LM04-0132-00

LMO: Large Mailing Operations System

# General Information Manual

Version 1.0.0

IBM

LMO: Large Mailing Operations System

LM04-0132-00

# General Information Manual

Version 1.0.0

**First Edition (October 1996)**

This edition of the *IBM: LMO System General Information Manual* applies to the LMO System Release 1.3.3, a service offering of IBM, and to all subsequent releases of this service until otherwise indicated in new releases or technical newsletters.

**The following paragraph does not apply to the United Kingdom or any country where such provisions are inconsistent with local law:** INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS MANUAL "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Some states do not allow disclaimer of expressed or implied warranties in certain transactions. Therefore, this may not apply to you.

IBM does not warrant that the contents of this publication will meet your requirements or that the publication is error-free.

Requests for copies of this publication and for technical information about IBM products should be made to your IBM authorized Dealer, your IBM Marketing Representative, or your IBM Printing Systems Company Representative.

The following copyright notice protects this documentation under the Copyright laws of the United States and other countries which prohibit such actions as, but not limited to, copying, distributing, modifying, and making derivative works.

© **Copyright International Business Machines Corporation 1996. All rights reserved.**
Note to U.S. Government Users — Documentation related to restricted rights — Use, duplication or disclosure is subject to restrictions set forth in GSA ADP Schedule Contract with IBM Corp.

# Contents


**Preface** . . . vii

**What is the Large Mailing Operations (LMO) System?** . . . 1
Needs of the Large Mailing Operations Industry . . . 1
The Need for Control . . . 1
The Need for Improved Operations (a system-wide view) . . . 1
The Need for a Standard . . . 2
Brief History of the LMO System . . . 2

**Architecture of LMO** . . . 5
Big Picture of LMO System . . . 5
Components of the System . . . 5
Production Information . . . 5
Overview of LMO Components . . . 5
Hosts . . . 6
LANs . . . 6
Servers . . . 6
MIFS . . . 6
DB/2 . . . 7
Printers . . . 7
Attaching Pre- and Post-Processors to the LMO system . . . 7
Inserters . . . 7
GUIs . . . 8
Reports . . . 8
Relating Applications to the LMO Data Structure . . . 11

**Device Hardware Data Capture** . . . 13
Printers . . . 13
Data Captured . . . 13
Inserters . . . 15
Data Captured . . . 15
Statistical Information from the Printers . . . 19
Graphical Display of Hardware Data . . . 22
Printer-Related Reports . . . 22
Inserter-Related Reports . . . 22
Regular Device Reports . . . 23
Printer Reports . . . 23
Inserter Reports . . . 24
Shop Floor Display . . . 25
Shop Floor Related View . . . 25

**Job Tracking** . . . 27
What Is Job Tracking? . . . 27
How Print Jobs are Tracked . . . 27
Product Level Information . . . 27
Job Level Information . . . 28
Agents . . . 28
From Host to MIFs . . . 28
Using Barcodes on Print Jobs . . . 29
Scanning Barcodes from the GUI . . . 29


© Copyright IBM Corp. 1996

Looking Up Job Data . . . . . 29
Automatic Job Tracking . . . . . 30

**Mailpiece Tracking** . . . . . 33
What Is Mailpiece Tracking? . . . . . 33
Mailpiece Cross-Referencing . . . . . 33
Mailpiece History Table . . . . . 34
Reports on Mailpieces in LMO System . . . . . 34
First and Last Mailpiece Ids . . . . . 34
Mutilated Mailpieces Report . . . . . 34
Mailpiece Detail Report . . . . . 35
Mailpiece Status Report . . . . . 35
From Host to LMO with PSF . . . . . 35
Sending TLEs to the LMO Server . . . . . 35
Implementing the LMO Starter Set on MVS . . . . . 36
Set Variable Values in the JCL . . . . . 36
Submitting the Model1 Job . . . . . 37
Submitting the Model2 Job . . . . . 37
Submitting the Model3 Job . . . . . 38
Placing Barcodes on Individual Statements . . . . . 39
How Inserters Read Barcodes . . . . . 39
Reprinting and Reconciling Statements . . . . . 39

**Installation Requirements** . . . . . 41
Migration/Implementation . . . . . 41
Mailing Processes Site Assessment . . . . . 41
Installation, Customization, and Training . . . . . 41
Maintenance . . . . . 42
LMO System Hardware/Software Guidelines . . . . . 42
Host Machines . . . . . 42
LMO Server . . . . . 43
GUI Workstations . . . . . 43
Optional . . . . . 43
AFP Printers . . . . . 43
Status Collectors . . . . . 44
Inserters . . . . . 44
Local Area Network . . . . . 44

**Appendix A. LMO Advisory Council** . . . . . 45

**Appendix B. LMO Vendor Council** . . . . . 47

**Glossary of Terms and Abbreviations** . . . . . 49

# Figures


1. LMO System Components . . . . . 5
2. The Printing Process . . . . . 5
3. LMO System Architecture . . . . . 5
4. Sample Report . . . . . 11
5. Printer Operator Reports . . . . . 22
6. Inserter Operator Reports . . . . . 22
7. Shop Floor Sample Report . . . . . 25
8. Barcode Dialog Box . . . . . 29
9. Products and Mail Jobs . . . . . 29
10. Starter Set Process Diagram . . . . . 35


# Tables


1. Status Table . . . . . 19
2. Printer Marker Table . . . . . 19
3. Usage Table . . . . . 19
4. Interval Statistics Table . . . . . 20
5. Intervention History Table . . . . . 21
6. Alert Table . . . . . 21
7. Mailpiece XReference Table Attributes . . . . . 33


© Copyright IBM Corp. 1996

# Preface

## Who this booklet is for

This booklet is primarily for executives and data-processing managers, but it may also be useful for application designers and printer or inserter operators. It is provided for evaluation of the LMO suite of problem-solving tools for the large mailing operations industry.

## How this booklet is organized

**"What is the Large Mailing Operations (LMO) System?" on page 1** provides an overview of the LMO System.

**"Architecture of LMO" on page 5** describes the LMO System architecture.

**"Device Hardware Data Capture" on page 13** describes how devices are connected to the LMO System and how their operations are monitored.

**"Job Tracking" on page 27** describes the job tracking capabilities of the LMO System.

**"Mailpiece Tracking" on page 33** describes mailpiece tracking capabilities.

**"Installation Requirements" on page 41** describes the hardware, software, and processes involved in installing and implementing an LMO System.

## Related Documents

### Industry Standards

*Desktop Management Interface Specifications*

*Large Mailing Operations Standards Specifications*, Version 1.2

### LMO System Documents

*LMO Starter Set*

*LMO System Administrator's Guide*

*LMO User's Guide*

© Copyright IBM Corp. 1996

# What is the Large Mailing Operations (LMO) System?

The IBM LMO System is a service offering of the IBM Printing Systems Company that is designed to meet the needs of customers who print and mail large volumes of data every month.

The LMO System provides a single, fully integrated means of capturing and displaying information about all of the various components (host applications, data, printers, inserters, and pre- and post-processing devices) that make up a print/mail production shop floor.

The LMO System also provides a centralized data collection methodology to gather information about the product that is produced and the devices that produce the product. It provides a single view of the overall operation on the shop floor and provides insight into what is happening at any point in time. It can automate manual steps in the production process. It can help eliminate production errors by being the source for accurate “decision” data for use by operators and operations managers. The system, therefore, provides a means for bringing production level control to the large print/mail operations process.

## Needs of the Large Mailing Operations Industry

The IBM LMO System was developed in response to requests from IBM Printing Systems Company customers. IBM PSC customers from around the world have expressed what they regard as the important needs in the print/mail industry. IBM PSC responded to these needs with the LMO System.

## The Need for Control

First and foremost, our customers expressed the desire to obtain control over their shop floor operations. While millions of customer statements are being produced every month, the requirement is for each and every statement to go out on time and be 100% accurate.

The need for overall control and management of the production process has resulted in manual and paper intensive, homegrown control systems. Daily production schedules are tight and prone to error. When errors do occur, it more often than not, results in mutilated or missing documents that are difficult to recreate.

Management and end users want to know what’s going on, but the information needed to answer their questions is difficult to find.

## The Need for Improved Operations (a system-wide view)

The large mailing operation production process consists principally of three operations:

Host print data
Print operations
Inserting operations

In many shops, these three operations are entirely separated from each other. Host systems personnel develop the data files to be printed. Printing operations

© Copyright IBM Corp. 1996

are performed by a different organization entirely, and inserting operations are often physically and organizationally entirely separate from the first two operations. With three separate organizations and data collection operations, there is rarely a single, comprehensive view of the entire operation.

Our customers have expressed the desire to obtain a single point of control and an overall view of the different phases of the production process. They want a single tool to help them view the different phases of the production processes. They want a way to monitor and view all phases of the operation from one location. They want a way to collect information from the different phases of the process and display, monitor it, and be able to have a complete audit trail. They want a single set of reports that enable them to monitor how the different devices are working and the productivity of their production operators.

## The Need for a Standard

Some of our customers have been able to achieve a degree of control over their operations because they have devices from a single vendor. However, most of our customers have devices from different vendors. In many cases, host, printing, and inserting devices are manufactured by different vendors, according to different standards, and with different means of data collection. Being able to tie all the different devices together into one comprehensive system is a prime requirement of customers with diverse systems.

The answer to many of our customer's problems is the IBM PSC LMO System. The system is based on a single standard, the DMI standard endorsed by multiple printer and inserter vendor manufacturers.

## Brief History of the LMO System

In 1992, the IBM PSC went out to some of its customers with the idea of building a system that would resolve many of the problems described above. The result of these meetings was the development of an Advisory Council comprised of these customers together with several pre- and post-processing vendors. The LMO Standards Specification document, released in October 1994, was the significant contribution of this council. (See Appendix A, "LMO Advisory Council" on page 45.) The LMO Standards are consistent with the International Standards Organization (ISO) standards and those of the Desktop Management Interface (DMI). In addition, AFP standards from IBM have been used to define host processes.

After the initial meetings of the Advisory Council were completed, the council became a vendor only council. See Appendix B, "LMO Vendor Council" on page 47. This council consists of IBM and many vendors of print/mail equipment. The council meets several times each year and has set up a Home Page on the World Wide Web.

In the November 1993, at Xplor in Denver, a concept demonstration was made of the LMO System. In November 1994, at Xplor in Phoenix, the base code was demonstrated. Nine vendor booths, each with a diverse set of pre- and post-processing devices, were successfully tied together. The initial release of the LMO System was brought to the market in 4Q94. It is built on the architectural standards defined by the Advisory Council. It was installed at two customer sites and provided about 50 percent of their requirements.

In August 1995, the second release of the LMO System product was delivered with significant enhancements. A Starter Set of reports and host JCLs helped customers avoid a lengthy implementation cycle. PSF Exits were added to PSF capabilities that allowed customers to track such things as actual page counts on a job-by-job basis.

The third release of the LMO system was demonstrated at Xplor in Minneapolis in November 1995. Full mailpiece level tracking, from the host through the inserters, integrated reconcilation/reprint, and a single shop floor view were the key features demonstrated. With these additions, the product was at a level where over 90% of the requirements of the customer advisory council were addressed.

In June 1996, the fifth release of the system was provided to customers.

The current release provides three main pieces of code:

AIX or MVS host code
AIX or OS/2 server code
Windows 3.1, NT, or OS/2-WIN/OS/2 GUI code

# Architecture of LMO

## Big Picture of LMO System

The Large Mailing Operations (LMO) system from IBM is a Client/Server, Local Area Network (LAN) based system built on the LMO Standard that connects the various components that make up a print/mail production facility.

## Components of the System

LMO's objective is to be able to collect pre-defined, architected pieces of data from host applications and from the devices making up a print/mail production shop floor. LMO must also allow viewing of this data in flexible formats. Figure 1 shows that the LMO System components communicate the LMO data to the LMO server, located on a Local Area Network (LAN).

These components include the applications that run on the host computers, the printers, the inserters, the pre/post devices, the LMO server, and the Graphical User Interface (GUI) workstations that are used to display system information. The open architecture of the LMO system allows any device manufacturer to connect their devices to the LMO system by adopting the Desktop Management Interface (DMI) communications standards.

*Figure 1. LMO System Components*

## Production Information

By allowing these various software and hardware components to communicate with the LMO server, important production information can be collected. This information, both real-time and historical, can be used to help optimize efficiency, increase productivity, and reduce errors in the print/mail facility.

*Figure 2. The Printing Process*

Figure 2 shows that as the print data goes through its normal production process, important status information about the products (jobs or statements) is updated in the LMO server, as the products move from station to station.

## Overview of LMO Components

The LMO System uses a client/server based architecture. Its principal components are depicted by the following diagram.

*Figure 3. LMO System Architecture*

© Copyright IBM Corp. 1996

## Hosts

One software component of the LMO System resides on an MVS or AIX host and provides “product” information to the server. At a minimum, product information consists of the product name and instance qualifier. The terms product and instance qualifier are LMO terms that correspond to customer names for jobs. For example, a product name could be XXX Statements and an instance qualifier could be XXX Statements for July 1996. At a more detailed level, product information can be broken down into individual print jobs. At an even higher level of granularity, this information may be broken down into data about individual mailpieces.

The host components of the LMO System can be used by applications to send LMO data directly to the LMO server database. This can be used to indicate that a job has started or ended a particular execution step. Applications can also put special “tag” records into the print data as it is being created or in a follow-on host step. These “tag” records contain LMO data, such as product name, mailjob name, or mailpiece identifier. When the “tag” records are detected by Print Services Facility (PSF), they are removed from the print data and sent to the LMO server. The LMO data will update the LMO database. (See “From Host to MIFs” on page 28.)

The data may be communicated from host to server through either TCP/IP on MVS or AIX hosts, or through SNA from MVS hosts.

## LANs

The Network Interface distributes the low level DMI interfaces and the high level LMO interfaces across the network. The Network Interface uses RPC and Socket level services over the industry standard TCP/IP protocol. The server can be connected to the network using any network interface hardware supported by TCP/IP, for example, Token Ring or Ethernet. One part of the Network Interface executes on the server and another part executes on the client.

## Servers

Another component of the LMO System is the LMO server, which may be either an AIX or OS/2 machine.

The LMO server receives and stores all product and event-related data. It receives data from the host related to products and print jobs.

The LMO server also receives data from devices that have been “instrumented” by various large mailing operations vendors to provide data on the devices to the LMO System.

**Note:** An “instrumented” component is one for which data collection code has been written and registered on the system.

## MIFS

The LMO System uses Management Information Format (MIF) files, as defined by the DMI, to define and organize LMO data. Device manufacturers, who adhere to the DMI standard, supply a MIF file template with each device. The MIF file template defines the attributes of the device.

Similarly, the LMO System supplies a set of predefined Product and Mailjob MIFs in the Starter Set. For the LMO System, customers may need to modify the data already in the sample files to fit the requirements of their environment.

## DB/2

The LMO data is kept in a DB/2 database on the LMO server. DB/2 facilitates exporting and importing data and facilitates the retrieval of LMO data for LMO reports from the GUI workstation.

For those operations that Get or Set attribute values, the LMO System processes can go either directly to the DMISL or to the DB/2 data processes. If a device has been instrumented, processes related to it go through DB/2; uninstrumented devices access the DMISL directly.

## Printers

Printers are one of the principal device types that can be connected to, and monitored by, the LMO System. The IBM PSC 3900 printer, which is the only instrumented printer to date, connects to the LMO LAN by one of two methods:

1. The IBM 3900, with an AFCCU control unit, may attach directly to the LAN through an Ethernet or Token Ring attachment card. This is called the Direct Connect method.
2. Any model of the IBM 3900 may attach to the LMO LAN by connecting the printer to a “status collector.” The printer connects to the “status collector” through the IBM 3900, 4720 Type II Intelligent Interface feature. The “status collector” device would then attach to the LAN. Status collectors are available from some pre/post equipment vendors.

## Attaching Pre- and Post-Processors to the LMO system

IBM has been working directly with vendors of pre- and post-processing devices to develop instrumented connections between the devices and the LMO System. By attaching eligible pre/post processing equipment to the “status collector device,” detailed operational data may be collected and displayed about each piece of pre/post equipment, on the LMO GUI workstation.

## Inserters

Inserters are another type of device that can be connected to and monitored by the LMO System. Connecting inserters to the LMO system allows the inserters to send two types of information to the LMO system.

**Hardware data --** Detailed hardware status information can be sent to the LMO system about each device connected to the LMO system.

**Product, Mailjob, Mailpiece data --** If the inserters have the correct features, product, mailjob, and mailpiece data may be sent to the LMO system. This allows the closed-loop job tracking or mailpiece tracking systems to be installed, which are described in following chapters.

## GUIs

The LMO System WIN-OS2 or Windows-based GUI workstation is used to view the data stored on the LMO server.

Attached to the network are a variety of clients. These include devices that access the system using either the Management Interface or the Component Interface. The Graphical User Interface, which accesses the system using the network Management Interface, is one example of a client. Device controller code, which accesses the system using the network Component Interface, is another example of a client. The device controller code runs on the device controller, that is, the control hardware for the device. The clients are connected to the server through a TCP/IP capable network.

## Reports

The GUI, an LMO client, provides an interface between the user and the network-enabled DMI Management Interface. It features account level security that associates access permissions with a user or group of users. The GUI has an internal representation of the complete structure of the system, including the number and type of devices, their characteristics, the number and type of jobs in progress, as well as historical information.

***Reports Display on Logon:*** Once logged in, the GUI displays system reports that were marked “display-on-login” in the account file. The reports are defined using an easy-to-use report definition language. The reports can display any information that is defined in the Management Information Format (MIF) database and are updated in real time. The report definition includes a configurable alert facility that allows an action to be taken when a value in a report matches a particular pattern or enters a particular range. These actions include displaying the value in an alternate color, displaying a bitmap graphic indicating a problem, or chaining to an external program, which could perform any user defined function, such as dialing a pager and sending an alphanumeric problem code.

***Chaining From Report to Report:*** A GUI user can double click on an item in a report and chain to another report (for example, one that gives more detail) or the user can chain to an update dialog box. This gives the user the opportunity to interact directly with a device, using a standard interface. The GUI also supports a configurable menu facility, so that common monitor or control operations can be defined as menu items.

***Ad-Hoc Charting:*** The GUI supports an ad-hoc charting capability. Any information in any report can be displayed in chart format. The charting facility supports the standard chart types: bar, 3-D bar, stacked, percent, and pie. The chart facility does automatic scaling, including a logarithmic scale. Charts can also be included as part of the report definition. These associated charts will be displayed automatically when the base report is opened.

### How Reports are Created

The LMO Starter Set contains approximately 75 pre-defined reports for products, jobs, mailpieces, and devices. These reports can be used as is or as an example, if the report needs to be modified. Use the following methodology if a new report needs to be created or if an existing one needs to be modified.

Four steps are involved in creating new reports and adding them to LMO System:

1. Design the format and content of a report
2. Code the report
3. Test the report
4. Associate the report with specific users and user groups.

***Designing Reports:*** The first step in creating a new site-specific report for the LMO System is to design the report. To design a report, specify its title and what the report is to display on its rows and columns.

***Coding a Report:*** The second step in creating the new report is to "code" it into an LMO System file. Using the administrative functions on the GUI, you can copy an existing report file and modify it to create a new report, or you can code a new report from scratch using the instructions provided in the *System Administrator's Guide*.

*Structure of a Report Definition:* A report definition has one main "block" of textual data, a Table block, that is marked off with the "StartTable" and "EndTable" keywords. Note that a report may also be placed on a menu, so we may include a Menu Block within a report definition. Following is an example of the main blocks in a report definition.

```
StartTable
  Title  title
  StartFont
  EndFont
  StartChart
  EndChart
  StartRow
  EndRow
  StartColumn
  EndColumn
EndTable

StartMenu
  ⋮
EndMenu
```

The Start/EndTable block of a report definition contains various types of blocks and statements. The main blocks are the chart, row, and column blocks. Other blocks, like font, are optional.

*Example of a Report File:* Below is an example of a report definition file. The example uses indentations to improve the readability of the definition. Lines beginning with # are comment lines that provide commentary on what the coder was doing at certain points in the report.

```
# LMO Starter Set Report
# Copyright 1996 IBM Corp. All Rights Reserved.
#
# File Name: mproduct
# User Type: Management User
# Version: 1.3
# Description: High Level information about all of the
# products in the system.
#
```

```
StartTable
 Title "LMO Products Currently in the System"

 # Rows:

 StartRow
   Component "LMO Product"
   Group "Product Table"
   Key  ,  #Choose all products and instances.
  Poll  1  %
EndRow

 # Columns:

 # Column 1 is the Product Name.
 # Chain to a report on all mail jobs in the product.
 StartColumn
  Heading  "Product|Name"
   Attribute "Product Name"
  Option  UseRowData
  Type  Value
   OnSelect Chain Report mmailjob
EndColumn

 # Column 2 is the Product Instance Qualifier.
 # Chain to a report on product details.
 StartColumn
  Heading  "Instance|Qualifier"
   Attribute "Product Instance Qualifier"
  Option  UseRowData
  Type  Value
   OnSelect Chain Report mproddet
EndColumn

 # Column 3 is the time the Product, for this instance,
 # became known to the system.
 # Chain to a report on product segment status.
 StartColumn
  Heading  "Date|Created"
   Attribute "Date Created"
  Option  UseRowData
  Type  Value
   OnSelect Chain Report mprdsegs
EndColumn

 StartColumn
   ⋮
 StartItem
   Name "Insert &Complete"
   OnSelect Chain Custom mscaninc
 EndItem

EndMenu
```

***The Resulting Report:*** Following is a sample report that results from this report definition:

*Figure 4. Sample Report*

### Testing New Reports

Once you have coded a report, you can test it immediately by running it directly from the GUI. When you are creating or editing a report definition, the GUI automatically positions the cursor on any line with a **syntax** error so you can make corrections immediately if the Edit or Create window is still open when you run the report. The testing process will help you find errors other than syntactical ones.

### Configuring Reports

The final step in creating a new report is to specify the user groups and users who are to have access to the report. A chapter in the *System Administrator's Guide* describes how to set up user access groups and userids permitted to access the LMO System reports.

## Relating Applications to the LMO Data Structure

An important part of preparing for a LMO install is relating the application's data and processing cycle to the LMO data architecture. The following example shows the logical structure of the main LMO data components:

Product

– Product Instance Qualifier

- Print Job

  Statements

- Insert Job

  Statements

The LMO data is kept in a DB/2 database on the LMO server. The attributes of the LMO database are defined by the MIF files. The attributes are updated with "values" that are sent from host applications or devices that are capable of sending LMO data. For example, a Product with the name "XXX Statements" could be sent to the LMO Product MIF, Product Name attribute, and update the value for the Product Name with "XXX Statements." Information for other LMO attributes would be sent in like manner.

Each print/mail production facility produces their product (statements) in a different manner to meet the requirements of their customers. For example, a very large number of statements may be processed one time a month or a smaller number of statements may be processed many times a month.

Example 1 - A large number of XXX Statements are produced at month end. As part of the host processing, the statements are divided into groups of 5000 statements to facilitate printing, inserting, and reprinting. The data loaded into the LMO system could be the following:

Product (XXX Statements)

– Product Instance Qualifier (XXX Statements for July '96)

- Print Job (XXX-7/96-01)
    - Statement (Statement Number -01)
    - Statement (Statement Number -02)
    - Statement (Statement Number -NN)
- Print Job (XXX-7/96-02)
    - Statement (Statement Number -01)
    - Statement (Statement Number -02)
    - Statement (Statement Number -NN)

Example 2 - A smaller number of XXX Statements are produced during many cycles per month. All statements are contained in one print file. The data loaded into the LMO system could be the following:

Product (XXX Statements)

– Product Instance Qualifier (Cycle 01)

- Print Job (XXX-01-FORMID)
    - Statement (Statement Number -01)
    - Statement (Statement Number -02)
    - Statement (Statement Number -NN)

The architecture of the LMO database has been proven to be flexible enough to accommodate many processing environments.

# Device Hardware Data Capture

What kind of device monitoring functions does the LMO System support? Due to the table driven, open systems nature of the LMO System, the answer is virtually anything the vendor can supply. At a minimum, this generally includes:

Current state of the device
Current state of major subsystems
Configuration of device and subsystems
Current workload in amount complete, amount to process
Current operator
Supply status
Hardware error/failure statistics
Device, operator, and shift performance

This information, for every device in the operation, can be displayed on the LMO GUI and saved in a relational database for future analysis. This provides valuable insight into the overall operation and gives both operators and administrators the information they need to improve job scheduling and device utilization, identify recurring problems in devices, identify operator training or performance issues, and give operators the ability to determine when supplies need replacing.

## Printers

Each printer vendor that adheres to the DMI and DMTF standards supplies a MIF file with each printing device.

## Data Captured

Below is a list of the attributes in the Printer MIF that is supplied with the LMO System Starter Set.

A MIF file consists of **groups** of attributes. The Printer MIF that is supplied with the Starter Set consists of the following groups and attributes.

COMPONENT ID GROUP Attributes:

This group defines attributes common to all printers.

- Manufacturer name
- Product name
- Version
- Serial Number
- Installation Date

GENERAL PRINTER GROUP attributes:

This group specifies general attributes that apply to the overall printer and its status.

- Count of configuration changes
- Number of display lines on the printer console
- Number of characters per line on console
- Current operator name
- Service person name
- Current status of printer

© Copyright IBM Corp. 1996

PRINTER LOCALIZATION attributes:

This table defines the natural language, country, and character sets supported by the printer.

- Language
- Country
- Character Set

INPUT TABLE GROUP attributes:

This group defines the attributes of the input devices used on printers.

- Feeder mechanism type
- Unit of measure for an input device
- Medium feed direction
- Capacity unit of measure
- Current level
- Status
- Current media name
- Input device name
- Vendor name
- Model
- Version
- Serial number
- Description

OUTPUT TABLE GROUP attributes:

This group defines the attributes of output devices on printers.

- Output devices
- Type of output device
- Capacity unit for the device
- Maximum capacity for the output device
- Capacity remaining
- Status
- Name of the output device
- Vendor name
- Model
- Serial number
- Description
- Stacking order for output device
- Page delivery orientation
- Bursting support
- Decollating support
- Page collation support
- Offset stacking support

MARKER TABLE GROUP attributes:

A list of marker devices associated with this printer capable of producing marks on the print media.

- Market device technology
- Marker unit of measure
- Count of UOM on power on
- UOM counted during life of printer
- Supported process colors
- Supported spot colorants

- Addressability units and feed direction
- Margins
- Status

MARKER SUPPLY TABLE GROUP attributes:

This group defines the supplies associated with a marker.

- Marker technology type
- Description
- UOM for supplies
- Maximum capacity
- Current supply levels
- Date when supply last added

MARKER COLORANT GROUP attributes:

This table lists all of the marker colorants available on the printer.

- Role played by a colorant
- Name of a color
- Levels of tonality for a color

ALERT TABLE attributes:

This table lists all of the critical and non-critical alerts currently active in the printer.

- Severity level for an alert
- Training level needed to resolve an alert
- Printer device that has an alert
- Location of device
- Alert code
- Description

CURRENT JOB GROUP attributes:

This group lists the current job running on the printer.

- Product name
- Instance qualifier
- Current print job name
- Number of mailpieces
- Form required to print a job

## Inserters

Each inserter vendor who adheres to the LMO Standards supplies a MIF for the inserter.

## Data Captured

Below is an abbreviated version of the Inserter MIF that is included in the LMO System Starter Set. It describes the data that can be captured for inserting devices.

COMPONENT GROUP attributes:

This group defines attributes common to all inserters.

- Inserter status
- Finisher device type

- Feed control mode
- Finisher input units of measure
- Finisher input capacity units of measure
- Finisher input device status
- Finisher features supported
- Stitching type
- Folding type
- Binding type
- Trimming type
- Die cutting type
- Punch type
- Perforation type
- Slitting type
- Separation cut type
- Imprinting type
- Wrapping type
- Banding type
- Colorant role
- Insert feeder status
- Insert feeder type
- Insert feeder feed control mode
- Insert feeder units of measure
- Unsert feeder action on misses
- Insert feeder action on doubles
- Insert feeder security
- Envelope feeder status
- Envelope feeder type
- Envelope feeder units
- Envelope feeder capacity units of measure
- Envelope feeder action on misses
- Envelope feeder action on doubles
- Envelope feeder control mode
- Envelope feeder security
- Output device status
- Output device units of measure
- Output device supply class
- Output device supply type
- Output device colorant table
- Output device supplies units of measure

COMPONENT ID GROUP attributes:

- Name of device
- Description
- Serial number
- Installation date

GENERAL GROUP attributes:

General Inserter Information.

- Configuration changes
- Current operator
- Service person
- Status

LOCALIZATION GROUP:

Record of language, country, and character set used in description string values for objects and attributes.

- Language
- Country
- Character set

DOCUMENT FINISHER GROUP attributes:

- Name of device
- Vendor name
- Model
- Serial number
- Description
- Status

FINISHER INPUT DEVICE GROUP attributes:

- Technology type
- Feed control mode
- Unit of measure
- Media feed dimension
- Media feed direction
- Capacity units
- Maximum capacity units
- Current level
- Status
- Media name

FINISHING FEATURES GROUP attributes:

- Stitching
- Stitching type
- Maximum pages stitched
- Folding
- Folding type
- Maximum pages that can be folded
- Binding
- Binding type
- Maximum pages that can be bound
- Binding color
- Trimming support
- Trimming type
- Maximum pages that can be trimmed
- Die cutting
- Die cutting type
- Maximum pages that can be die cut
- Punching
- Punch type
- Maximum pages that can be punched
- Perforating
- Perforation type
- Slitting type
- Slitting operation type
- Separation cut type
- Imprinting support
- Imprinting type

- Wrapping
- Wrapping type
- Maximum pages wrapped
- Banding
- Banding type
- Maximum pages that can be banded

INSERTER FEEDER GROUP attributes:

Uniquely identifies each insert feeder.

- Insert feeder type
- Feed control mode
- Unit of measure
- Media dimensional feed direction
- Capacity units
- Capacity units
- Current level
- Status
- Media name
- Action on misses
- Action on doubles
- Name of the input device
- Vendor name
- Model
- Version
- Serial number
- Description
- Security

ENVELOPE FEEDER GROUP attributes:

- Envelope feeder technology type
- Feed control mode
- Unit of measure
- Media dimensional feed direction
- Capacity units
- Maximum capacity
- Current level
- Status
- Media name
- Action on misses
- Action on doubles

ENVELOPE FEEDER TYPE EXTENDED GROUP attributes:

- Name
- Vendor name
- Model
- Version
- Serial number
- Description
- Security features

OUTPUT DEVICE GROUP attributes:

- Output device type
- Capacity units
- Maximum capacity

- Current level
- Status

ALERT GROUP attributes:

This table lists all of the critical and non-critical alerts currently active in the inserter.

- Severity level
- Training level
- Alert code
- Description

CURRENT JOB GROUP attributes:

- Current job
- Product name
- Instance qualifier
- Insert job name
- Insert job size unit of measure
- Insert job size

# Statistical Information from the Printers

## Status Values

The following status values are stored in the MIF for each printer. The values are updated every *updatesecs* or whenever there is a status change in the printer.

*Table 1. Status Table*

| Attribute | Description |
|---|---|
| Device Status | Operational status of the device. |
| Printer Status | Operational status of the printer. |
| Error State | Detected error messages. |

## Printer Marker Table

*Table 2. Printer Marker Table*

| Attribute | Description |
|---|---|
| Counter Unit | Feet. |
| Power on Count | Set to foot usage since IML. |
| Life Count | Set to foot usage since Manufacture. |
| Status | Set to available or unavailable. |

## Usage Table

The Usage Table stores the current paper usage since OOP (out-of-paper) and OOT (out-of-toner). There is one row in the table for each device that comprises the printer.

*Table 3 (Page 1 of 2). Usage Table*

| Attribute | Description |
|---|---|
| Device ID | ID of the device instance. |

| Table 3 (Page 2 of 2). Usage Table | |
|---|---|
| **Attribute** | **Description** |
| Life count since OOP | Usage since the last OOP. |
| Life count since OOT | Usage since the last OOT. |
| Life count at OOP | Usage count at the last OOP. |
| Life count at OOT | Usage count at the last OOT. |

## The Interval Statistics Table

The following Interval Statistics table describes the statistics that are accumulated on the state of the printer during a user-specified interval. The interval specifies the length of time during which statistical values are to be accumulated. The interval value, specified in seconds, is determined by the user. Standard values for the interval include:

**Hour** 3600 seconds.

**Day** 86400 seconds.

**Week** 604800 seconds.

| Table 4 (Page 1 of 2). Interval Statistics Table | |
|---|---|
| **Field** | **Description** |
| **Device ID** | Id of the device within the printer. |
| **Time** | Internal start time and date of this interval. |
| **Seconds** | Seconds (so far) in the interval. |
| **Unit Count** | Paper used so far in the interval. |
| **Idle seconds** | Seconds idle during the interval. |
| **Idle count** | Number of times idle during the interval. |
| **Printing seconds** | Number of seconds printing during the interval. |
| **Printing count** | Number of times printing during the interval. |
| **Alert seconds** | Number of seconds alert during the interval. |
| **Alert count** | Number of times an alert was active during the interval. |
| **Not communicating seconds** | Number of seconds the printer was not communicating during the interval. |
| **Not communicating count** | Number of times the printer was in a not communicating state during the interval. |
| **Jam Seconds** | Number of seconds the printer has been jammed during the current interval. |
| **Jam Count** | Number of times the printer has been jammed during the current interval. |
| **OOP Seconds** | Number of seconds the printer has been out of paper during the current interval. |
| **OOP Count** | Number of times the printer has been out of paper during the current interval. |
| **OOT Seconds** | Number of seconds the printer has been out of toner during the current interval. |

| Table 4 (Page 2 of 2). Interval Statistics Table | |
|---|---|
| **Field** | **Description** |
| **OOT Count** | Number of times the printer has been out of toner during the current interval. |

## Intervention History Table

The Intervention History table keeps the start and end times of interventions. A new row is added to the table whenever an intervention occurs. When the intervention ends, the “End” time is written indicating the row is closed.

| Table 5. Intervention History Table | |
|---|---|
| **Attribute** | **Description** |
| Device Id | Id of the device within the printer. |
| Start time | Date and time the intervention request was sensed. |
| End time | Date and time the intervention request was closed. |
| Intervention type | Type of intervention:<br>0 --No Alert<br>1 --Unknown.<br>2 --Jammed<br>3 --Out of paper<br>4 --Out of toner<br>5 --Cover open<br>6 --Not ready<br>7 --Stacker full<br>8 --Fuser oil empty |
| Life count | Paper usage when intervention occurred. |
| Delete row | Delete this row of the table. |
| Query | For special query processing. |

## Alert Table

The Alert table keeps a list of active alerts. Each time an alert is noted, a row is added to the table.

| Table 6 (Page 1 of 2). Alert Table | |
|---|---|
| **Attribute** | **Description** |
| Index | Index of this alert entry. |
| Severity level | Set to Critical. |
| Training level | Set to Unknown. |
| Group | Set to General. |
| Group index | Set to 1. |
| Location | Set to 0. |
| Alert code | Set to IPDS sense byte 0, 1, and 19. |

| Table 6 (Page 2 of 2). Alert Table | |
|---|---|
| **Attribute** | **Description** |
| Description | Describes the alert. Indicated values are only for DIRECT. SNMP printers maintain their own values. |

## Graphical Display of Hardware Data

Device data can be displayed in two formats, report or the shop floor view. Following are examples of the GUI reports for printers and inserters that are included with the LMO System Starter Set.

## Printer-Related Reports

*Figure 5. Printer Operator Reports*

Figure 5 displays four reports simultaneously:

**Printer Information** Showing the status of all printers on the LMO System LAN.

**Pre/Post Processing** Showing the status and related information about all pre- and post-processing devices attached to the LMO System LAN.

**Supplies** Supply status for any selected device.

**Alerts** The Alerts report that will display any alert on any attached device as it occurs.

**Note:** The LMO System can display alerts from instrumented devices, directly attached AFCCU devices, and SNMP-attached devices.

The printer operator selects a product print file for printing and begins the process. All of the value add information is added to the LMO System database as the print file is being processed.

At the same time, the LMO System server is collecting data of various sorts about the print file:

- User-defined applications collect accounting information.
- Each mail job has an associated status and time stamp added to it at various points.
- The status of every printing device is shown on screen.
- Operators can check for the current status and estimated supply needs.

## Inserter-Related Reports

*Figure 6. Inserter Operator Reports*

**Inserters** The first report shows the status of inserters.

**Alerts** The second report shows any alerts (as they occur) for an inserter.

**Queued Jobs** The third report shows jobs queued for inserting.

# Regular Device Reports

Below is a list of the printer, inserter, and other hardware-related reports that are provided with the LMO System Starter Set.

**Note:** The "↓" indicates that by clicking a column you can chain to the report described below the ↓.

# Printer Reports

## Printer Operator's Top Level Report on Printers

| **PRINTER STATUS INFORMATION** | | | | |
|---|---|---|---|---|
| Printer | Device ID | Device Status | Device Status | Error States |
| ↓ | ↓ | ↓ | ↓ | ↓ |
| | **Printer Job Information for** *printer*. See "Printer Job Information." | **PRINTER ALERT INFORMATION**. See "Printer Alerts for Printer." | **Printer Alerts for** *printer***.** See "Printer Alerts for Printer." | |

## Printer Alerts for Printer

| **PRINTER ALERT INFORMATION** | | | | |
|---|---|---|---|---|
| Printer | Device ID | Alert Type | Error Description | Severity |

## Printer Job Information

| **Printer Job Information for** *printer* | | | |
|---|---|---|---|
| Printer Loaded Form | Required Form | Current Product | Current Job |
| ↓ | ↓ | ↓ | ↓ |
| | | | **JOB INFORMATION**. See "Print Job Information" on page 24. |

## Print Queue Report

| **PRINT JOBS QUEUED FOR** *printer* | | | | |
|---|---|---|---|---|
| Print Job Name | Product | JES ID | Required Form | Estimated Segments |

## Supply Usage for Printer(s)

| **SUPPLY USAGE FOR** *printer* | |
|---|---|
| Supply Type | Foot Count When Last Added |

### Operator and Service Person Report

| OPERATOR AND SERVICE PERSON | |
|---|---|
| Operator | Service Person |

### Print Job Information

See “Printer Job Information” on page 23.

### Counter Information

| Printer Counter Summary for *printer* | | | | | | |
|---|---|---|---|---|---|---|
| Printer | Device ID | Printer Counter | Since Out of Paper | Since Out of Toner | At Out of Toner | At Out of Paper |

### Pre/Post Processing Device Status

| Pre/Post Processing Device Status for *printer* | | | | | |
|---|---|---|---|---|---|
| Device | Device Id | Type | Max Capacity | Current Capacity | Status |

### Pre/Post Processing Device Details Report

| Pre/Post Processing Device Details for *device* | | | | |
|---|---|---|---|---|
| Device | Device Id | Manufacturer | Model | Serial Number |

## Inserter Reports

### Inserter Operator’s Top Level Report on Inserters

| INSERTER INFORMATION | | | | | |
|---|---|---|---|---|---|
| Inserter | State | Job | Product | Job Size | Units |
| ↓ | ↓ | ↓ | ↓ | ↓ | ↓ |
| | **INSERTER ALERTS FOR** *inserter*. See “Inserter Alerts For Inserter.” | | | | |

### Inserter Alerts For Inserter

| INSERTER ALERTS FOR *inserter* | | | | |
|---|---|---|---|---|
| Group | Index | Location | Alert Code | Severity |

### Insert Queue Report

| INSERT JOBS QUEUED FOR *inserter* | | | | |
|---|---|---|---|---|
| Insert Job Name | Product Name | Instance | Job Ticket | Size |

### Inserter Details for Inserter

| **INSERTER DETAILS FOR** *inserter* | | | | |
|---|---|---|---|---|
| Manufacturer | Model | Serial Number | Installation Date | |

## Shop Floor Display

The LMO System contains the ability to create a graphical shop floor display. Figure 7 shows a sample of this capability.

## Shop Floor Related View

*Figure 7. Shop Floor Sample Report*

Using the shop floor feature, a graphical representation of printers, inserters, and pre/post processing devices can be created. The device icons can be placed on the screen to approximate the print/insert room layout. The device icons are then related to the device MIFs in the LMO system. The color of the icons can be related to different values in the device MIF. For example, as printers change state from Ready to Not Ready to Busy, the colors of the icons showing on the screen will change from Green to Red to Yellow. This screen shows at a glance the actual state of the devices that are being monitored. This screen could be helpful to Operators and Operations Managers who are trying to keep the devices running in a very busy environment.

# Job Tracking

In addition to device monitoring functions, the LMO provides job tracking capabilities. Although these job tracking capabilities are tailored to large mailing operations, the system is designed to provide general job tracking functions, and it can be tailored to other environments as needed.

## What Is Job Tracking?

The LMO System provides the ability to track print jobs from the host through the production process to the distribution step. Input comes from both online and offline sources. Online data comes from the host applications or PSF exits. Offline data comes from scanning a barcode on the job or keying data into the LMO system. This ability allows managers and end users to answer questions such as:

Where is print job xxx in the process?

What were the process steps that job xxx went through and when?

When discussing job tracking, one question to ask is what pieces of data are meaningful to track? The LMO system allows any data to be sent to LMO attributes. The product can be any piece of data if it qualifies as an LMO product. The LMO system also has the ability to use standard system data as job tracking data. The decision is, therefore, whether to use the standard data or customized data for job tracking parameters. Using the automatic approach means that the PSF exit, installed as part of the LMO host code, will send the standard data to the LMO server. No applications need to be changed as this data is collected from the MVS or PSF systems. Using the customized approach means that some host application must send the proper TLE LMO data to the LMO server if host data is required. The effort involved in modifying the applications to send the customized data to the LMO needs to be clearly identified. The following sections describe both the standard and the customized data used in tracking jobs.

## How Print Jobs are Tracked

The job tracking process starts with the host data processing components. These components use the LMO network interface to initialize product and job information on the LMO server. The products and jobs each have a unique identifier associated with them. These identifiers are the basis for job tracking throughout the system. As each device in the system processes a mail object (product or job), it updates the status of the object on the server.

## Product Level Information

As is the case with device monitoring, the system is table driven and can associate any information with a product, job, or mailpiece that is valuable to the operational and administrative staff. Product level information typically includes the following:

Product Name
Instance Qualifier
Owner
Date Created
Input Origin
Job Size

© Copyright IBM Corp. 1996

Number of Jobs
Accounting Data
Description

## Job Level Information

A product consists of one or more jobs. Job level information usually includes the following:

Job Name
Job Ticket Name (Processing Instructions)
Print File Name
Print File Format
Date Created
Job Size
Current Device
Current Status
Description

A job consists of one or more mailpieces. The LMO job information consists of a cross reference table that identifies the product and job, as well as its current status.

In addition to retaining information on products, jobs, and mailpieces, the system provides the capability to define process steps, record process history, and define bill of materials, and job ticket information.

## Agents

The LMO provides agents that facilitate the tracking process. These agents use the attributes described above. They give operators and administrators access to the following types of information:

Where is this job right now?
Has this job been mailed?
How much work is complete on a product?
How much work is remaining?
What devices are ready or will be ready?
What jobs are ready to be processed?
Can a job or product be reconciled?
What supplies were used by a job?

This information provides valuable insight into the printing and finishing operation and is valuable to a number of departments, including operations, accounting, quality assurance, and customer service.

---

## From Host to MIFs

Host programs and devices can send data to the LMO server by using the TLE method. Customers who have worked with IBM's AFP products are probably already familiar with Five Able (5A) records. 5A records are structured records that the AFP printer driver Print Services Facility (PSF) uses to format data, change fonts, include overlays for a page, and so on. The TLE is a type of 5A record that is used by the LMO System.

Any program running on a host computer or device can build a TLE record and send it to the LMO server. A separate TLE is needed for each attribute in the system's MIF files that you want to update.

Host systems can place TLEs in the print data stream so that when the data is processed by PSF, PSF recognizes the TLEs and sends them to LMO. A separate file of TLEs can also be built and sent to the server when needed.

The TLEs can tell the LMO System as much detail as you want. You can inform the LMO System when a specific product begins to print or when specific print jobs for a product begin or complete printing, or even when specific mailpieces are printed.

Printers, inserters, and other devices can also send data to the LMO System.

Printers like the IBM 3900 can attach directly to a LAN, through a built-in Ethernet or Token Ring card and send status data directly to the LMO System. Other devices may need to have status collectors attached to them.

## Using Barcodes on Print Jobs

Instead of, or in addition to, tagging print files with data to be processed through PSF exits, you may choose to inscribe barcodes on print files so that LMO System barcode readers can read related data directly into the LMO System database.

## Scanning Barcodes from the GUI

When print files are barcoded, operators can scan data about the print files directly into the system's database from any GUI workstation.

In the following example, a dialog box has been created (customized) to collect the following information about each print job:

Bank number
The cycle number
The agent
The form Id

These fields have been correlated to the LMO required Product, Product Instance Qualifier, and Print Job Name fields in the MIF.

*Figure 8. Barcode Dialog Box*

This data can be keyed in by the operator or read from a barcode scan.

## Looking Up Job Data

Once the data has been read or keyed in, the workstation screen displays this new product on the real-time report entitled "LMO Products Currently in the System."

*Figure 9. Products and Mail Jobs*

Figure 9 shows two LMO System reports that are displayed simulateneously:

LMO Products Currently in the System
LMO Mail Jobs for Selected products (in the previous report)

Placing a barcode on a print job, and subsequent scanning of the identifying information into the LMO system, allows jobs to be tracked or located quickly, especially if jobs follow different routes in the production process.

After printing, the printer operator could scan the jobs's barcode, which would indicate that the job was successfully printed. The printer operator could also choose a status that would indicate where the job was going. For example, the job could be scanned into the Quality Assurance department or it could be scanned into Statement Production. Each station could scan the job's barcode, which would update the LMO database with where the job is, date, time, etc. Any questions about the job, from creation to final disposition, could be answered with a quick look at the LMO data on the GUI workstation.

The LMO system could also be customized to indicate to the scanning operator that the job just scanned was already in the system, that is, a reprint. This could help prevent jobs from being mailed twice.

This customization flexibility of the LMO system allows it to be a lot more than just a data gathering/reporting tool. It can be used to help “control” the production process.

## Automatic Job Tracking

The LMO Automatic Job Tracking function enables customers to perform basic job tracking based on information that is available to PSF. The tracking consists of both online and offline tracking. The online tracking is provided by an LMO PSF/MVS accounting exit. The offline tracking is facilitated by bar codes that are printed on the header and trailer pages by LMO PSF/MVS header and trailer exits. Offline job tracking requires that the customer use scanners (preferable hand held units) to scan the header and/or trailer page at each step in the process (print separation, quality control, inserter staging, insert started, insert complete, quality control, billing, mailed, and so on).

This job tracking provides real value for customers right out of the box and allows customers to answer questions like:

1. How many jobs do I have to process?
2. What jobs are at what steps in the process?
3. How long are jobs taking for each step?
4. What bottlenecks do I have?
5. Do I have device or operator training problems?
6. What devices or personnel resources will be needed tomorrow?
7. How long is it taking to get jobs out?
8. How many pages were printed for each job?
9. What work do I have to do next (pending)?

In addition, it provides the raw information needed for workflow management:

Enforce order of processing steps
Make sure steps are processed only once
Find missing or delayed jobs

This is only a partial list. The system is easily configured to do all sorts of new, customer specific things.

The LMO Product Name, Product Instance Qualifier, and Print Job Name are automatically generated using information that is available to the accounting exit. The Product Name is the four character MVS system identifier. This makes the job information unique within a multiple processor complex. The Product Instance Qualifier is the three-digit Julian day of the year. This groups all the jobs run on a given day together and makes them easy to process/remove from the system. The Print Job Name is the five digits of the JES job identifier plus a two digit dataset sequence number. The sequence number is incremented for each print dataset in the MVS job. Together, they uniquely identify the job in the same context as the banner printed on the header page. There are a couple of “gotchas” in this naming scheme (a JES cold start will recycle the JES ID, a multi-step job can produce multiple datasets with the same JES ID), but it is a fair compromise between ease-of-use and more lengthy implementations. In addition, the bar code is short enough to be read using an inexpensive CCD scanner.

The LMO PSF/MVS accounting exit automatically forwards the following information (see the *Systems Administrators Guide* on the accounting exit for a complete list):

Print Start Time
Print Stop Time
Pages Printed
Printer Name
Status
PAGEDEF
FORMDEF

Automatic job tracking is “basic” because it uses LMO rules for generating LMO Product Name, Instance Qualifier, and Job Name, and also because it provides a limited amount of information on job structure. This is an entry level option, it is a quick way to get job tracking up and running and providing benefits. It allows customers to become familiar with the LMO system quickly and is a base upon which to expand the LMO capabilities. As the list above indicates, it provides quite a bit of function with limited customer impact/effort.

# Mailpiece Tracking

## What Is Mailpiece Tracking?

The LMO System can track products, mail jobs (print, insert) within products, and mailpieces within mail jobs through the production process.

Implementation of the mailpiece tracking facility on LMO System requires that data about mailpieces (and on a higher level, products and mail jobs) is collected and reported to the LMO system.

The objective of the LMO mailpiece tracking facility is to work in conjunction with the inserter vendor to provide a closed-loop capability to ensure that all mailpieces, within a mailjob, are mailed. This requires that the host computer application provide initial identifying information to the LMO server. This information identifies each mailpiece within a mailjob, within a product. Each mailpiece would have the mailpiece identifying information in a barcode on the first page of each statement. The inserter would read the barcode and, after processing the statement, send the mailpiece status (inserted, mutilated, etc.) to the LMO system, where the mailpiece records would be updated.

## Mailpiece Cross-Referencing

The Mailpiece XReference Table **can** track data for each mailpiece that has been given a unique identifier. The assignment of unique identifiers for mailpieces is done by some application (such as a Value Add process) independent of the LMO System.

Assuming that a user has assigned unique identifiers to mailpieces within a product, the Mailpiece XReference Table is then used to collect and track the following data for those mailpieces:

*Table 7. Mailpiece XReference Table Attributes*

| **Attribute** | **Description** |
|---|---|
| Product Name | Name of the product with one or more mailpieces |
| Product Instance Qualifier | Identifier for a product name segment |
| Mailpiece Identifier | Unique identifier for a mailpiece |
| Process Assigned Identifier | Identifier for any production process for a mailpiece |
| Print Job Name | Id of the job that prints the mailpiece |
| Insert Job Name | Id of the job that inserts the mailpiece |
| Mailpiece Size Unit | Unit of measure for the mailpiece size |
| Mailpiece Size | Size of the mailpiece |
| Mailpiece Postage Unit | Unit of measure for the mailpiece postage |
| Current Status | The status of the mailpiece entry |
| Mailpiece Postage | Cost to mail the mailpiece |

© Copyright IBM Corp. 1996

## Mailpiece History Table

The Mailpiece History Table keeps a history of two items to the data collected about each mailpiece:

Current status

Time status assigned

Following is the list of status codes that may be assigned to a mailpiece:

01 = Other
02 = Unknown
10 = Created
11 = Spooled
12 = Held
13 = Started
14 = Normal End
15 = Abnormal End
20 = Printing
21 = Printed
22 = Reprinted
30 = Inserting
31 = Inserted
32 = Removed
33 = Diverted
34 = Mutilated
35 = Missing
36 = Received
50 = Quality
51 = Inventory
55 = Mailing
56 = Mailed
60 = Reconciling
61 = Reconciled

# Reports on Mailpieces in LMO System

Included with the LMO System is a “Starter Set” of MIF files, GUI reports, and other tools that provide a customer with a prototype system that can be customized to meet the requirements of a specific organization. The Starter Set of the LMO System includes a number of reports that can be used for mailpiece tracking.

## First and Last Mailpiece Ids

The EMAILIDS.REP report provides a report on the first and last mailpiece Ids for a specific print job.

## Mutilated Mailpieces Report

The mutilated mailpieces report shows the following information on the mutilated or diverted mailpieces within a particular mail job:

Unique mailpiece Id
Id of the Print Job in which it was printed
Id of the Insert Job in which it was inserted (if any)
Id of the Process through which it was going

Current status

## Mailpiece Detail Report

The Mailpiece Detail Report is usually generated for specific mailpieces only. However, a range of mailpiece ids can also be specified.

The report shows the following information:

Mailpiece Id
Process Id
Print Job Name
Insert Job Name
Size
Size unit of measure
Postage
Postage unit of measure

## Mailpiece Status Report

The Mailpiece Status Report is usually generated for specific mailpieces only. However, a range of mailpiece Ids can also be specified.

The report shows the following information:

Mailpiece Id
Timestamp
Status

The report may have multiple entries for each mailpiece showing the various states the mailpiece has been associated with.

---

# From Host to LMO with PSF

A high level view of the processes used in the Starter Set are depicted in Figure 10.

These Starter Set jobs are used during the LMO install to verify a successful installation. They can also be used as models for future customer applications.

*Figure 10. Starter Set Process Diagram*

The processes depicted in Figure 10, can be tracked by the LMO System. To track these processes, attributes in the MIFs must be set on the LMO server.

## Sending TLEs to the LMO Server

Three jobs that send TLEs to the LMO server are included in the Starter Set:

Model1 job

Model2 job

Model3 job

All three jobs send TLEs (built with the BLDTLE utility)[1] and concatenate them to application data sets.

Model1 consists of:

A single print job

One mailpiece

No insertions

Model2 consists of:

5 print jobs

80-120 mailpieces

5 insert jobs

Model3 consists of the Model2 components plus a new step to identify each mailpiece.

## Implementing the LMO Starter Set on MVS

The following list provides an overview of the steps to take to implement the Starter Set on an MVS host:

1. Set the variables in the JCL for your installation.
2. Submit the Model1 job and verify the results.
3. Submit the Model2 job and verify the results.
4. Submit the Model3 job and verify the results.

## Set Variable Values in the JCL

To implement the Starter Set on MVS complete the following steps:

1. Edit LMO.STARTSET.JCL(model1):

   Modify the Job Card.
   Modify Symbolic parameters in the M1 Proc Statement (see *Starter Set JCL Reference*).
   Modify dataset names as required.

2. Edit LMO.STARTSET.JCL(model2):

   Modify the Job Card.
   Modify Symbolic parameters in the M2 Proc Statement (see *Starter Set JCL Reference*).
   Modify dataset names as required.

3. Edit LMO.STARTSET.JCL(model3):

   Modify the Job Card.
   Modify Symbolic parameters in the M3 Proc Statement (see *Starter Set JCL Reference*).
   Modify dataset names as required. ACIF is required for this job. Modifications may be needed if your site uses an ACIF equivalent.

---

[1] BLDTLE is described in the *System Administrator's Guide*.

## Submitting the Model1 Job

Model1 is a single product with one print job and no insert jobs.

To submit Model1:

1. Bring up the TLESRV.EXE (INETD) window[2] on the LMO server to watch the TLEs appear on the screen.
2. Logon to the LMO client Workstation to view the results in the Product report and the Mail Jobs report.
3. Verify that the "LMO Mail Jobs for MODEL1 INSTANCE1" report contains one row with the following information for each column heading:

| ***Heading*** | ***Model 1 Data*** |
|---|---|
| **Mail Job Type** | Print Job Name |
| **Mail Job Name** | PRTJOB01 |
| **Date Created** | Date and time that the job in Model1 was run in MVS. |
| **Status** | First "Spooled," then "Printing," and finally "Printed" for the print job. |
| **Current Device** | When the status is Printing, this should be the device name (PRT*xxx*). At any other time, this should be blank or none. |

**Note:** Since the Model1 job only has 51 pages, the changes in attribute values may occur very quickly. Each status change can be verified by accessing the LMO Browser and viewing the Print Job History table or by accessing the Print Job History report.

## Submitting the Model2 Job

Model2 is a single product with five print jobs and five insert jobs.

To submit Model2:

1. Bring up the TLESRV.EXE (INETD) window on the LMO server to watch the TLEs appear on the screen.
2. Logon to the LMO client workstation to view the results in the Product report and the Mail Jobs report.
3. Verify that the "LMO Mail Jobs for MODEL2 INSTANCE1" report contains ten rows with the following information for each column heading:

| ***Heading*** | ***Model 2 Data*** |
|---|---|
| **Mail Job Type** | Five rows with "Print Job Name" and five rows with "Insert Job Name." |
| **Mail Job Name** | PRTJOB01, PRTJOB02, PRTJOB03, PRTJOB04, PRTJOB05, INSJOB01, INSJOB02, INSJOB03, INSJOB04, INSJOB05. |

[2] The TLESRV and INETD window are the same. If no TLEs have been processed, the window is INETD. If TLEs are being or have been processed the window is TLESRV.

| | |
|---|---|
| **Date Created** | Date and time that each job in Model2 was created by the JCL. |
| **Status** | First “Spooled,” then “Printing,” and finally “Printed” for each print job. “Created” for the insert jobs. |
| **Current Device** | When the status is Printing for the print jobs, this should be the device name (PRT*xxx*). At any other time and for the insert jobs, this should be blank. |

**Note:** If you attach an instrumented inserter that has been designed to work with the Starter Set you may also see the insert jobs change status and display the name of the current inserter device.

## Submitting the Model3 Job

Model3 is a single product with five print jobs and five insert jobs.

**Note:** IBM’s ACIF program is required for this job. To submit Model3:

1. Bring up the TLESRV.EXE (INETD)[3] window on the LMO server to watch the TLEs appear on the screen.
2. Logon to the LMO client workstation to view the results in the Product report and the Mail Jobs report.
3. Verify that the “LMO Mail Jobs for MODEL3 INSTANCE1” report contains ten rows with the following information for each column heading:

| ***Heading*** | ***Model 3 Data*** |
|---|---|
| **Mail Job Type** | Five rows with “Print Job Name” and five rows with “Insert Job Name.” |
| **Mail Job Name** | PRTJOB01, PRTJOB02, PRTJOB03, PRTJOB04, PRTJOB05, INSJOB01, INSJOB02, INSJOB03, INSJOB04, INSJOB05. |
| **Date Created** | Date and time that each job in Model3 was created by the JCL. |
| **Status** | First “Spooled,” then “Printing,” and finally “Printed” for each print job. “Created” for the insert jobs. |
| **Current Device** | When the status is Printing for the print jobs, this should be the device name (PRT*xxx*). At any other time and for the insert jobs, this should be blank. |

**Note:** If you attach an instrumented inserter that has been designed to work with the Starter Set, you may also see the insert jobs change status and display the name of the current inserter device. You can also view mailpiece-related reports.

[3] The TLESRV and INETD window are the same. If no TLEs have been processed, the window is INETD. If TLEs are being or have been processed the window is TLESRV.

## Placing Barcodes on Individual Statements

You can place barcodes on individual statements the same way you place them on anything else. The barcode is positioned so that the inserter barcode reader could scan the barcode. The encoded data is the same mailpiece identifier that was sent to the LMO system from the host application.

## How Inserters Read Barcodes

Ask the inserter representative about the availability of barcode readers on the inserter.

## Reprinting and Reconciling Statements

The task of reconciling the process occurs at the end of the print/insert process. This means:

Verifying that what you intended to print was printed

Reprinting mutilated items that did not make it through the process

The LMO System provides mailjob level and product level reconciliation. Both forms of reconciliation can handle cases where some of its mailpieces had to be reprinted. If reprinting was necessary, the LMO System will reconcile a mailjob or a product only when every last mailpiece has been reprinted and trayed for mailing.

# Installation Requirements

This chapter provides an overview of the hardware, software, and other requirements that are needed for an LMO System installation.

## Migration/Implementation

The standard LMO System implementation has three phases:

1. Mailing processes site assessment
2. LMO System installation, customization, and training
3. Maintenance

## Mailing Processes Site Assessment

Since the LMO System was designed to solve both general problems in the large mailing operations industry, as well as customer-specific ones, the first step in the process of implementing a LMO System is to examine, analyse, and review the **actual** problems the customer is experiencing with a potential customer. This assessment is used to build an initial systems design and a specific project plan for implementing the design for this application.

## Installation, Customization, and Training

A typical system consists of an LMO server, thirty or more devices, a host data processing facility such as MVS, ten GUI's, and a Token Ring or Ethernet network.

System installation and configuration is a coordinated effort between the device manufacturers and the manager of the printing and finishing center. The steps are:

Install the hardware
Install the software
Configure the network
Install the MIF files
Customize the system
Document the customizations
Train users
Test the system

### Installation

Installing the hardware and the software and configuring the network are standard installation activities that will not be addressed here.

### MIFs

Once the hardware and software installation is complete, the next step is to install the MIF files.[4] The device manufacturer provides a MIF file that describes the manageable characteristics of the device in terms of both standard groups and vendor extensions. The manufacturer also provides software on the manufacturer's device controller that supports the functions defined in the MIF file. The LMO system administrator invokes an installation program to install the MIF file into the

[4] Management Information Format (MIF) files are the files that constitute the LMO System database.

© Copyright IBM Corp. 1996

MIF database. The installation program converts the human readable MIF file into a more efficient binary format. Once the MIF file is installed, the device is known to the system and any other management application in the system can get MIF metainformation[5] on the device and can read (get) and write (set or change) attribute values.

After the MIF definitions are installed in the MIF database on the server, devices in the system can register with the server, and the DMI Service Layer passes requests from management applications to the device.

### Customizing

The next step in the installation process is customization. This involves tailoring the Graphical User Interface to meet specific end user requirements. The system is installed with a default ("Starter Set") set of files (MIFs) and reports that meet 80% to 90% of requirements. The installation team works with the operations staff to further customize the content and method by which information is displayed on the GUI.

### Testing

With the system installed and customized and the users trained, the final step is to run an operational test. This is done by selecting a production job and running it through the system during off hours. Any problems that may be encountered are fixed.

With the completion of the test phase, the system is ready for production use.

Professional services are offered to assist the customer to enable 1-2 applications for job level or mailpiece level tracking.

## Maintenance

Upgrading LMO System workstation and server software
Upgrading the Starter Set
Reporting defects
Monthly maintenance

# LMO System Hardware/Software Guidelines

## Host Machines

The LMO System currently supports MVS and AIX host machines.

MVS Host
- PSF for MVS V 4.3
- TCP/IP V 3.1.0 (for MVS TCP/IP communications)
- SNA APPC (for MVS/ESA SNA communications)
- C/370 Run Time Libraries V 2.2.0

AIX Host
- AIX 4.1 (includes TCP/IP)
- PSF/AIX V 2.1
- DB2/6000 V 2.1

[5] "metainformation" is information **about** a device.

## LMO Server

The LMO System supports OS/2 and RS/6000 servers. You need one or the other of:

OS/2
- Pentium 150 MHz CPU or higher
- 64 MB memory
- 1 GB Hard Drive
- Ethernet or Token-Ring Network Adapter
- SVGA display
- Pointing device
- OS/2 WARP Connect V 3.0 (includes TCP/IP)
- DB/2 V 1.2
- CM/2 V 1.11 (for MVS SNA communication)

RS/6000
- C20 RS/6000 CPU or higher
- 128 MB memory
- 2 GB Hard Drive
- Ethernet or Token-Ring Network Adapter
- SVGA display
- Pointing device
- AIX V 4.1
- DB2/2 for AIX V2.1

## GUI Workstations

### DOS/Windows or OS/2

You need one or more PC's with the following capabilities:

Pentium 50 MHz or higher
16 MB memory
50 MB free disk space
Ethernet or Token-Ring Network Adapter
SVGA display
Pointing device
One of the following:
- OS/2 WARP Connect V 3.0 with WIN-OS/2
- Windows V 3.1 with TCP/IP for DOS V 2.1.1 and DOS V 5.1
- Windows NT V 3.5

## Optional

If you are using the corresponding LMO System feature, you need a barcode reader.

## AFP Printers

IBM will identify the hardware and software prerequisites for LMO compatibility.

## Status Collectors

Your pre/post processing equipment vendor will identify hardware and software prerequisites for LMO compatibility.

## Inserters

Your inserter vendor will identify hardware and software prerequisites for LMO compatibility.

## Local Area Network

Token Ring or Ethernet LAN with 16 Mbits (IEEE 801)
Host-to-LAN gateway at 16 Mbits LAN speed (e.g., 3172 Model 3)

# Appendix A. LMO Advisory Council

The LMO Advisory Council was convened by the IBM Printing Systems Company in September 1992. It consisted of the following customers and vendors:

Customers

- Advantis
- Aetna
- Bell South
- EDS
- Merrill Lynch/Tritech Services
- Pacific Bell

Vendors

- Bell & Howell
- BESTE Bunch
- C.O.P.E.
- Champion Paper
- IBM Printing Systems Company
- Johnson & Quin
- Pitney Bowes
- Roll Systems
- Wallace

© Copyright IBM Corp. 1996

# Appendix B. LMO Vendor Council

In December 1993, the vendors on the LMO Advisory Council formed the LMO Vendor Council to develop the Large Mailing Operations Standards Specification. Today, the LMO Vendor Council consists of the following companies:

Bell & Howell
BESTE Bunch
Bowe Systec
C.O.P.E.
Delphax
Gunther International
Hunkeler
IBM Printing Systems Company
J.Q. Technologies (Johnson & Quin)
Kern
LASERMAX (Wallace/Stralfors)
Moore Business Forms
Pitney Bowes
Roll Systems
Siemens
Standard Register
Xerox

© Copyright IBM Corp. 1996

# Glossary of Terms and Abbreviations

**A Note on LMO Terms**

This glossary defines terms that are used by documents provided with the LMO System. The terms defined here are not necessarily used in this specific manual.

## A

**address**. A unique code assigned to each device connected to a network.

**Advanced Function Common Control Unit (AFCCU)**. A control unit that is used by some IBM 3900-series Page Printers to obtain status information about these printers.

**Advanced Function Presentation (AFP)**. AFP is a set of licensed programs that use the all-points-addressable concept to print data on many printers or display data on a variety of display devices. AFP also includes creating, formatting, archiving, viewing, retrieving, and distributing information.

**AFP Conversion and Indexing Facility (ACIF)**. The AFP Conversion and Indexing Facility (ACIF) is a program that converts an unstructured print dataset to an architected format, provides an index to that dataset, and can add tags to the print and index datasets.

**agent**. An agent is a function that does an action, other than getting and setting attribute values, on the LMO System's database based on user-specified parameters.

**alert**. A device-initiated indication of a problem (for example, paper jam) on a device.

**APPC**. Advanced Program-to-Program Communications. A part of SNA.

**APPN**. Advanced Peer-to-Peer Networking. An extension of SNA.

**attribute**. (1) In devices, an attribute is a characteristic of a defined or configured device. (2) For LMO components, an attribute is a named property of the component.

**attribute matrix**. A tabular depiction of attributes showing the source of the attribute value when it is set initially, and the point in mail job processing when the value is updated.

## B

**BLDTLE**. BLDTLE is a set of programs, supplied with the LMO System, used to create TLEs and submit them to the TLE server for processing.

**Browser**. A utility on the LMO System workstation used to view and update attribute values in the LMO System database.

## C

**capacity units**. Capacity units are the units in which we measure or report the capacity of a device. For example, the capacity units for a roll feed input device may be hundreds of feet, while the capacity units for an input tray may be pages or inches.

**component**. A component is any hardware or software element that is (or can be) connected to a computer system.

**component instrumentation**. Component Instrumentation is the code that carries out management actions for a particular component.

**Component Interface (CI)**. The Component Interface is that part of the DMI that component instrumentation uses.

**configuration**. Configuration is the process of organizing and connecting a system of devices, optional features, and program products that have been installed so that these features can be used.

**consumable resource**. A consumable resource is a supply that is used up by a device. Examples of consumable resources include toner, ink, and stitching wire.

**consumable resource units**. Consumable resource units are the units in which the consumable resources used by a device is measured or reported.

**coupled interface (non-intelligent)**. Electronic and physical connections to IBM printers to attach pre- and post-processing devices.

**customization**. The process of implementing optional changes to defaults of a software program that is already installed on the system and configured so that it can be used. Contrast with configuration.

© Copyright IBM Corp. 1996

# D

**DMI**. Desktop Management Interface. The Desktop Management Task Force (DMTF) developed a set of standards for interfacing computer systems to devices manufactured by different vendors. These standards are named the DMI standards. The LMO System is an implementation of these standards.

**Desktop Management Task Force (DMTF)**. The DMTF is a consortium of companies that joined to come up with standards for interfacing devices to computer systems.

**document**. In the LMO System, a document is assumed to be the electronic form of a document, in a form acceptable to print servers, viewers, archivers, and other document processing components to which a document is sent.

**document format**. The generic name for any data syntax in which a final form electronic document may be encoded. For example, in AFP architecture the document format for final form electronic document interchange is MO:DCA, Mixed Object Document Content Architecture.

**doubles**. Media duplications, such as letters, inserts, envelopes, etc.

**duplex**. A method used to print on both sides of a sheet of paper. Normal-duplex printing occurs when the paper is turned over the Ym axis (left to right). Tumble-duplex printing occurs when the paper is turned over the Xm axis (top to bottom).

# E

**event**. An event is an occurrence of significance to a process or device. Device error, state change, supply add, and process complete are typical examples of events.

**exit program**. An exit program is a user-written program given control during operation of a system function.

# F

**finisher device**. A finisher is a device that does operations other than marking on a medium. Some examples of finishing processes are stapling, punching, trimming, binding, and banding. A given device may support more than one finishing process.

**flag**. A flag is a Hex number used to grant or withhold permissions for various system actions from users.

**form definition**. A form definition is a resource object (used by PSF) that defines the characteristics of the form or printed media, which include: overlays to be used, the paper source (for cut-sheet printers), duplex printing, text suppression, the position of composed text on the form, and the number and modifications of a page.

# G

**group**. (1) A group is a collection of attributes in a DMI database. (2) A set consisting of pathnames and flags that are used to control what users can access through the system's GUI.

**group permission set**. Access to the LMO System GUI is based on permissions granted to members of groups, such as inserter operators, printer operators, managers, and the system administrator.

**GUI**. Graphical User Interface.

# H

**history database**. A History database is a repository of information about product and device performance over time.

**host system**. (1) A host system is a data processing system that prepares programs and operating environments for another computer or controller. (2) A computer used to prepare programs for use on another computer or on another data processing system. (3) In TCP/IP, a computer that is a peer system in a network.

# I

**indexing**. (1) Indexing is the process of segmenting a print file into uniquely identifiable groups of pages (a named collection of sequential pages) for later retrieval. (2) A process of matching reference points within a file and creating structured field tags within the document and the separate index object file.

**inserter**. An inserter is a collection of devices that accumulates related papers, folds them, adds selected inserts, stuffs the collected papers in an envelope, seals and meters them, and stacks the finished mailpieces.

**Insertion Queue**. Short term storage location for printed mail jobs waiting for insertion. At many installations, the insertion queue is between the print room and the insertion room. (The Insertion Queue is also known as "inventory" in some shops.)

**insert job**. A mail job that can be uniquely identified and tracked by the LMO System through the insertion and reconciliation processes.

**instance**. A single occurrence of an object.

**instrumentation**. Instrumenting is the act of registering a device or component with the LMO System so that data collection about it will be more efficient than noninstrumented components.

**intelligent coupling**. Intelligent coupling is the presence of electronic and physical connections on IBM printers allowing attachment of pre- and post-processing devices. The devices establish a two-way dialog over the connection, which enables error correction and information sharing.

**IP address**. Internet Protocal address in dotted decimal notation format.

**Installation Verification Procedure (IVP)**. A procedure used to verify that a software installation has been done correctly and that system processing can be done.

# J

**job ticket**. A job ticket is a set of specific finishing instructions for processing a particular mail job. A job ticket may contain setup instructions for the operator, operating instructions for the inserter, and structure information for the inserter to correlate the paper structure to the instructions. An architected job ticket is one that conforms to a consortium standard. A nonarchitected job ticket is one that conforms only to the standards of a particular vendor.

# K

**key**. A key is an attribute in a group used to identify a specific row in a table of attributes.

# L

**large mailing operations (LMO)**. (1) An LMO is a collection of hardware and software components designed to work together to automate output processes associated with generating, printing, mailing, and tracking large volumes of mailpieces.
(2) Nickname for the LMO System.

**Late Diverting**. Late diverting is the act of diverting a selected subset of mailpieces in an already printed print job from the insertion process. This is done so that some action may be done on them before insertion, such as reprinting or inserting with different inserts. The late diversion function allows customers to continue a print job even if selected mailpieces in it need to be diverted.

**legacy application**. Applications that have been around for a long time and are hard to modify.

**LMOAPI**. A set of 'C' functions that can be called from a 'C' program to do standard GET, SET, and List actions on the DMI database.

**LMO GUI**. The LMO System interfaces its users and operators through a Windows-based Graphical User Interface (GUI) application running on a workstation.

**LMO host components**. Host-based applications that manage host-based software and devices.

**LMO System**. The LMO System is the name of the software that supplies the control functions for managing large mailing operations. It consists of a server, client workstations, and software.

**LMO Systems Manager**. The LMO Systems Manager is the name of the LMO System component that manages the LMO System's Graphical User Interface (GUI).

# M

**mail job**. A mail job is a collection of mailpieces that represent a unit of work in the LMO System. A mail job results from segmenting output from product applications into manageable pieces for printing, inserting, postal processing, or reprint. A given mail job may have multiple print jobs associated with it to be inserted into the same envelope. A mail job may have an insert job without a print job, a print job without an insert job, multiple print jobs for one insert job, or multiple insert jobs for one print job.

**mailpath**. A mailpath is an ordered sequence of processes to be done by a mail job.

**mailpiece**. A mailpiece is the envelope and its entire contents.

**Management Application**. A Management Application is a program (such as the LMO System) that initiates management requests. A management application uses the DMI to do management operations. A management application can be a program such as an application with a graphical user interface or an application program agent, or it may be a network management protocol function that translates requests from a network management protocol (such as SNMP or CMIP) to the DMI and back again.

**manifest**. A manifest is a mail stream produced in accordance with U.S. Postal Service regulations whereby customers deliver a detailed report to the Post Office with funds for the required postage. They number each mailpiece for identification and they do not apply unique postage to each mailpiece.

**marker device**. A marking device is a mechanism (such as a printer) that produces marks on a medium.

**markless**. Markless tracking is the tracking of individual mailpieces without the addition of extra bar codes or optical recognition marks on the mailpiece.

**Management Information Base (MIB)**. A logical database of configuration, status, and statistical information for a device.

**Management Information Format (MIF) file**. The Management Information Format is a file format used by the DMI and LMO standards and implemented in the LMO System.

**Management Interface (MI)**. A Management Interface is a component of the LMO System that applications that want to manage components use. The MI protects management application vendors from the different mechanisms used to obtain management information from elements in the system.

**misses**. A miss is the failure to feed an insert medium into a mailpiece envelope.

**mutes**. Mutilated documents are mailpieces damaged following the printer process. We assume that they are damaged after the printer error recovery point.

# N

**navigation diagrams**. Graphical depictions of the “chained” relationships between reports, dialog boxes, and other LMO System Starter Set functions.

# O

**OID**. Object Identifier.

**OnDemand**. OnDemand is an IBM software product that manages electronic archives of documents and searches for and retrieves documents for viewing, faxing, printing, or merging with other documents. The LMO System may use OnDemand to hold historical data, such as print images after printing and insertion.

**operator**. An operator is a person who uses printers and inserters to accomplish their job. They may or may not also be a user of the LMO.

**operator profile**. Operators are allowed to access and operate functions depending on the security profile that is set up by the LMO System Administrator. A profile is a file containing an operator's security access and a list of authorized functions.

# P

**paper handling device**. A device that handles printer paper before or after it is printed, such as roll unwinds, pac feeders, roll rewinds, folders, folder separators, cutter/burster trimmer stackers, and so on.

**poll interval**. The poll statement is used when defining rows and columns in reports. It defines the frequency with which polling for changes occurs (1) in the number of rows in a table or (2) the value of a column (attribute) changes. The poll interval is expressed in terms of a percent of the number of poll intervals. A poll value of 100 means poll every time the interval timer expires (ï, poll 100 percent of the time). A value of fifty means poll 50 percent of the time.

**postprocessing device**. A device that does an operation on the paper after it leaves the printer.

**preprocessing device**. A device that does an operation on the paper before it enters the printer.

**print dataset**. A print dataset exists on a spool and is sent to PSF for printing. It contains print data, if any, and may contain resources or tags for logical elements.

**print error recovery**. The process of repositioning and reprinting printed pages following the clearing of a jam on a printer.

**print job**. A print job is a part of a mail job that can be uniquely identified and tracked by the LMO System through the printing process.

**print quality verification**. Print quality verification is checking the printed page to assure that it meets pre-set quality standards.

**process set point**. Point at which attribute values are updated by LMO System operations.

**product**. A product is the collection of all mail jobs associated with a particular run or cycle of an application. The LMO System can identify and track a product.

**PSF**. Print Services Facility. IBM software that is used to drive page printers.

# Q

**qualified tray**. A qualified tray is a U.S. Postal Service mail tray containing mailpieces that have been sorted and arranged in accordance with Postal Service regulations and meet all requirements for a presort reduced rate.

# R

**reconciliation**. Verification that all mailpieces in a mail job or product have been printed, inserted, and trayed for mailing.

**reprint**. Process of printing a second instance of a mailpiece that did not successfully complete the mailing process.

**row**. A row is an instance of a table (of one or more rows).

# S

**segmentation**. Segmenting is breaking a mail job into manageable pieces called mail jobs.

**Service Layer (SL)**. The Service Layer is an active, resident piece of code that mediates between the Management Interface and the Component Interface. The Service Layer coordinates access to component instrumentation and component-provided data.

**Simple Network Management Protocol (SNMP)**. A protocol used to configure and monitor network devices.

**SNA**. System Network Architecture.

**special handlers**. Special handlers are utilities that do some function related to a component's attributes when they meet certain user-specified conditions. Handlers are like global parameters that can specify actions that component instrumentation is to take whenever certain conditions are met.

**Starter Set**. A collection of customized LMO System files and procedures designed to work together to provide an example of a real LMO System implementation.

**status collector**. A status collector is a computer system dedicated to collecting status information on printing and other devices.

**supplies inventory**. For each device that can report its status, the LMO System supplies an interface between the device and its supplies. This allows a device to determine how much of each supply is left and when it was last added. Users/operators can view this information and to tell the LMO System when supplies are added to a device.

# T

**table**. A table is a group with more than one instance.

**tag**. A type of structured field used for indexing in an AFP document. Tags associate an index attribute-value pair with a specific page or group of pages in a document. IBM defines tags in the Mixed Object Document Content Architecture reference document.

**Tag Logical Element (TLE)**. An AFPDS-type record that user's imbed in product data and is read by the LMO System to collect data about products.

**traying**. Traying is placing the completed mailpieces into containers provided by the U.S. Postal Service for Post Office processing.

**turn around document**. A turn around document is a portion of a mailpiece that U.S. Postal Service customers want sent back from the recipient with a reply. Usually this is a remittance page returned with payment.

# U

**user**. A user is a person who uses the LMO workstation to accomplish their job. Users may or may not operate the printers or inserters in the system.

# V

**Value Add (VA)**. Value Add is a software process by which LMO System users enhance the print file. Examples include correcting invalid addresses and adding postal bar code. Various software vendors may provide Value Add software.

# Readers' Comments — We'd Like to Hear from You

**LMO: Large Mailing Operations System**
**General Information Manual**
**Version 1.0.0**

**Publication No. LM04-0132-00**

Use this form to provide comments about this publication, its organization, or subject matter. Understand that IBM may use the information any way it believes appropriate, without incurring any obligation to you. Your comments will be sent to the author's department for the appropriate action. Comments may be written in your language.

**Note:** IBM publications are not stocked at the location to which this form is addressed. Direct requests for publications or for assistance in using your IBM system, to your IBM representative or local IBM branch office.

| | Yes | No |
|---|---|---|
| Does the publication meet your needs? | ____ | ____ |
| Did you find the information: | | |
| Accurate? | ____ | ____ |
| Easy to read and understand? | ____ | ____ |
| Easy to retrieve? | ____ | ____ |
| Organized for convenient use? | ____ | ____ |
| Legible? | ____ | ____ |
| Complete? | ____ | ____ |
| Well illustrated? | ____ | ____ |
| Written for your technical level? | ____ | ____ |
| Do you use this publication: | | |
| As an introduction to the subject? | ____ | ____ |
| As a reference manual? | ____ | ____ |
| As an instructor in class? | ____ | ____ |
| As a student in class? | ____ | ____ |

What is your occupation?

_____

Thank you for your input and cooperation.

**Note:** You may either send your comments by fax to 1-800-524-1519, or mail your comments. If mailed in the U.S.A., no postage stamp is necessary. For residents outside the U.S.A., your local IBM office or representative will forward your comments.

**Comments:**

Name _____ Address _____

Company or Organization _____ _____

Phone No. _____ _____

**Readers' Comments — We'd Like to Hear from You**
LM04-0132-00

IBM®

Cut or Fold
Along Line

Fold and Tape | **Please do not staple** | Fold and Tape

NO POSTAGE
NECESSARY
IF MAILED IN THE
UNITED STATES

# BUSINESS REPLY MAIL

FIRST-CLASS MAIL PERMIT NO. 40 ARMONK, NEW YORK

POSTAGE WILL BE PAID BY ADDRESSEE

Information Development
The IBM Printing Systems Company
Department H7FE Building 003G
P O Box 1900
BOULDER CO 80301-9817

Fold and Tape | **Please do not staple** | Fold and Tape



Cut or Fold
Along Line

IBM®

Printed in U.S.A.

LM 4- 132-

```
DSMKPO654E INVALID POSTSCRIPT FILE.
DSMMOM395I '.EDFPO' LINE 80: .po icot
DSMMOM397I '.EDFPO' WAS IMBEDDED AT LINE 910 OF '.EDFAWRK'
DSMMOM397I '.EDFAWRK' WAS IMBEDDED AT LINE 2330 OF '.EDF#CV'
DSMMOM397I '.EDF#CV' WAS IMBEDDED AT LINE 190 OF '.EDF#FCV7'
DSMMOM397I '.EDF#FCV7' WAS IMBEDDED AT LINE 330 OF '.EDFCOVER'
DSMMOM397I '.EDFCOVER' WAS IMBEDDED AT LINE 36 OF 'GIMRUN'
DSMKPO654E INVALID POSTSCRIPT FILE.
DSMMOM395I '.EDFPO' LINE 80: .po icot
DSMMOM397I '.EDFPO' WAS IMBEDDED AT LINE 910 OF '.EDFAWRK'
DSMMOM397I '.EDFAWRK' WAS IMBEDDED AT LINE 2 OF 'TITLEART'
DSMMOM397I 'TITLEART' WAS IMBEDDED AT LINE 36 OF 'GIMRUN'
DSMKPO653E POSTSCRIPT FILE 'lmoflo8' NOT FOUND.
DSMMOM395I '.EDFPO' LINE 80: .po lmoflo8 width 4i  SCALE
DSMMOM397I '.EDFPO' WAS IMBEDDED AT LINE 910 OF '.EDFAWRK'
DSMMOM397I '.EDFAWRK' WAS IMBEDDED AT LINE 35 OF 'HATARCH'
DSMMOM397I 'HATARCH' WAS IMBEDDED AT LINE 53 OF 'GIMRUN'
DSMKPO653E POSTSCRIPT FILE 'lmofl' NOT FOUND.
DSMMOM395I '.EDFPO' LINE 80: .po lmofl width 4i  SCALE
DSMMOM397I '.EDFPO' WAS IMBEDDED AT LINE 910 OF '.EDFAWRK'
DSMMOM397I '.EDFAWRK' WAS IMBEDDED AT LINE 49 OF 'HATARCH'
DSMMOM397I 'HATARCH' WAS IMBEDDED AT LINE 53 OF 'GIMRUN'
DSMKPO653E POSTSCRIPT FILE 'lmos0001' NOT FOUND.
DSMMOM395I '.EDFPO' LINE 80: .po lmos0001 width 4i  SCALE
DSMMOM397I '.EDFPO' WAS IMBEDDED AT LINE 910 OF '.EDFAWRK'
DSMMOM397I '.EDFAWRK' WAS IMBEDDED AT LINE 67 OF 'HATARCH'
DSMMOM397I 'HATARCH' WAS IMBEDDED AT LINE 53 OF 'GIMRUN'
DSMKPO653E POSTSCRIPT FILE 'prodis' NOT FOUND.
DSMMOM395I '.EDFPO' LINE 80: .po prodis
DSMMOM397I '.EDFPO' WAS IMBEDDED AT LINE 910 OF '.EDFAWRK'
DSMMOM397I '.EDFAWRK' WAS IMBEDDED AT LINE 489 OF 'HATARCH'
DSMMOM397I 'HATARCH' WAS IMBEDDED AT LINE 53 OF 'GIMRUN'
DSMKPO654E INVALID POSTSCRIPT FILE.
DSMMOM395I '.EDFPO' LINE 80: .po prtwat width 4i  SCALE
DSMMOM397I '.EDFPO' WAS IMBEDDED AT LINE 910 OF '.EDFAWRK'
DSMMOM397I '.EDFAWRK' WAS IMBEDDED AT LINE 992 OF 'HATDEV'
DSMMOM397I 'HATDEV' WAS IMBEDDED AT LINE 55 OF 'GIMRUN'
DSMKPO654E INVALID POSTSCRIPT FILE.
DSMMOM395I '.EDFPO' LINE 80: .po inswat width 4i  SCALE
DSMMOM397I '.EDFPO' WAS IMBEDDED AT LINE 910 OF '.EDFAWRK'
DSMMOM397I '.EDFAWRK' WAS IMBEDDED AT LINE 1048 OF 'HATDEV'
DSMMOM397I 'HATDEV' WAS IMBEDDED AT LINE 55 OF 'GIMRUN'
DSMKPO653E POSTSCRIPT FILE 'samps' NOT FOUND.
DSMMOM395I '.EDFPO' LINE 80: .po samps
DSMMOM397I '.EDFPO' WAS IMBEDDED AT LINE 910 OF '.EDFAWRK'
DSMMOM397I '.EDFAWRK' WAS IMBEDDED AT LINE 1357 OF 'HATDEV'
DSMMOM397I 'HATDEV' WAS IMBEDDED AT LINE 55 OF 'GIMRUN'
DSMKPO653E POSTSCRIPT FILE 'bcdb2' NOT FOUND.
DSMMOM395I '.EDFPO' LINE 80: .po bcdb2 width 4i  SCALE
DSMMOM397I '.EDFPO' WAS IMBEDDED AT LINE 910 OF '.EDFAWRK'
DSMMOM397I '.EDFAWRK' WAS IMBEDDED AT LINE 250 OF 'HATJOBT'
DSMMOM397I 'HATJOBT' WAS IMBEDDED AT LINE 57 OF 'GIMRUN'
DSMKPO653E POSTSCRIPT FILE 'mjprod' NOT FOUND.
DSMMOM395I '.EDFPO' LINE 80: .po mjprod width 4i  SCALE
DSMMOM397I '.EDFPO' WAS IMBEDDED AT LINE 910 OF '.EDFAWRK'
DSMMOM397I '.EDFAWRK' WAS IMBEDDED AT LINE 268 OF 'HATJOBT'
DSMMOM397I 'HATJOBT' WAS IMBEDDED AT LINE 57 OF 'GIMRUN'
DSMKPO653E POSTSCRIPT FILE 'lmop0001' NOT FOUND.
DSMMOM395I '.EDFPO' LINE 80: .po lmop0001
DSMMOM397I '.EDFPO' WAS IMBEDDED AT LINE 910 OF '.EDFAWRK'
DSMMOM397I '.EDFAWRK' WAS IMBEDDED AT LINE 238 OF 'HATMPT'
DSMMOM397I 'HATMPT' WAS IMBEDDED AT LINE 59 OF 'GIMRUN'
DSMBEG323I STARTING PASS 2 OF 2.
DSMKPO654E INVALID POSTSCRIPT FILE.
DSMMOM395I '.EDFPO' LINE 80: .po icot
```

DSMMOM397I '.EDFPO' WAS IMBEDDED AT LINE 910 OF '.EDFAWRK'
DSMMOM397I '.EDFAWRK' WAS IMBEDDED AT LINE 2330 OF '.EDF#CV'
DSMMOM397I '.EDF#CV' WAS IMBEDDED AT LINE 190 OF '.EDF#FCV7'
DSMMOM397I '.EDF#FCV7' WAS IMBEDDED AT LINE 330 OF '.EDFCOVER'
DSMMOM397I '.EDFCOVER' WAS IMBEDDED AT LINE 36 OF 'GIMRUN'
DSMKPO654E INVALID POSTSCRIPT FILE.
DSMMOM395I '.EDFPO' LINE 80: .po icot
DSMMOM397I '.EDFPO' WAS IMBEDDED AT LINE 910 OF '.EDFAWRK'
DSMMOM397I '.EDFAWRK' WAS IMBEDDED AT LINE 2 OF 'TITLEART'
DSMMOM397I 'TITLEART' WAS IMBEDDED AT LINE 36 OF 'GIMRUN'
DSMKPO653E POSTSCRIPT FILE 'lmoflo8' NOT FOUND.
DSMMOM395I '.EDFPO' LINE 80: .po lmoflo8 width 4i  SCALE
DSMMOM397I '.EDFPO' WAS IMBEDDED AT LINE 910 OF '.EDFAWRK'
DSMMOM397I '.EDFAWRK' WAS IMBEDDED AT LINE 35 OF 'HATARCH'
DSMMOM397I 'HATARCH' WAS IMBEDDED AT LINE 53 OF 'GIMRUN'
DSMKPO653E POSTSCRIPT FILE 'lmofl' NOT FOUND.
DSMMOM395I '.EDFPO' LINE 80: .po lmofl width 4i  SCALE
DSMMOM397I '.EDFPO' WAS IMBEDDED AT LINE 910 OF '.EDFAWRK'
DSMMOM397I '.EDFAWRK' WAS IMBEDDED AT LINE 49 OF 'HATARCH'
DSMMOM397I 'HATARCH' WAS IMBEDDED AT LINE 53 OF 'GIMRUN'
DSMKPO653E POSTSCRIPT FILE 'lmos0001' NOT FOUND.
DSMMOM395I '.EDFPO' LINE 80: .po lmos0001 width 4i  SCALE
DSMMOM397I '.EDFPO' WAS IMBEDDED AT LINE 910 OF '.EDFAWRK'
DSMMOM397I '.EDFAWRK' WAS IMBEDDED AT LINE 67 OF 'HATARCH'
DSMMOM397I 'HATARCH' WAS IMBEDDED AT LINE 53 OF 'GIMRUN'
DSMKPO653E POSTSCRIPT FILE 'prodis' NOT FOUND.
DSMMOM395I '.EDFPO' LINE 80: .po prodis
DSMMOM397I '.EDFPO' WAS IMBEDDED AT LINE 910 OF '.EDFAWRK'
DSMMOM397I '.EDFAWRK' WAS IMBEDDED AT LINE 489 OF 'HATARCH'
DSMMOM397I 'HATARCH' WAS IMBEDDED AT LINE 53 OF 'GIMRUN'
DSMKPO654E INVALID POSTSCRIPT FILE.
DSMMOM395I '.EDFPO' LINE 80: .po prtwat width 4i  SCALE
DSMMOM397I '.EDFPO' WAS IMBEDDED AT LINE 910 OF '.EDFAWRK'
DSMMOM397I '.EDFAWRK' WAS IMBEDDED AT LINE 992 OF 'HATDEV'
DSMMOM397I 'HATDEV' WAS IMBEDDED AT LINE 55 OF 'GIMRUN'
DSMKPO654E INVALID POSTSCRIPT FILE.
DSMMOM395I '.EDFPO' LINE 80: .po inswat width 4i  SCALE
DSMMOM397I '.EDFPO' WAS IMBEDDED AT LINE 910 OF '.EDFAWRK'
DSMMOM397I '.EDFAWRK' WAS IMBEDDED AT LINE 1048 OF 'HATDEV'
DSMMOM397I 'HATDEV' WAS IMBEDDED AT LINE 55 OF 'GIMRUN'
DSMKPO653E POSTSCRIPT FILE 'samps' NOT FOUND.
DSMMOM395I '.EDFPO' LINE 80: .po samps
DSMMOM397I '.EDFPO' WAS IMBEDDED AT LINE 910 OF '.EDFAWRK'
DSMMOM397I '.EDFAWRK' WAS IMBEDDED AT LINE 1357 OF 'HATDEV'
DSMMOM397I 'HATDEV' WAS IMBEDDED AT LINE 55 OF 'GIMRUN'
DSMKPO653E POSTSCRIPT FILE 'bcdb2' NOT FOUND.
DSMMOM395I '.EDFPO' LINE 80: .po bcdb2 width 4i  SCALE
DSMMOM397I '.EDFPO' WAS IMBEDDED AT LINE 910 OF '.EDFAWRK'
DSMMOM397I '.EDFAWRK' WAS IMBEDDED AT LINE 250 OF 'HATJOBT'
DSMMOM397I 'HATJOBT' WAS IMBEDDED AT LINE 57 OF 'GIMRUN'
DSMKPO653E POSTSCRIPT FILE 'mjprod' NOT FOUND.
DSMMOM395I '.EDFPO' LINE 80: .po mjprod width 4i  SCALE
DSMMOM397I '.EDFPO' WAS IMBEDDED AT LINE 910 OF '.EDFAWRK'
DSMMOM397I '.EDFAWRK' WAS IMBEDDED AT LINE 268 OF 'HATJOBT'
DSMMOM397I 'HATJOBT' WAS IMBEDDED AT LINE 57 OF 'GIMRUN'
DSMKPO653E POSTSCRIPT FILE 'lmop0001' NOT FOUND.
DSMMOM395I '.EDFPO' LINE 80: .po lmop0001
DSMMOM397I '.EDFPO' WAS IMBEDDED AT LINE 910 OF '.EDFAWRK'
DSMMOM397I '.EDFAWRK' WAS IMBEDDED AT LINE 238 OF 'HATMPT'
DSMMOM397I 'HATMPT' WAS IMBEDDED AT LINE 59 OF 'GIMRUN'