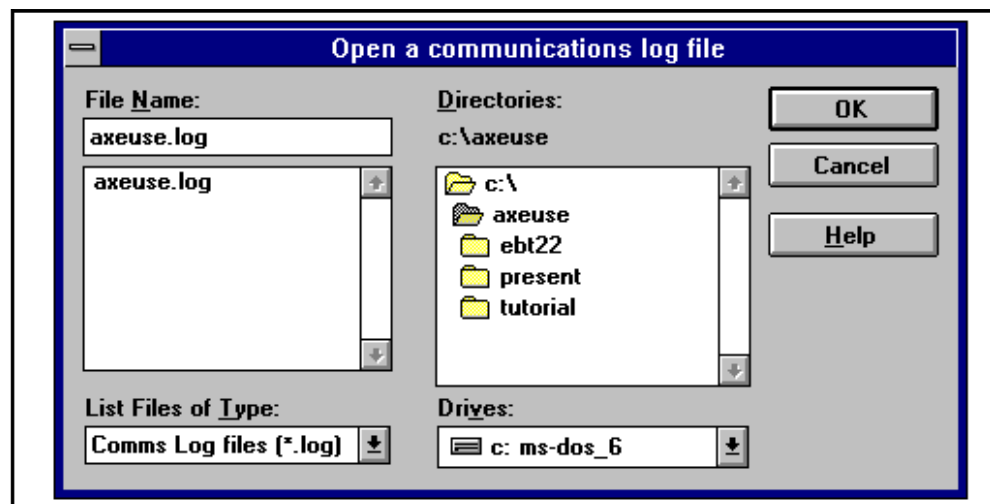
Figure 4.14
Open a Log File Dialog Box

4.4.11 On Screen Documentation

Whenever you start AXEUSE on your PC, the browser application is also started. It runs in the background until you select it.

Using the DynaText Browser, you can read documentation regarding your

application system. This is stored on the CD-ROM which you will have received from your supplier. Of course, the on-screen documentation CD-ROM must be loaded via your PC's CD-ROM drive in order to enable AXEUSE to access the information that it contains.

You can access the Browser from within AXEUSE, or you can simply switch between AXEUSE and the Browser using the Windows task-switching facility.

4.4.12 Interactive Access

AXEUSE provides the user with interactive access to the DynaText Browser.
Whenever feedback containing a command-related fault code is displayed in the exchange window, the program can automatically retrieve and display the relevant Command Description.

4.4.13 Access to Technology Based Training (TBT) Sessions

TBT sessions may be accessed from within AXEUSE, there is therefor no need to terminate the current application when entering a training session.

AXEUSE is, at the moment, supplied with three TBT courses: C7 Signalling in AXE, C7 in the Telecommunications Network and IOG11 Hardware.

Future additions on TBT will include operator aids applicable to the handling of emergency situations.

4.4.14 Online Help and Tutorial

In addition to printed documentation, AXEUSE offers on-line help for all commands and commonly performed functions. You can access this material at any stage by pressing the standard Windows help key, F1.

The online tutorial enables you to learn the basics of AXEUSE by practising interactively with a copy of the real application.

4.5 Connection to TMOS

Communication with TMOS, (**T**elecommunication **M**anagement and **O**peration **S**upport) presupposes a standard for the sending and receiving of information. TMOS uses several different standard communication protocols to communicate with AXE 10.

- X.25 for the link communication (Layer 3)
- MTP for application communication (Layer 4 - 7).

The physical connection to TMOS is performed via one of the physical ports in the IOEXT magazine located in the IOG11 (Input / Output System).

Communication between the AXE 10 and TMOS, (see figure 4.15), can be divided into the following five traffic cases:

- MML- Commands
- Delayed Responses
- Spontaneous Reports
- File output from the AXE 10 Exchange
- File information from TMOS to the AXE 10 Exchange.
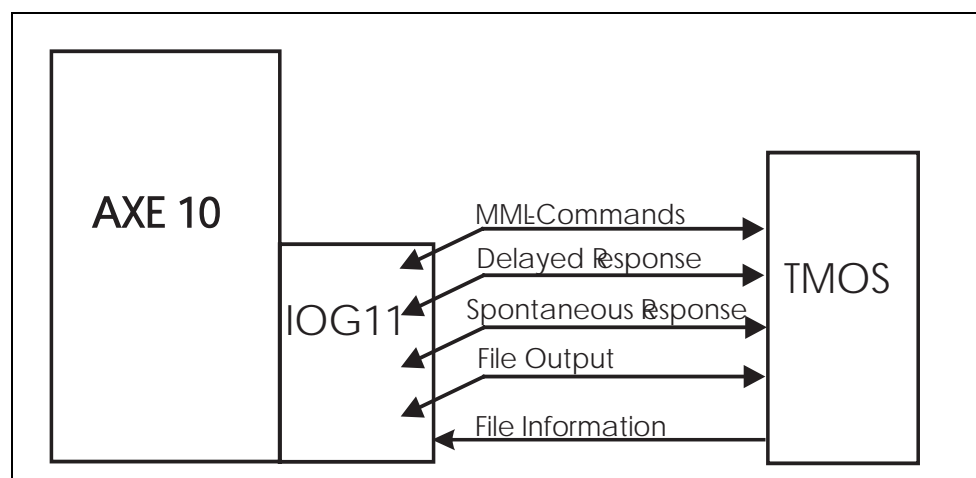
Figure 4.15
Traffic Cases

4.5.1 MML Commands

The MML language used for normal handling of AXE 10 Exchanges can also be used for communication via TMOS.

Immediate Response

All MML commands result in some sort of immediate response from the AXE 10 Exchange. Immediate responses are received as ASCII characters and may therefore be displayed via character terminals.

TMOS designates immediate output as an *immediate response*. There are four types of immediate responses:

- Procedure Printouts
- Interactive Printouts
- Answer Printouts
- Check Printouts.

4.5.2 Delayed Responses

A response is often delayed due to the fact that the action requested requires the AXE system to collect data (traffic recording etc.), which takes a varying amount of time.

4.5.3 Spontaneous Reports

This report category represents reports produced by the AXE system that were not solicited by the TMOS system. Alarm situations are examples of situations resulting in such reports.

4.5.4 File Output from the AXE 10 Exchange

File outputs from AXE 10 are binary ASCII files and are converted by the TMOS system (statistic measurement etc.).

4.5.5 File Information from TMOS to the AXE 10 Exchange

Any files that are similar in syntax to the file output from the AXE 10 system can be sent from TMOS to the AXE 10 Exchange.

4.6 Chapter Summary

- FIOL/Docview is using EDML, Ericsson Document Mark-up Language

- FIOL is a program witch makes it possible to use a personal computer as a terminal for communication with AXE

- FIOL can be used for e.g. transmitting a command file, creating a log file

- AXEUSE is a Microsoft Window application that provides multiexchange communication with the AXE system

- Only documentation available in SGML, Standard General Mark-up Language can be handled by AXEUSE

- Communication with TMOS is performed via the X.25 protocol connected to IOG 11 (IOEXT magazine)

- File outputs from AXE to TMOS are binary ASCII files.

5. Hardware Orientation

Chapter Objectives

After completing this chapter the participant will be able to:

* Locate Hardware units in the exchange through the use of commands

* Identify the operational activities that are to be performed based on information in a specific work order and the contents of the associated B-Module.

Figure 5.1
Chapter Objectives

5.1 Mechanical Structure

5.1.1 Introduction

The mechanical organization of the AXE system is based on a concept called the *Packaging System* or the *BYB-Structure*. This system offers a high degree of flexibility which is well suited to the AXE system's overall modularity. Packaging system size standardization contributes to the simplification of the handling required during the variousd phases of design, manufacture, documentation, installation, and operation and maintenance activities related to the AXE system.

The AXE equipment is delivered in *Magazines* equipped with *Printed Board Assemblies*. These magazines are the basic building blocks of the packaging system.

The magazines are installed on *Shelves* housed in *Racks* or *Cabinets*. The racks or cabinets are arranged in *Rows* in the exchange room.

5.2 Development of the Packaging System

5.2.1 BYB 101 and BYB 102

The first packaging structure developed was called BYB 101. Certain objectives were particularly considered during the design of this package:

- The structure was to be suited to electronic equipment units made up of integrated circuits, miniaturized electromechanical components and power supply units.

- It was to be possible to use computerized aids to facilitate the design, production and documentation of the system.

- The processing time and cost were to be kept as low as possible.

- The structure should not to restrict the use of existing and future components.

- Cooling was to be achived by natural air circulation (selfconvection) for most of the cabinets, (With the exeption of the IOG and CP).

Basically, the BYB 102 has retained the basic structure of its predecessor, the BYB 101. Its primary objective was to simplify installation methods and operations, thereby reducing installation time.

Modified elements of the BYB 102 structure may be applied when existing BYB 101 installatons are expanded.

Both BYB 101 and BYB 102 structures use racks to house the shelves carrying the magazines.

5.2.2 BYB 202

The BYB 202 is designed to meet the requirements for a flexible cabinet-type structure. The designers of this system seized the opportunity, while maintaining the basic design of the BYB structure, to make a number of improvements:

Screening

The BYB 202 cabinet structure ensures effective protection against ESD (Electrostatic Discharge) and EMI (Electromagnetic Interference). The cabinets are electrically screened to comply with international standards. The front doors have special features to optimize both EMI and air ventilation(see figure 5.2).

.
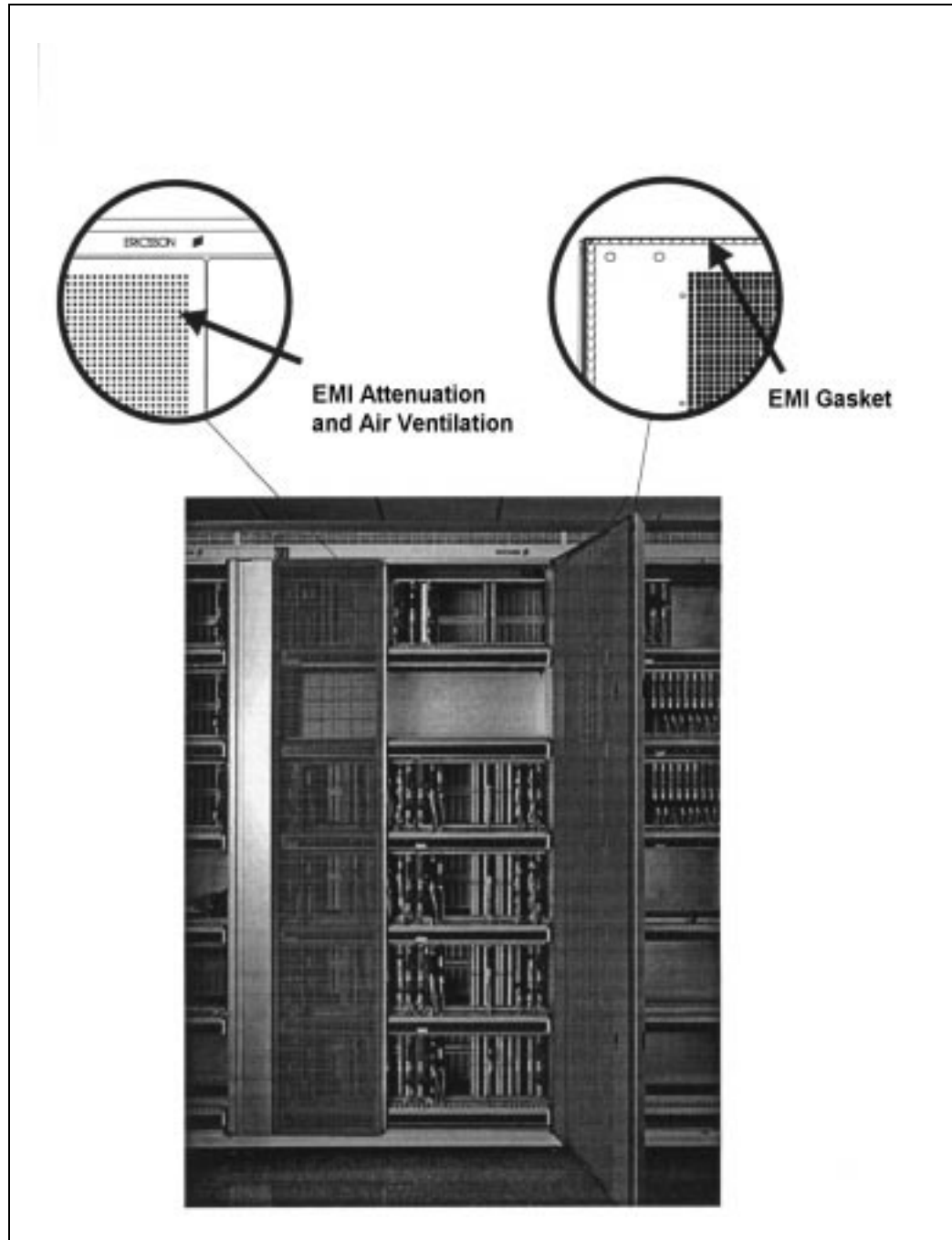
Figure 5.2
Screening

Heat Dissipation

The main objective in the thermal dimensioning of the cabinets was to keep component temperature as low as possible. An efficient combination of series and parallel natural convection, with its known advantages (no noise, no fan maintenance, etc.), was used to achieve greater heat dissipation than that achieved with earlier designs (see figure 5.3).

Cabinets requiring extreme heat dissipation make use of fans that support natural convection.
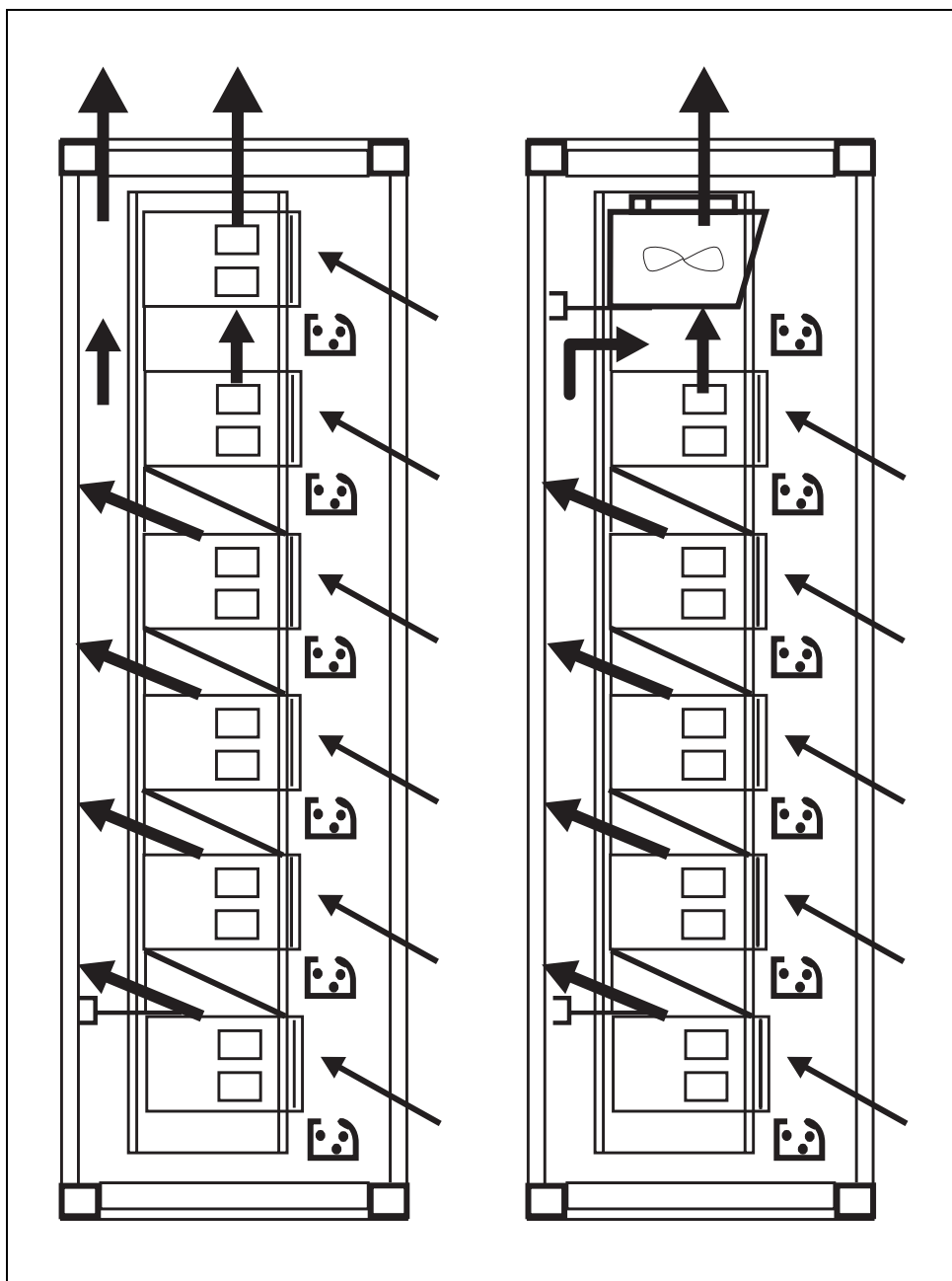
Figure 5.3
Heat Dissipation

Earthing

The combination of the material and the excellent mechanical design of the contact points employed in the earthing system of each cabinet, coupled with the inter-cabinet earth connection scheme, ensures good zero-level stability.

Cable Running

As in the case of rack design, the exchange cables can be run in screened cable chutes mounted on top of the cabinets or between a raised deck and the actual floor of the switching room (see figure 5.4).
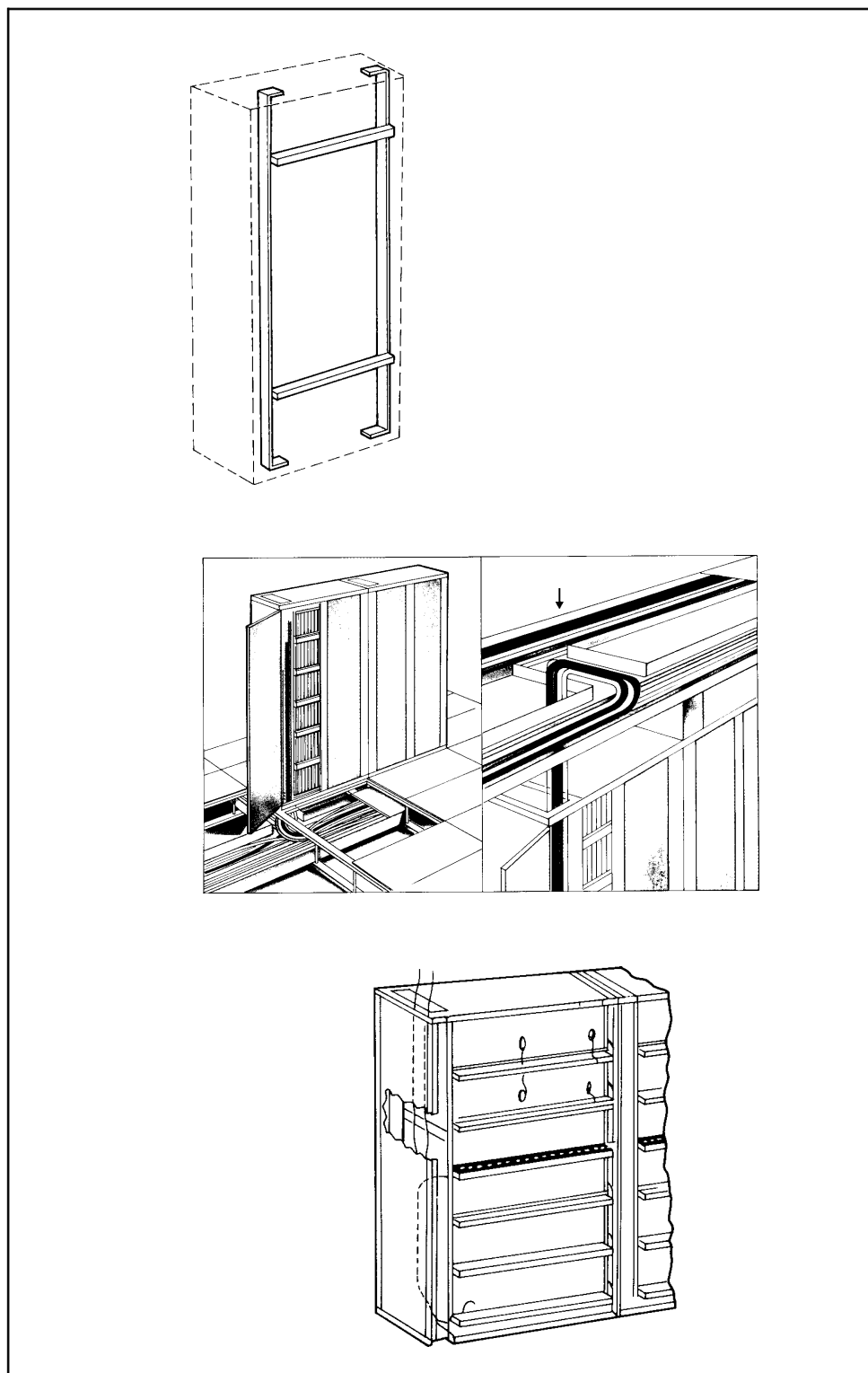
Figure 5.4.
Cable Chutes

Interior cabinet cabling is distributed so that it is run in both the horizontal cable chutes and in the vertical space at the left side of the cabinet.

Earthquake Resistance

Anchoring arrangements and the design of the cabinet ensure resistance to earthquakes, in line with international requirements.

5.2.3 The Building Module

Instead of inches or centimetres, Ericsson uses a standard unit of length which is called a "Module", designated (M) in mechanical structures.

1 M = 0.1 Inch = 2.54 mm

This unit is a bit too small for practical use, so another unit which is called a "Building Module", designated (BM), is used.

1 BM = 16 M = 1.6 Inches = 40.64 mm

5.3 The Cabinet

Cabinets are manufactured in two different widths. The narrower of them is 720 mm wide, has only one door, and is used for magazines of up to 12 BM. The broader version is 1200 mm wide, has two doors and is used for magazines up to 24 BM (See Fig. 5.5).
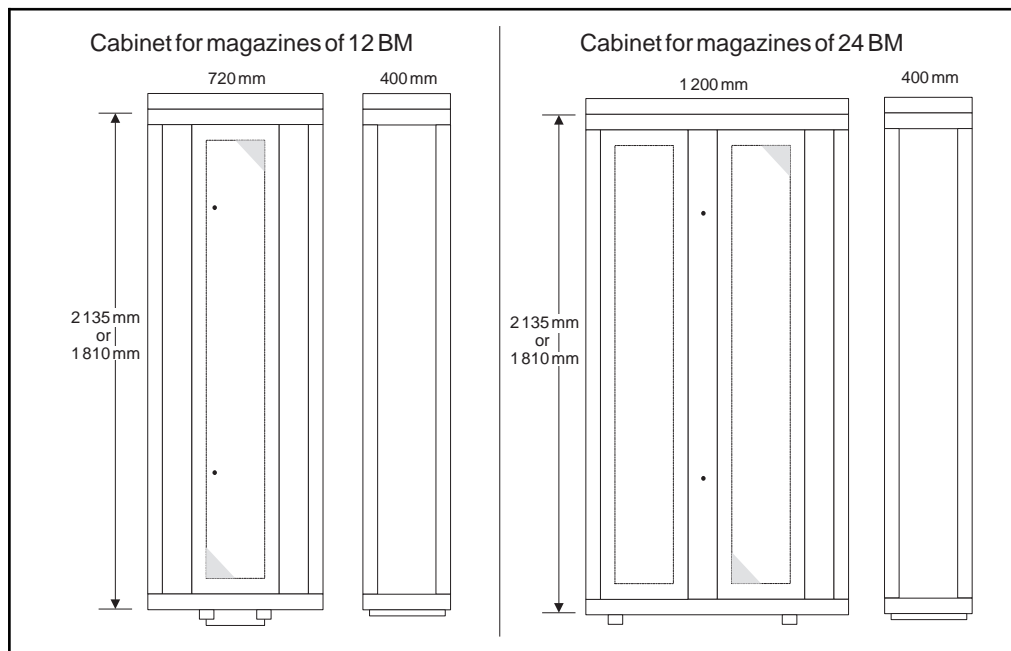
Figure 5.5
Cabinets for magazines of 12 BM and 24 BM

The cabinets can be delivered in two heights; 2135 mm or 1810 mm.

The depth of the cabinets is 400 mm.

There is a maximum of 6 shelves in BYB 202 cabinets.

Required ceiling height is, on a raised floor, a minimum of 2697 mm, and with overhead cabling a minimum 3100 mm.

The cabinets may be mounted in double-sided rows (back-to-back), in single sided rows, or single against a wall. The required maintenance aisle is minimum 800 mm.

The rows, cabinets and shelf numbering are shown in figure 5.6. The row numbering (3-digit) is marked on the end of the cabinet at the beginning of each row. The first digit is normally the floor number, the second and third digits indicate the actual row number. In this example, this particular row is located on the first floor in row no. 21.
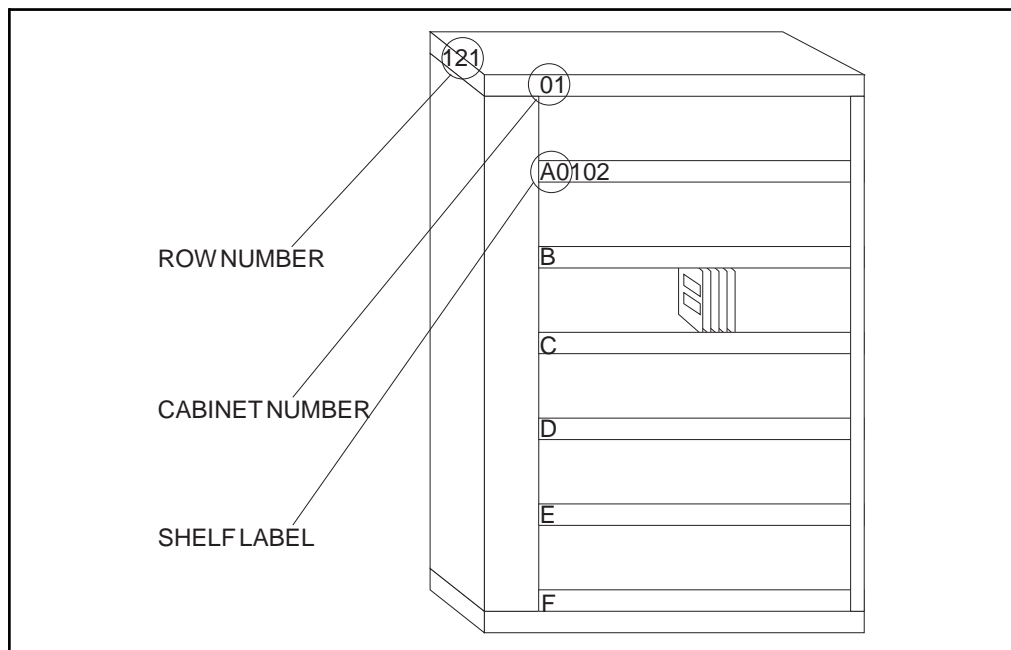
Figure 5.6
Row, Cabinet and Shelf Numbering

Each cabinet has its own number at the front upper corner which indicates its position within the row. Numbering starts at the beginning of each row, which is always indicated on the layout by a line.

The shelves are labelled alphabetically, with the top shelf as A, the second as B, and so forth, down to the letter F as we use a maximum of 6 shelves.

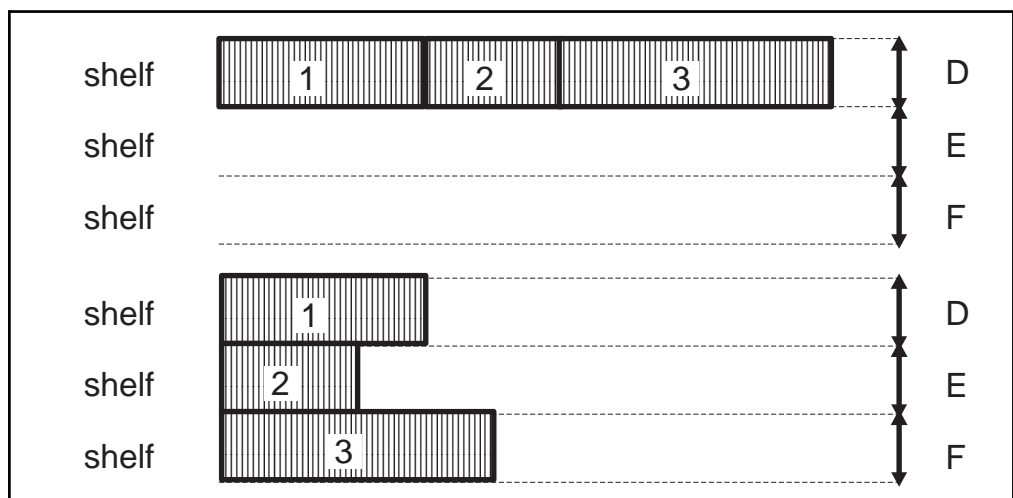### 5.3.1 Magazines

A magazine consists of two main components:

- The board frame including slots that hold and guide the printed boards
- The backplane which contains the magazine's internal wiring and circuit board connectors.

The magazines with circuit boards are placed on the shelves. The magazines correspond to function units and therefore vary in size, (see figure 5.7).
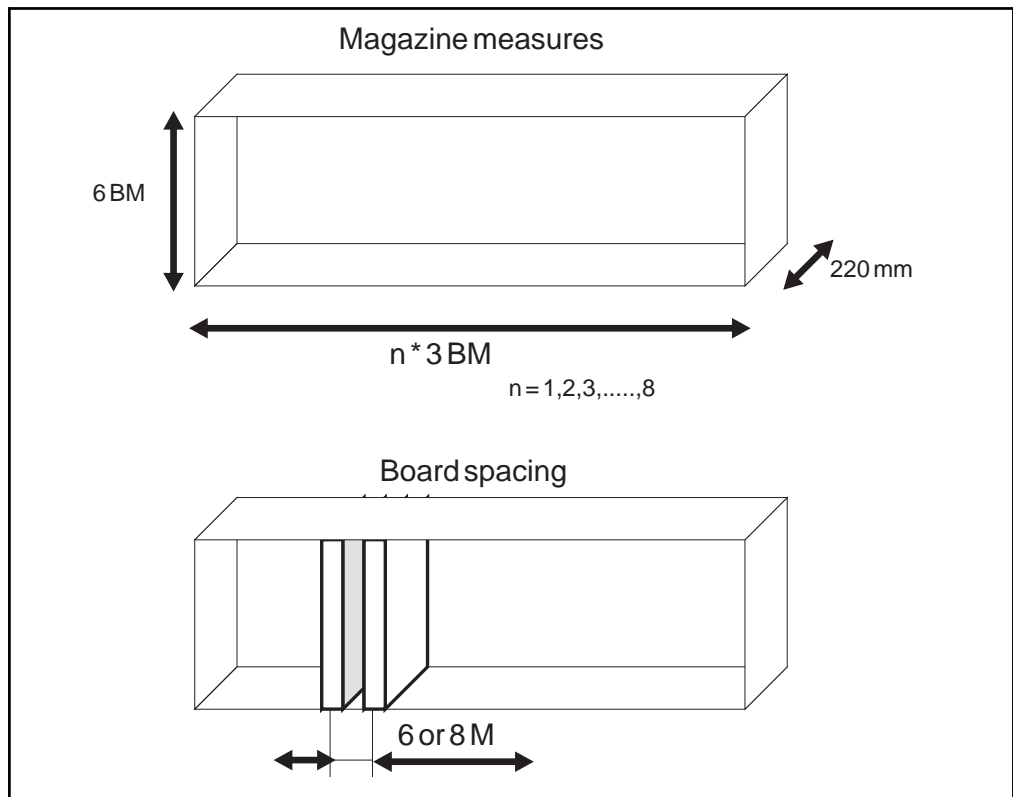
Figure 5.7
Magazines in BYB System

The packaging structure permits flexible positioning of the magazines, i.e. they can be placed side by side or on top of each other, or on a combination of the two arrangements, (see figure 5.8). This permits the cabinets to be equipped in the easiest and most economical way.

Figure 5.8

Positioning of Magazines

The magazines are interconnected by means of front connections and can thus be moved or replaced without necessitating any change of the cabinet layout.

The magazines are assigned type-codes BFD XYZ, in which:

X   denotes magazine type,
         = 1 for magazine with PCBs or
         = 2 for magazine devices such as power units.

Y   denotes board spacing,
         = 1 for 6M or
         = 2 for 8M.

Z   denotes magazine width,
         = 2 for 3BM,
         = 3 for 6BM,
         = 4 for 9BM, etc.

Looking at figure 5.9 we see how the magazines are differentiated by their width, and thus the number and type of printed circuit boards (PCBs) they can contain.

Magazine type	Number of Board positions		Width
	6M	8M	BM
BFD 112	7		3
BFD 122		5	3
BFD 113	15		6
BFD 123		11	6
BFD 114	23		9
BFD 124		17	9
BFD 115	31		12
BFD 125		23	12
BFD 116	38		15
BFD 126		28	15
BFD 117	46		18
BFD 127		34	18
BFD 118	54		21
BFD 128		40	21
BFD 119	62		24
BFD 129		46	24

Figure 5.9
*Magazine types B F D*

Each magazine is equipped with the PCBs that are required by the particular function unit in which the magazine is included. Each PCB has its predefined position in the magazine. All magazines are equipped with one or more power boards to supply power to the individual magazine. These power boards have a toggle switch for turning power on and off. Some boards are equipped with a fuse mounted on the power plug.

5.3.2 Magazine Devices

These are units which require a space-equivalent of an entire magazine and are placed on shelves in the same way as magazines containing PCBs. Examples of these units are the DC/DC converter unit, the ringing generator, the distribution unit, etc.

5.3.3 Printed Circuit Boards (PCBs)

The Printed Circuit Boards are installed in slots in the magazines. Each board has room for two connectors at the back side and two connectors at its front, (see figure 5.10). When the boards are put into place in the magazine, they are plugged into the backplane by means of the back connectors.
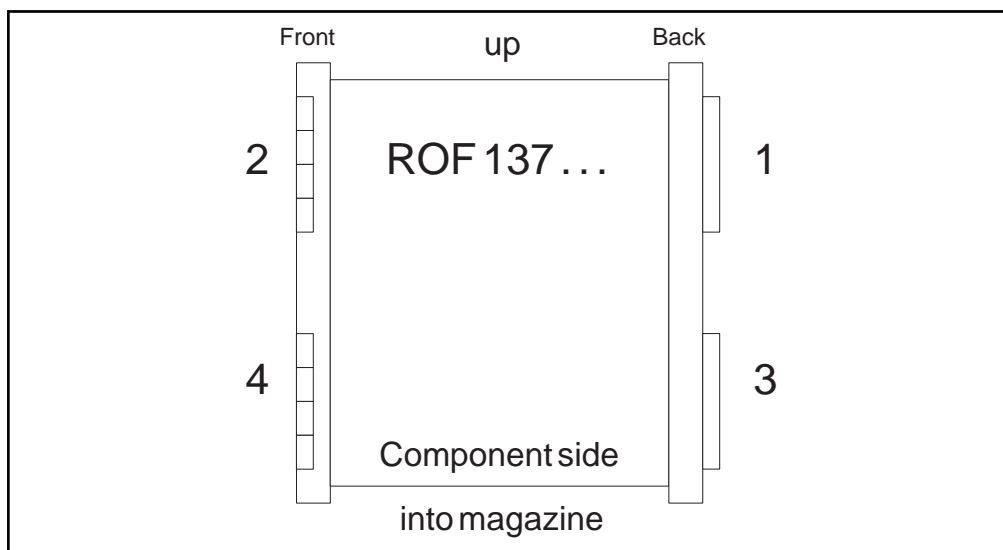
Figure 5.10
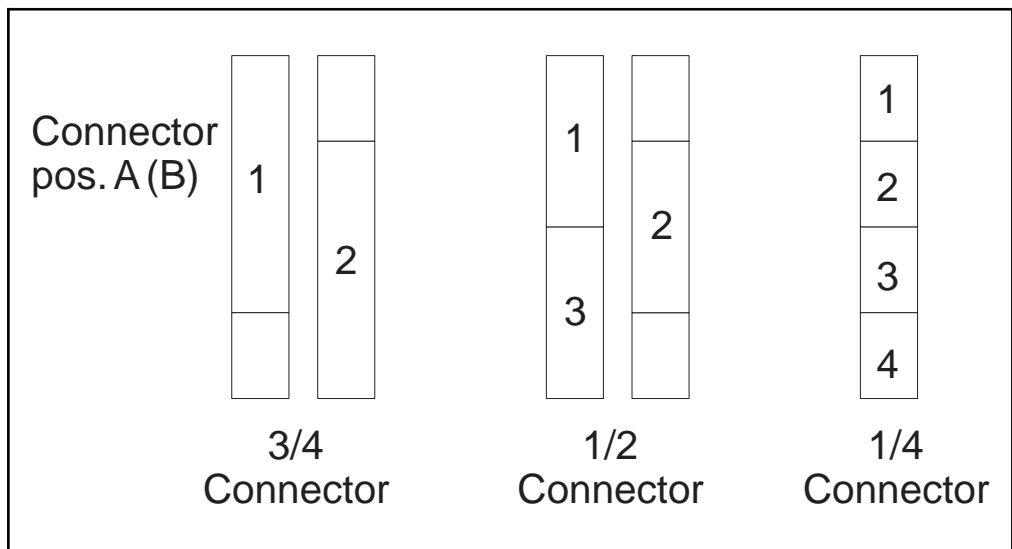*Printed Circuit Board (PCB)*

The front connector positions on the printed boards in a magazine are allocated in two rows (A and B), (see figure 5.11).
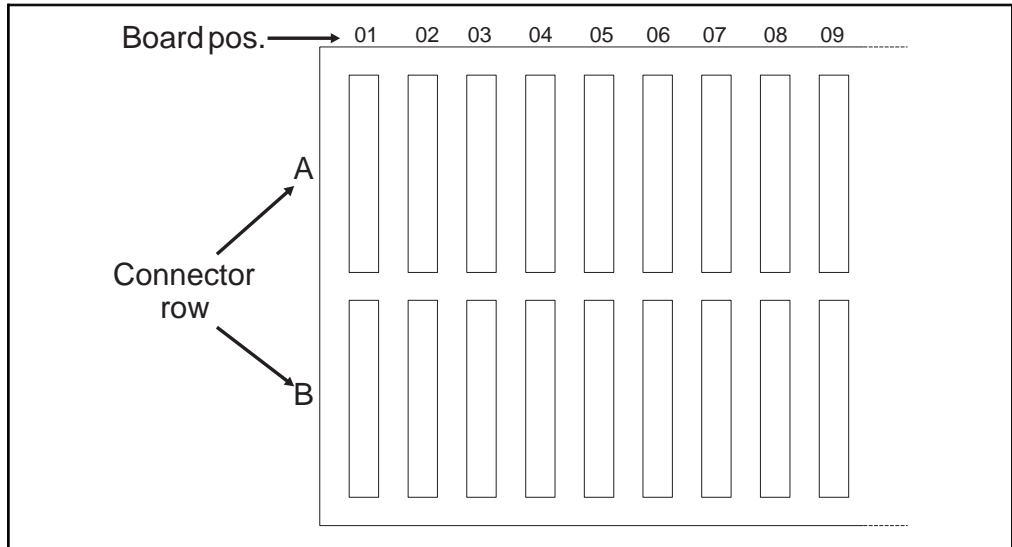
Figure 5.11
Connector Row

The backplane connectors on the circuit board have position C and D.

The connectors can be positioned in a number of ways within these two rows, (see figure 5.12).

Figure 5.12
Connector Positions

The standard PCBs are assigned type-code ROF 13 ... except for CP boards which are assigned ROF 16 ....

Depending on the size of the components mounted on a board, boards require magazine space amounting to 6M or 8M. Components are mounted only on one side of the board.

5.4 Localization of hardware units

In order to locate the physical position of a Magazine, RP, EM, DEV etc, in an exchange, an operator can use the command **EXPOP** and study the printout for localization of the suspected unit.

Example:

EXPOP: TSM=TSM-B-2;

Time Switch Module number 2 in the digital group switch, plane B, is pointed out.

New equipment added to an exchange must be initiated via the command **EXPOI.**

Example:

EXPOI:DEV=KR-0&&-15,POS=CITY-24B-6-C;

For KR individuals 0-15 the following position is defined: Building CITY, row 34B, section 6 and shelf C.

Position information defined in the system can be removed by command **EXPOE.**

Example:

EXPOE:DEV=KR-0&&-15;

Position information for the Hardware entity KR 0-15 is removed.

5.5 Chapter Summary

- Communication with TMOS is performed via the X.25 protocol connected to IOG 11 (IOEXT magazine).
- The BYB 202 cabinet structure ensures effective protection against ESD, Electrostatic Discharge and EMI, Electromagnetic Interference
- Anchoring arrangements and the design of the cabinet ensure resistance to earthquakes, in line with international requirements.
- 1 BM = 16 M = 1.6 Inches = 40.64 mm

Using the Acrobat Reader ▶

This electronic (on-line) document is stored in Adobe Acrobat format. To view the document you use the **Acrobat Reader 3.0** program (the one you are using right now) together with the **Acrobat Search Plug-in**.

The following pages briefly describe the Acrobat Reader functions used in this application. Click the next page button at the top of the page to continue.

▶

More detailed information to help you use the Acrobat Reader program is found in the **Acrobat Reader Online Guide**. Select **Help** from the menu bar at the top of the Acrobat Reader window. Then click on **Reader Online Guide**.

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Exiting the Acrobat Reader

Select **Exit** from the **File Menu**
(or press **Alt**+**F4**) to exit the
Acrobat Reader.

You can also click **Exit** on the
first page of this document to exit
the Acrobat Reader.

File	
Open...	Ctrl+O
Close	Ctrl+W
Document Info	▶
Print...	Ctrl+P
Print Setup...	Ctrl+Shift+P
Preferences	▶
Exit	Alt+F4

Page navigation

The page navigation buttons on the toolbar are used to move between pages within the document.

The **Previous Page** and **Next Page** buttons are used to move within the document backward or forward, one page at a time.

Use the **First Page** or **Last Page** button to move to the first or last page.
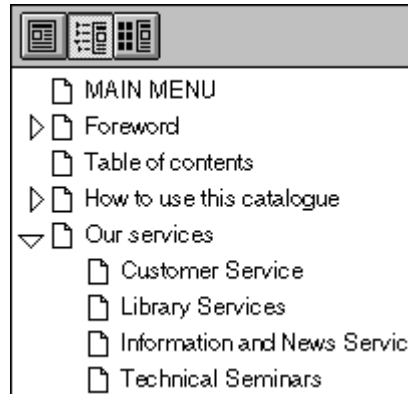
Use the **Go Back** and **Go Forward** buttons to retrace your steps in a document, moving to each view in the order visited.

Document overview

On the left-hand side of the Acrobat window you find the **document overview** area. In this application the area contains the table of contents or page thumbnails (miniatures) for all pages in the document. In Acrobat terminology the items in the content list are called bookmarks. Click a paragraph title to go to the corresponding paragraph. Clicking one of the small triangles in the list will show or hide subordinate headings (bookmarks).

▢ MAIN MENU
▷ ▢ Foreword
▢ Table of contents
▷ ▢ How to use this catalogue
▽ ▢ Our services
　　▢ Customer Service
　　▢ Library Services
　　▢ Information and News Servic
　　▢ Technical Seminars

You can click and drag (see the cursor in the figure) the border between the overview area and the page area to change the area proportions (size relation between areas).
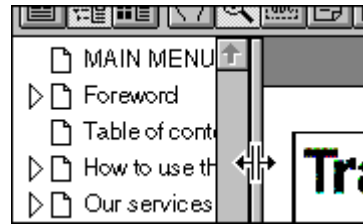
Click the **Thumbnails and Page** button to display the thumbnails.

Click the **Page Only** button to close the overview area of the window.

Click the **Bookmarks and Page** button to open the overview area and show the table of contents (display bookmarks).
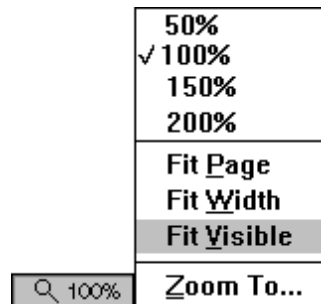
Page magnification

The magnification box at the bottom of the screen displays the current page magnification and lets you select various magnifications.

Fit Visible is the default magnification for this electronic document application.

```
   50%
√ 100%
   150%
   200%
   Fit Page
   Fit Width
   Fit Visible
🔍 100%   Zoom To...
```

You can also use the **Actual Size**, **Fit Page**, and **Fit Width** toolbar buttons to change the screen magnification.

Find

There are two functions to locate a word or a phrase when using the Acrobat Reader. One function is called **Find** and the other is called **Search**. Find is the slowest and processes the text in a sequential way. Search is much quicker and is the recommended method. See next page for details.

(Step-by Step instructions for the **Find** function)

1. Click the **Find** button and enter keyword(s).

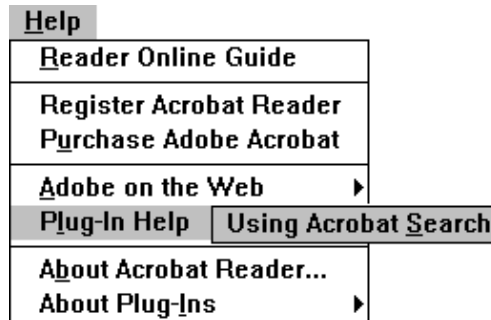2. If necessary, press **F3** to find next occurrence.

Search

It is recommended that Acrobat Reader 3.0 with the **Search Plug-In** is used to view this electronic document. The plug-in enables the Acrobat Reader to use the **Search** function to very quickly find the information you are looking for.

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Select **Plug-In Help** from the **Help Menu** and then click on **Using Acrobat Search** to read about advanced uses of the **Search** function. There is also a **Find** function (see previous page) but **Search** is the recommended method as it is much quicker than **Find** and it also includes more advanced search functions.

Search (cont.)

(Step-by Step instructions for the **Search** function)

1. Click the **Search** button and enter keyword(s).

2. If necessary, click the **Search Next** and
   Search Previous buttons to find other
   occurrences in the text.

Print

(Step-by Step instructions)

1. Select **Print** from the **File Menu**.

2. Select print range (what pages to print) and set options.
   Select **Shrink to Fit** if your paper is smaller than A4-size
   (e.g. letter size paper).

3. Click the **OK** button

File	
<u>O</u>pen...	Ctrl+O
<u>C</u>lose	Ctrl+W
Document <u>I</u>nfo	▶
<u>P</u>rint...	Ctrl+P
P<u>r</u>int Setup...	Ctrl+Shift+P
Pre<u>f</u>erences	▶
E<u>x</u>it	Alt+F4

Cutting and pasting text

(Step-by Step instructions)

1. Click the **Select Text** button and select the text you want to copy into another Windows application.

2. Select **Copy** from the **Edit Menu** to copy the text to the Windows clipboard.

3. Go to the target Windows application (e.g. Windows Write or WordPad).

4. Paste the text into your target application.

Important: This function may only be used to create notes or summaries for personal use. Beware of copyright rules.

Cutting and pasting graphics

(Step-by Step instructions)

1. Choose **Select Graphics** from the **Tools Menu** to select the graphics item you want to copy into another Windows application.

2. Select **Copy** from the **Edit Menu** to copy the graphics to the clipboard.

3. Go to the target Windows application (e.g. Windows Write or WordPad).

Tools	Window	Help
✓ Hand		Ctrl+Shift+1
Zoom In		Ctrl+Shift+2
Zoom Out		Ctrl+Shift+3
Select Text		Ctrl+Shift+4
Select Graphics		Ctrl+Shift+5
Find...		Ctrl+F
Find Again		Ctrl+G
Find Next Note		Ctrl+T
Search		▶

4. Paste the graphics into your target application.

Important: This function may only be used to create notes or summaries for personal use. Beware of copyright rules.