Information Systems

Application Reference Manual

Documentation Guide for the Integrated Business System

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GENERAL ELECTRIC

AS-CP B-1432

DOCUMENTATION GUIDE FOR THE INTEGRATED BUSINESS SYSTEM

APPLICATION MANUAL

August 1967

GENERAL ELECTRIC

INFORMATION SYSTEMS DIVISION

AS-CPB-1432

(1.M 11-67)

ACKNOWLEDGMENT

Initially, Application Systems Development (ISMO) personnel were instructed to write a guide relative to documenting application programs. During the course of this project, we found that Industrial Sales Division personnel were writing a guide for documenting total integrated business systems of which application programs are an integral part. At this point, we combined forces with ISD in the production of this "Documentation Guide for the Integrated Business System".

We gratefully acknowledge the efforts of ISD personnel, and in particular those of Pete Dufresne.

It is next to impossible to prepare a manual with examples covering all industries. In this manual, we use examples of a hypothetical steel company (Edison Steel) which permit the reader to more readily determine how all levels of an integrated business system tie together. Despite the terms/forms used, the reader will appreciate that the same procedures are required in whatever industry he is concerned. For example, a Standard Practice Instruction (page 43) might be called a Planning Sheet, Operations Sheet, Manufacturing Instruction, etc., depending on the industry. On the other hand, despite these industry differences, this documentation guide is recommended as the standard for use by all users of General Electric computers and is being submitted to proper Company groups for adaptation as such.

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FOREWORD

This manual is a plan for documentation of larger, integrated business control systems. Its purpose is to illustrate content and relationships of the many documents in a business information system. It defines and relates those areas of business operation connected with an information system, such as:

- Procedures - Manual aspects of the business decision-making process.
- Programs - Internal system logic for computer and business applications.
- Hardware - Description and technical details on physical devices.

This plan is intended as a guide. It illustrates one of many possible approaches to documentation of the business system. The plan objective is to identify necessary information content of the system documents rather than to state a rigid standard for document layout. However, where local conventions have not been established, these illustrations are recommended for document layouts.

The plan is intended for use by General Electric and computer user personnel. It is especially suited to those situations where the coordination of groups of analysts, programmers and operating personnel are necessary to accomplish a major computer system effort. In this case, a comprehensive documentation plan can contribute materially to completeness and compatibility of independent system efforts.

Within the General Electric Company, it is recommended that this plan and its standards be used in system design and publications of major computer marketing and systems engineering operations. In addition, it is written as an aid to design, implementation and system maintenance for the General Electric computer user.

This manual is not tutorial. It is not a guide to computer or business system design. It is assumed that readers have some familiarity with systems and/or program flowcharting. Therefore, this manual supports an extension of this experience into the broader information pattern of the larger, integrated system.

While there is considerable discussion of manual procedures in its several forms, there is no coverage of the business policies on which these procedures are based. It is assumed that those responsible for system structuring have this information available. Further, the need and justification for the integrated system is left to the reader.

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INTRODUCTION

Thorough and well engineered documentation is vital to the long-range success of any business information system. This is especially true of systems containing a computer. Documentation is the only long-range means by which knowledge can be transferred from those first on the scene to those who follow. It is the only successful means by which the work of many can be coordinated and changes monitored. A procedure cannot be examined, corrected, improved or measured until its nature is stated in a preservable, transmittable, understandable manner. Those familiar with computers to any degree are familiar with program flowcharts which detail the logic steps used in writing the computer program.

Many of these same observers have not been exposed to the additional disciplines necessary to effectively organize, develop and maintain the integrated, random access oriented, major corporate system. In addition, it may not be recognized at this early stage in the implementation of integrated systems that manual procedures are an integral part of the system design and documentation. Every manufacturing business information system contains manual procedures and shop instructions. However, the more sophisticated the system becomes, the more necessary it is to fully document not only the computer logic and related procedures, but also the manual operations that use the computer portion of the system.

A complete system documentation maintenance program must, therefore, identify and relate all aspects of the total business, the manual (or operating procedures), computer program(s) (software), and operations of all physical facilities (hardware).

This manual is a documentation plan which relates each of these areas of the integrated business system. It contains description sections with document exhibits as well as appendices containing standards details.

DOCUMENTATION PLAN SUMMARY

DOCUMENT DIVISIONS

Documentation of the logic and procedures of a mechanized business complex consists of three major information areas and several levels of detail in ten document divisions or chapters. The three information areas are operating procedures, programs and hardware. Levels of detail extend from the finest of program details up to a broad overview of the entire system. The ten document divisions identify each of the areas and detail levels within an area. Division documents are numbered to permit cross indexing of all information.

- Division 0 - System Overview

  The most general level of documentation is the "system overview." It describes the physical and applications scope of the system. It indexes all of the major subdivisions (or subsystems). Overview documents also include maps of system sites and communication lines and tables showing the data services performed for each of the corporate organizations.

- Division 1 - Subsystems

  Each system subdivision indexed in the overview is described at the "subsystem" level. In a major business system, about 12 subsystems are appropriate. Examples include Finance, Sales and Operations. A subsystem becomes the top working level of documentation. Business procedures are indexed to a subsystem. A subsystem includes one or more computer "applications".

- Division 2 - Applications

  An "application" is a segment of a subsystem consisting of one or more computer programs. The application is the prime working level of system documentation. It is based on a logical business activity such as Production Planning or Accounts Receivable. Production Planning is one of many applications in the Operations subsystem; Accounts Receivable is one of many applications in the Finance subsystem. In addition, it is the major cross reference between user programs, manual "Operating Procedures", mill operating or "Standard Practice Instructions", system "files" and the manual paperwork or "forms and formats" of the business.

. Division 3 - Operating Procedures

Operating Procedures are the manual actions and repetitive decision-making rules of the business. They constitute the non-programmed part of the integrated business system information loop.

. Division 4 - Standard Practice Instructions

Standard Practice Instructions (SPI's) are the detailed rules or recipes for performing operations on production facilities terminal devices, or for computer room actions. For example, steel coils may be annealed in one of ten time-temperature cycles at company "A". Each cycle is a Standard Practice.

. Division 5 - Application Programs

Application (or user) programs include all of the business-oriented tactics and operating data which are internal to the information system. Application programs in conjunction with operation procedures are the principle elements of the business system information cycle.

. Division 6 - Files

Files contain all of the system's business information. Files may be on magnetic tape, paper tape, cards, drum or disc in the computer configuration. They may be on any other form used in the manual routines of the business.

. Division 7 - Software

Operating systems software consists of those programs associated with the operation of the computer equipment. It includes the operating executive (MONITOR or Supervisor), compilers, and utility programs. In-house developed software programs are also included in this category.

. Division 8 - Forms and Formats

Forms and Formats are the business system hard-copy documents. They include inputs and outputs from the computer system (cards, tapes, reports) and the manual documents which will perform business functions outside the computer system.

. Division 9 - Hardware

Hardware documentation for the integrated system covers Machine Practices for computer, terminals and facilities. Machine Practices are the start-up, shutdown, check-out, etc. routines. They complement Standard Practices which describe the operating cycles of a device or facility.

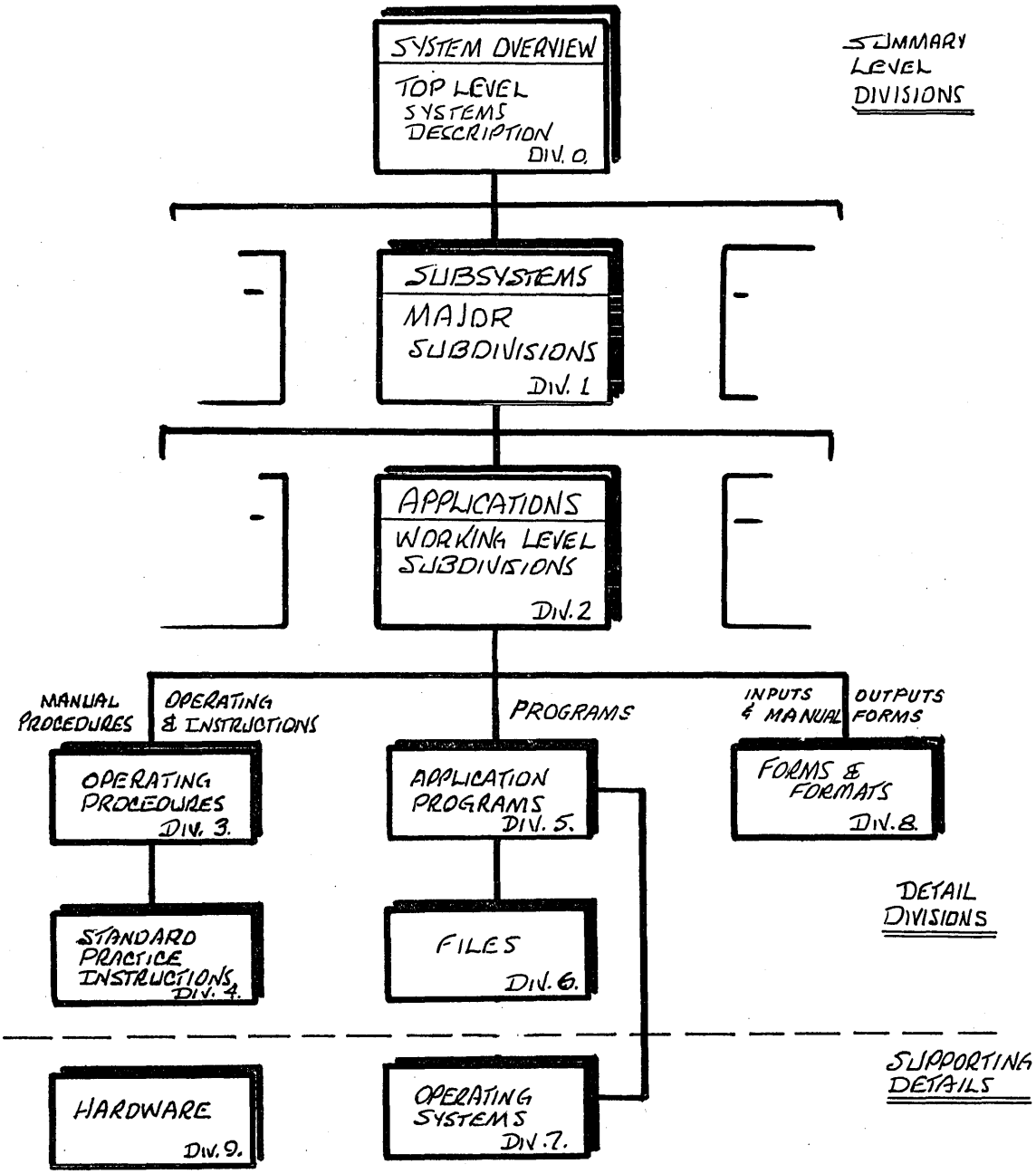


FIGURE 1 - DOCUMENTATION PLAN SUMMARY

DOCUMENT INDEXING

An important objective in organizing documents in the manner described is complete cross indexing capability. Programs make reference to files, input and output formats. Operating Procedures make reference to input formats, output formats and Standard Practice Instructions. And, overview documents index all of the subordinate items of information.

A document coding plan is used here which permits complete cross indexing. The coding plan has several features.

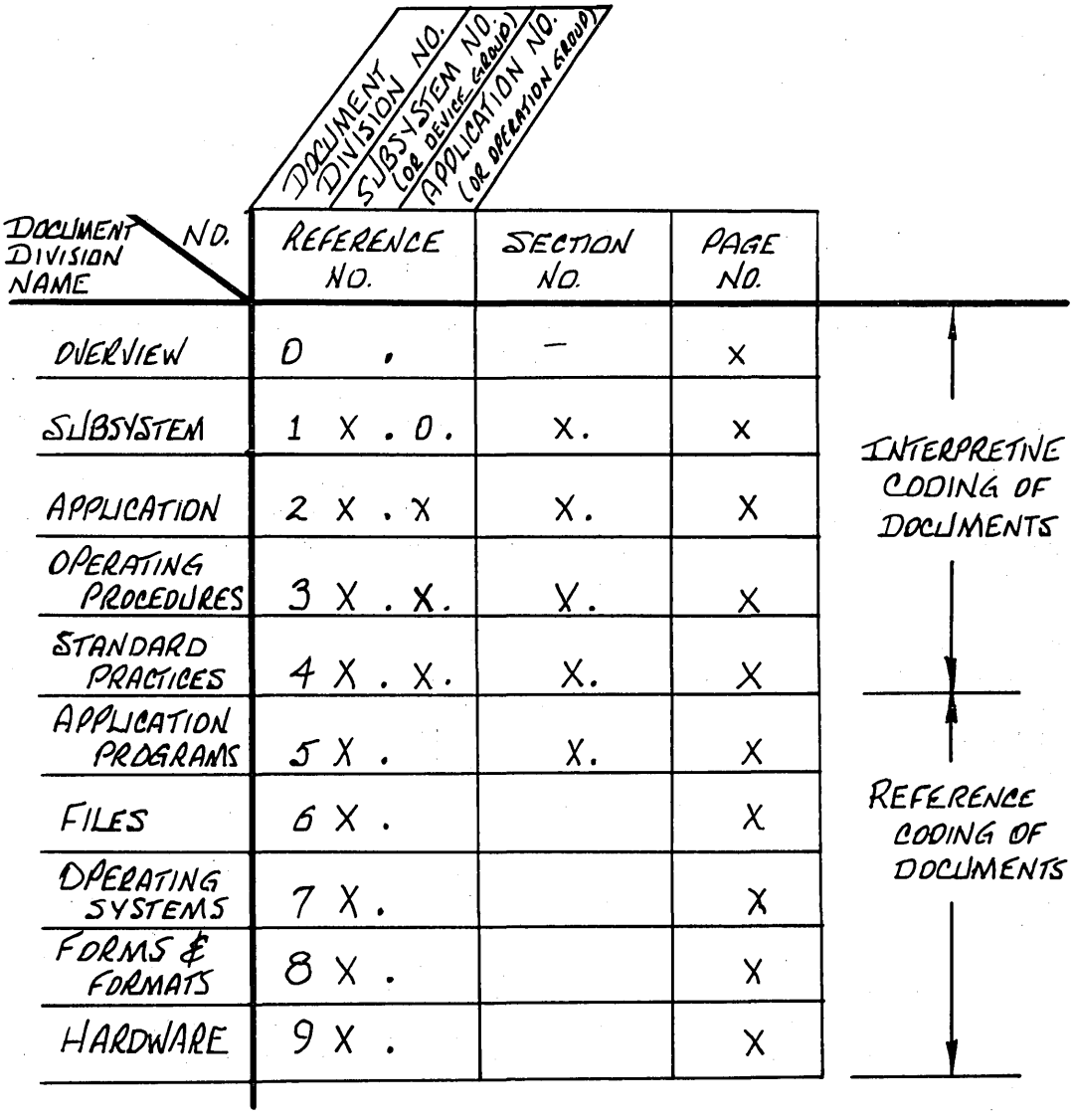
- Grouping of documents by "division". (i.e. Programs, files, procedures, etc.)
- Interpretive coding of summary level documents. (i.e. Subsystem, application, etc. can be read directly.)
- Reference coding of detail level documents. (Numbers assigned serially to each document of a set.)

Grouping of documents by division is illustrated, Figure 1. Interpretive coding can be recommended in any large indexing problem because of the ability of a reader to obtain intelligence from a number. Filing and finding of companion (not necessarily referenced) documents are simplified. Interpretive coding is used on all summary level and manual procedures divisions.

An interpretive code becomes large after many levels of subdivision. In addition, many program language compilers have a limited identification field size available for program reference numbers. Therefore, reference codes are used at detail levels in those divisions which are normally referenced inside the automated information system. The smaller numbers permit use directly in program coding.

One additional point on document coding and its use in compilers: Most program language compilers have further limitations on valid characters. For example, the first character of an identification must be alphabetic in many cases. Therefore, this proposed index coding plan can be modified by the addition or substitution of a P _ _ _ in a program number for the 5 _ _ _. Inputs, outputs and files may also require this adjustment depending upon the compiler used.

An outline of the coding format for each document level and detail division is shown, Figure 2



"X" ONE OR MORE DIGITS, AS REQUIRED, DEPENDING UPON SYSTEM SIZE.

FIGURE 2 - DOCUMENT CODING

Not all systems designs will require all levels of summarization to effectively describe the design. Stand-alone applications in small systems require only the applications level summary along with program details. The larger the system, the more significant an organized fragmentation and multi-level description becomes. Without these many levels of summary, the large system is unmanageably complex for either the working level analyst or programmer.

This plan is based upon the collective experiences of many individuals; and where possible, it is based upon either accepted standards or conventions in use. For example, recently adopted ASA flowcharting symbols are included, Appendix A. The Application Summary Diagram is an adaption of a diagram used by the Information Management Operation in system design and description. Flowcharting conventions have been obtained from observations of external conventions in major systems.

"New" documents exist in the overview levels. Some degree of novelty exists also in the coordination of operating procedures, standard practices and application programs. The heavy emphasis on manual procedures may be the most significant system documentation difference.

In the integrated system, other documentation differences will arise. With programs often stored on drum and disc and data accumulated in disc files, there is a shift from computer run instructions for handling of card decks and tape mounting to instructions at a terminal on how to ask for a report. Tape-to-tape computer runs and card-to-card tab runs will decrease significantly. Therefore, customary documentation will change its format.

No discussion is included on system design procedures. Data file structuring information organization techniques and run estimates are not part of this treatise. These specialized subjects are left to other manuals.

DOCUMENTATION DESCRIPTION

This section describes each of the documents in the plan in greater detail. Each of the summary levels and system detail areas are discussed.

The summary levels and the detail areas are discussed in "divisions". Documents within each division are usually illustrated with a figure. The figure relates each document to its neighbor and to adjoining document divisions. Exhibits of each document are grouped together at the end of a discussion.

The summary levels include the Overview, Subsystem, and Applications divisions. Detail-containing divisions include Operating Procedures, Standard Practice Instructions, files, applications programs, operating system programs and hardware. Summary levels are discussed first.

Both summary and detail level description and exhibits of this manual are designed to illustrate information content and relationships in the integrated system. Therefore, all ten divisions are offered as a recommended documentation format. However, within this manual certain standards are used or referenced. Standards for flowchart symbols, for symbols used on key documents of this manual and for page layouts are included in appendices.

SUMMARY LEVELS

- SYSTEM OVERVIEW
- SUBSYSTEM
- APPLICATIONS

SYSTEM OVERVIEW

The System Overview is the most general of three summary levels. These levels are all written to orient the reader and relate the detailed information. They are:

- System Overview
- Subsystems
- Applications

The System Overview is a summary of the entire business information system. It defines the business, data service and system scope. It consists of a narrative description of the system and a series of diagrams. Diagrams illustrate scope and show relationships of the Subsystems and Applications that make up the system. The contents of the overview chapter are illustrated, Figure 3.

General Description

Narrative description summarizes the system design, its scope, objectives and characteristics. Specific features are described. A sample is included, Exhibit 0.1.

Subsystem Diagram

Each of the subsystems or major subdivisions of the total integrated system is specified on this chart. Subsystems are defined as a logical grouping of related applications that perform a major service to the business. They are approximately equivalent to the major business functions or the corporate organization. For example, the subsystems that will probably be included are Sales, Operation, Maintenance, Finance, etc.

By observation of the subsystems that are included, a broad picture of the system's scope is readily obtained, Exhibit 0.2.

Each of the subsystems specified on this diagram is an index to the next level of documentation detail. A subsystem is made up of one or more applications. Applications, in turn, are a group of manual business procedures and computer program runs and files which, together, perform a defined business service. Accounts Receivable is such an application within the Finance subsystem.

As shown on the exhibit, Exhibit 0.2, Edison Steel Company has been divided into twelve business-oriented subsystems. One special subsystem, Information Systems, is included to permit cataloguing of procedures not directly related to business-oriented subsystems.

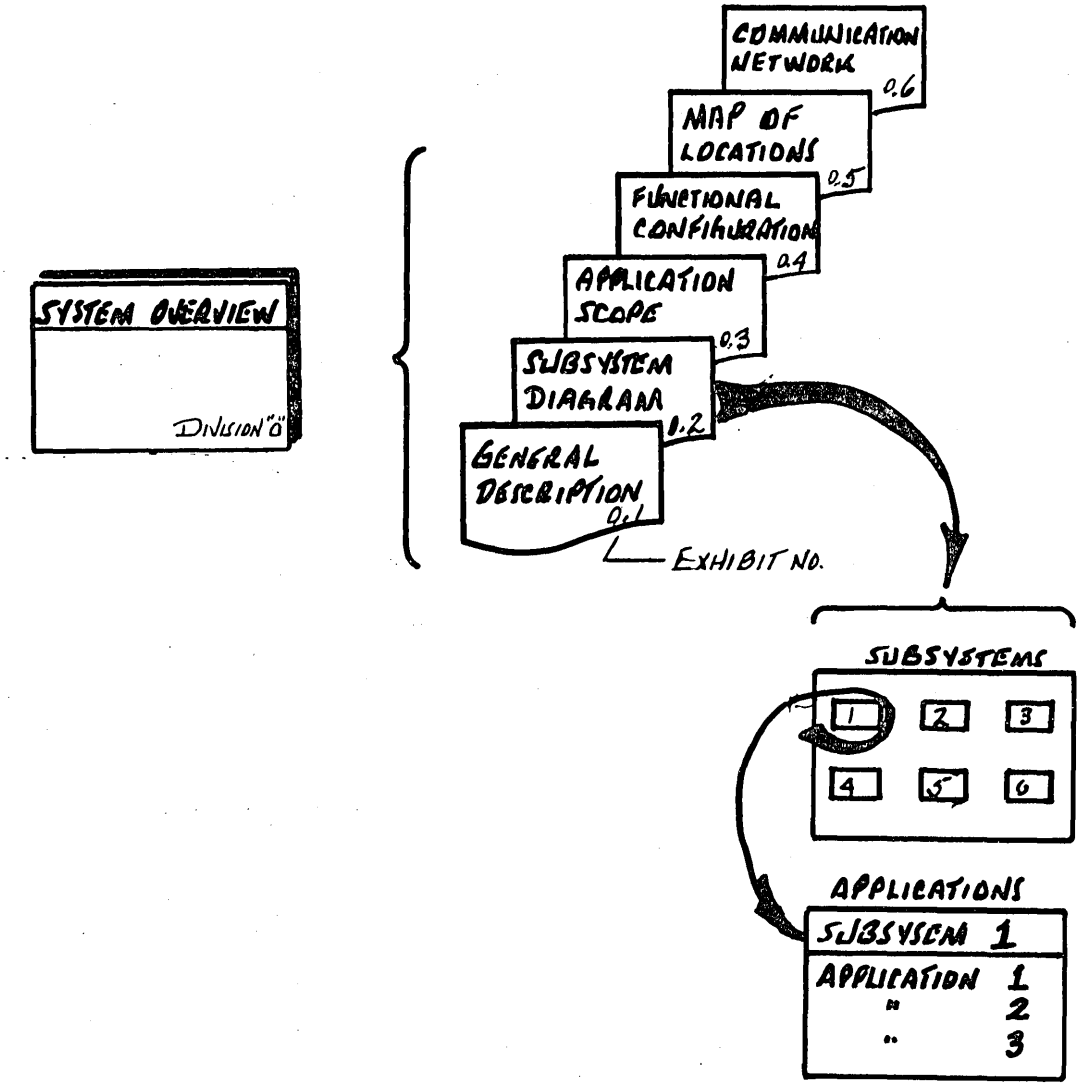


FIGURE 3. SYSTEM OVERVIEW - AN INDEX TO APPLICATIONS

DOCUMENT
0.1

EDISON STEEL COMPANY

GENERAL DESCRIPTION - SYSTEM OVERVIEW

The Edison Steel Company information system has been designed to provide improved customer service, improved manufacturing and management control of the business. It has been designed with emphasis on the manufacturing problem, receipt of orders, the manufacture and shipment of products.

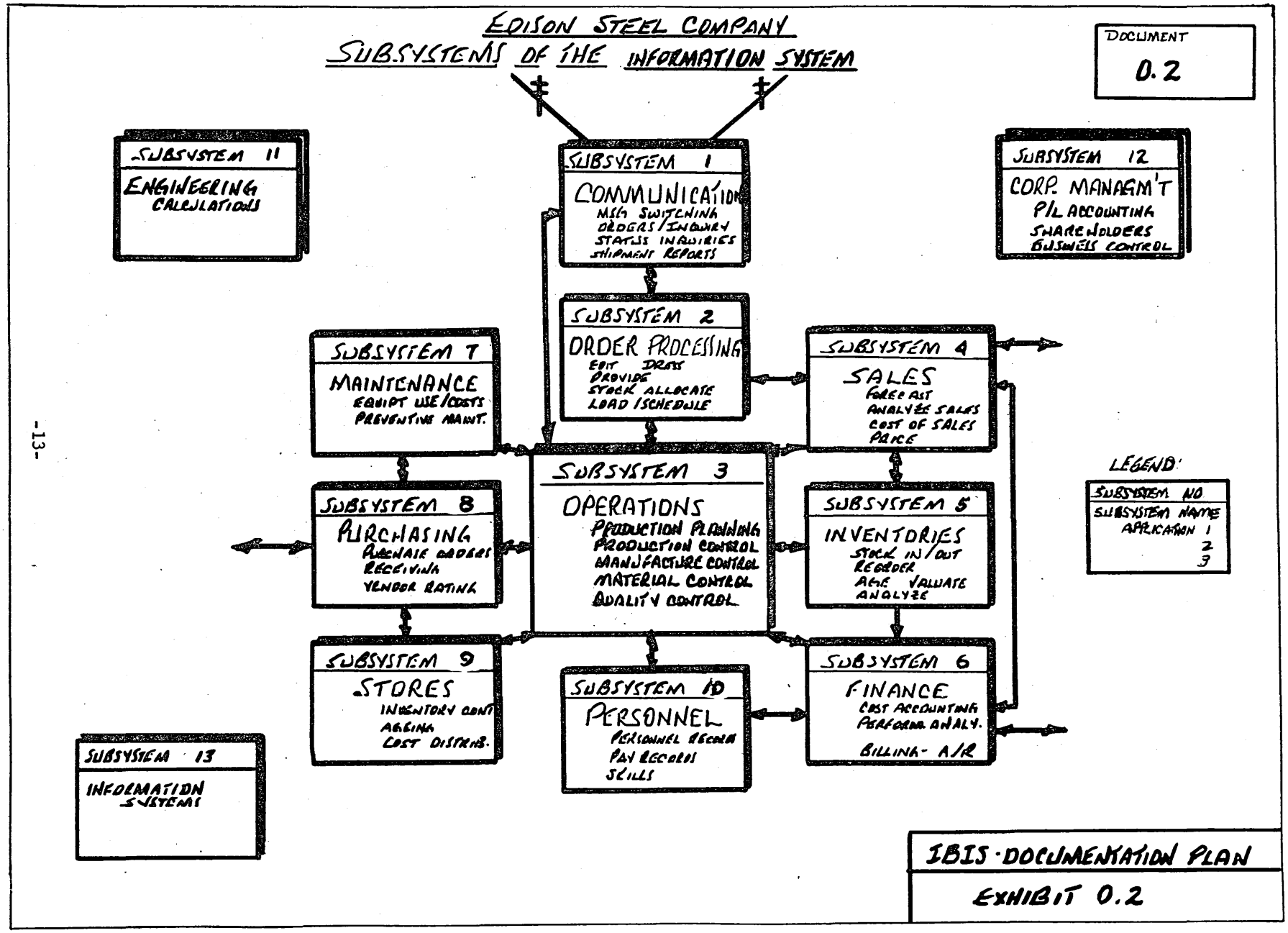
The system receives orders from remote locations. It processes the orders, defines manufacturing instructions, loads facilities and schedules operations. It prepares mill paperwork. Reporting of production transactions is used to track materials and orders. A comparison of events with manufacturing plans identifies non-standard events. Exception reports inform operating personnel of conditions requiring attention.

Statistics resulting from the manufacturing cycle are used for Finance, Sales and Management organizations. Production event reporting provides the raw materials for product casting, standard casting, and production performance analysis.

The System consists of 12 business subsystems (main subdivisions). A subsystem is roughly equivalent to a line or staff business function such as Sales, Operations, Finance, Personnel.

-- etc. --

IBIS - DOCUMENTATION PLAN
EXHIBIT 0.1


EDISON STEEL COMPANY
SUBSYSTEMS OF THE INFORMATION SYSTEM
DOCUMENT
0.2
SUBSYSTEM 11
ENGINEERING
CALCULATIONS
SUBSYSTEM 1
COMMUNICATION
MSG SWITCHING
ORDERS/INQUIRY
STATUS INQUIRIES
SHIPMENT REPORTS
SUBSYSTEM 12
CORP. MANAGM'T
P/L ACCOUNTING
SHAREHOLDERS
BUSINESS CONTROL
SUBSYSTEM 2
ORDER PROCESSING
EDIT DRESS
PROVIDE
STOCK ALLOCATE
LOAD/SCHEDULE
SUBSYSTEM 7
MAINTENANCE
EQUIPT USE/COSTS
PREVENTIVE MAINT.
SUBSYSTEM 4
SALES
FORECAST
ANALYZE SALES
COST OF SALES
PRICE
SUBSYSTEM 3
OPERATIONS
PRODUCTION PLANNING
PRODUCTION CONTROL
MANUFACTURE CONTROL
MATERIAL CONTROL
QUALITY CONTROL
SUBSYSTEM 8
PURCHASING
PURCHASE ORDERS
RECEIVING
VENDOR RATING
SUBSYSTEM 5
INVENTORIES
STOCK IN/OUT
REORDER
AGE VALUATE
ANALYZE
LEGEND
SUBSYSTEM NO
SUBSYSTEM NAME
APPLICATION 1
2
3
SUBSYSTEM 9
STORES
INVENTORY CONT
AGEING
COST DISTRIB.
SUBSYSTEM 10
PERSONNEL
PERSONNEL RECORD
PAY RECORDS
SKILLS
SUBSYSTEM 6
FINANCE
COST ACCOUNTING
PERFORM. ANALY.
BILLING - A/R
SUBSYSTEM 13
INFORMATION
SYSTEMS
IBIS · DOCUMENTATION PLAN
EXHIBIT 0.2

Application Scope

Even in the comprehensive, integrated business control system, not all data services will apply to the same degree in the various staff and operating departments of the business. However, it is desirable in the overview to illustrate what services are being performed for each organization. A broad system scope is illustrated for each of the departments concerned, Exhibit 0.3.

In the example, Exhibit 0.3, it can be seen that Production Planning (Subsystem 3, Operation 3, Operations) is performed for the Steelmaking Department but not for the Blast Furnace Department.

System Functional Configuration

In an overview of the complex, multi-works business, a broad view of where the computing and business services (i.e. functions) are being performed is advisable. It is informative to see that Order Entry is performed either centrally or at the works level. A functional configuration diagram illustrates this fact, Exhibit 0.4.

In the example, a data controller (message switcher) services all warehouse and sales office messages for all remote sites. Message switching as well as corporate planning and control are physically located at headquarters. Process control, however, exists only at the West Point Works. All data services or functions on this diagram are geographically distributed.

Map of Locations

The medium-to-large size company often has more than one geographical location. If he does, it is meaningful to illustrate the relationships of a headquarters, manufacturing, warehouse or sales site with respect to other sites. A typical map for the company is shown, Exhibit 0.5.

Communications Network Diagram

Many companies will have communications systems linking remote sites with a headquarters location. The system will have low speed, wide band, duplex, party line or private line links, etc. System requirements for line servicing depend on these characteristics. A typical chart which gives a broad view of communications links is shown, Exhibit 0.6.

DOCUMENT 0.3

EDISON STEEL COMPANY

FUNCTIONAL SCOPE OF THE SYSTEM

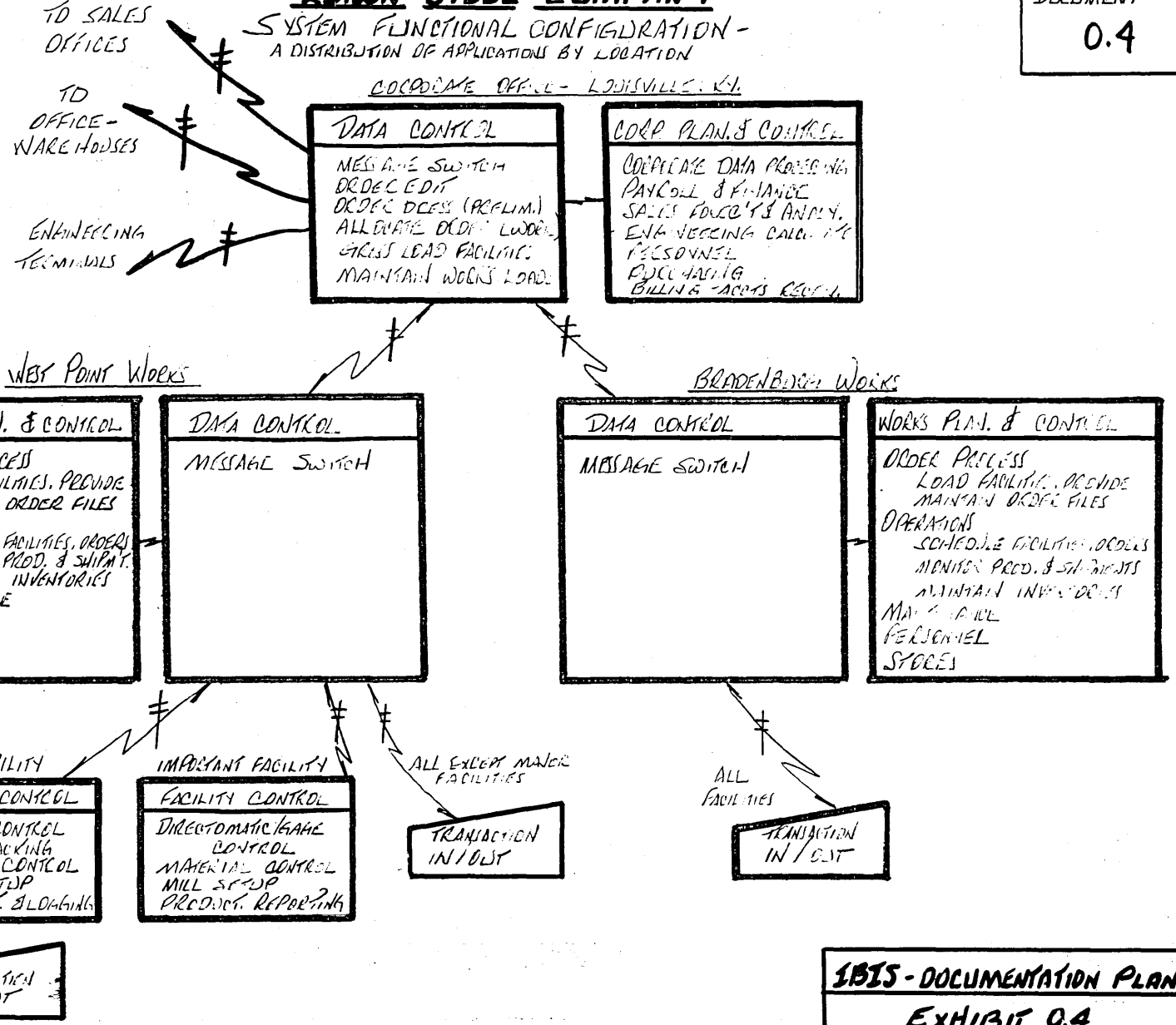
SUBSYSTEM / MAJOR FUNCTION / BUSINESS DEPARTMENT	1 COMMUNIC.			2 ORDER PROCESSING				3 OPERATIONS						4 SALES		5 INVENTORY			6 FINANCE			7 MAINTENANCE			8 PURCHASING				9 STORES		10 PERSONNEL			11 ENGINEER.		12 CORPORATE MANAGEM'T	
	MESSAGE SWITCH	INQUIRY	CALCULATIONS	PROVIDE	ORDER SCHED.	FACILITY LOAD	STOCK ALLOCATE	PRODUCT. PLAN	PROD. CONTROL	MFG. CONTROL	MATERIAL CONT.	QUALITY CONT.	ARRIVES CONT.	FORECAST.	ANALYSIS	ALLOCATE	CONTROL	REORDER	COST ACCOUNT.	PERFORM. ANAL.	BILLING	SCHEDULING	EQUIPT. USE	EQUIPT. COSTS	PURCHASES	ACCTS. PAYABLE	RECEIVING	VENDOR RATING	INVENTORY CONT.	COST DISTRIB.	PERSONNEL REC.	DAY RECORDS	SKILLS	CALCULATIONS	TIME SHARE	PROFIT-LOSS	BUSINESS CONT.	SHARE HOLDERS
WEST POINT WORKS																																					
RAW MATERIALS																			X	X		X	X	X	X	X	X		X	X	X	X	X			X	
COKE																			X	X		X	X	X	X	X	X		X	X	X	X	X			X	
BLAST FURNACE																			X	X		X	X	X	X	X	X		X	X	X	X	X			X	
STEELMAKING		X		X	X	X		X	X	X	X	X	X						X	X		X	X	X	X	X	X	X	X	X	X	X	X			X	
PRIMARY ROLLING		X		X	X	X	X	X	X	X	X	X							X	X		X	X	X	X	X	X	X	X	X	X	X	X			X	
HOT STRIP		X		X	X	X	X	X	X	X	X	X	X						X	X		X	X	X	X	X	X	X	X	X	X	X	X			X	
PLATE		X		X	X	X	X	X	X	X	X	X							X	X		X	X	X	X	X	X	X	X	X	X	X	X			X	
COLD REDUCTION		X		X	X	X	X	X	X	X	X	X	X						X	X		X	X	X	X	X	X	X	X	X	X	X	X			X	
COLD FINISHING		X		X	X	X	X	X	X	X	X	X	X						X	X		X	X	X	X	X	X	X	X	X	X	X	X			X	
TIN FINISHING		X		X	X	X	X	X	X	X	X	X							X	X		X	X	X	X	X	X	X	X	X	X	X	X			X	
ROLL SHOPS								X											X	X		X	X	X	X	X	X	X	X	X	X	X	X			X	
METALLURGICAL	X	X	X																						X	X	X		X	X	X	X	X	X			X	
TRANSPORTATION		X																	X	X		X	X	X	X	X	X		X	X	X	X	X			X	
PLANT ENGINEER.		X	X																X	X					X	X	X		X	X	X	X	X	X	X	X	
ACCOUNTING		X																	X						X	X	X		X	X	X	X	X	X	X	X	
PRODUCTION PLANNING	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X						X	X	X	X	X	X	X	X	X	X	X	X	
INFORMATION SYSTEMS		X	X																X						X	X	X		X	X	X	X	X	X	X		
INDUSTRIAL RELATIONS	X	X																	X						X	X	X		X	X	X	X	X				
INDUSTRIAL ENGINEER.			X																X						X	X	X		X	X	X	X	X	X	X		
WORKS MANAGEMENT		X												X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X	X	

EXHIBIT 0.3

EDISON STEEL COMPANY

SYSTEM FUNCTIONAL CONFIGURATION -
A DISTRIBUTION OF APPLICATIONS BY LOCATION

DOCUMENT 0.4



IBIS - DOCUMENTATION PLAN

EXHIBIT 0.4

DOCUMENT
0.5

EDISON STEEL COMPANY

LOCATIONS OF WORKS, WAREHOUSES & SALES OFFICES

BREMERTON - S.O.

DETROIT - S.O.

NEW YORK - S.O./WHSE

COLUMBUS - S.O.

GARY - W/S.O.

CHARLESTON - S.O.

LOUISVILLE - HDQTRS
WEST POINT - WKS/W
BRADENBURG - WKS/W.

ST. LOUIS - S.O.

CHARLOTTE - S.O.

NASHVILLE - S.O.

LITTLE ROCK - S.O.

ATLANTA - W/S.O.

NEW ORLEANS - S.O.

HOUSTON - W/S.O.

LEGEND

- HEADQUARTERS
- WAREHOUSE/WORKS OR WAREHOUSE/SALES OFFICE
- SALES OFFICE

SCALE IN MILES
0 100 200 300

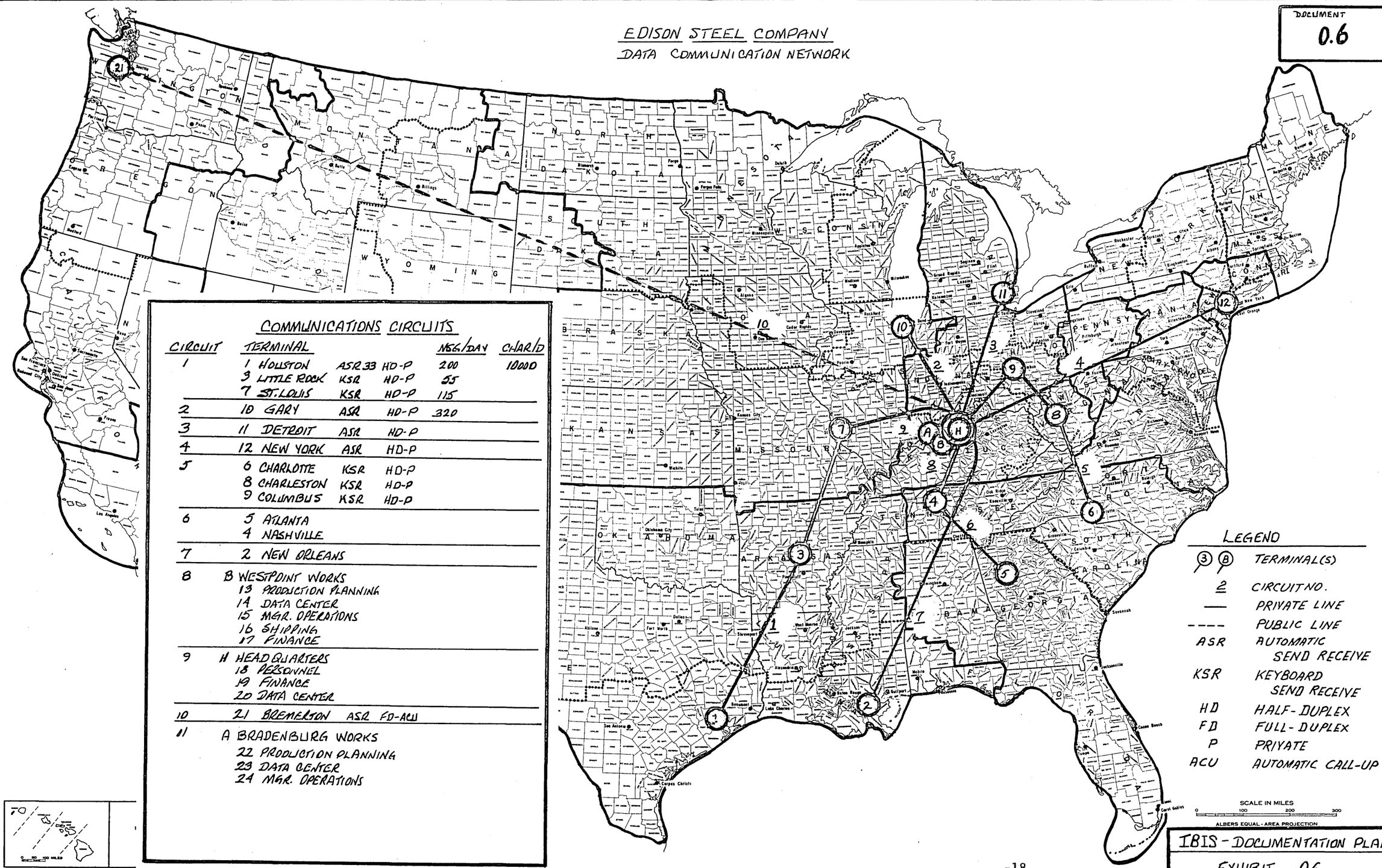
ALBERS EQUAL-AREA PROJECTION

IBIS - DOCUMENTATION PLAN
EXHIBIT 0.5

County boundaries as of April 1, 1960

DOCUMENT
0.6

EDISON STEEL COMPANY
DATA COMMUNICATION NETWORK



COMMUNICATIONS CIRCUITS

CIRCUIT	TERMINAL			NSG./DAY	CHAR/D
1	1 HOUSTON	ASR 33	HD-P	200	10000
	3 LITTLE ROCK	KSR	HD-P	55	
	7 ST. LOUIS	KSR	HD-P	115	
2	10 GARY	ASR	HD-P	320	
3	11 DETROIT	ASR	HD-P		
4	12 NEW YORK	ASR	HD-P		
5	6 CHARLOTTE	KSR	HD-P		
	8 CHARLESTON	KSR	HD-P		
	9 COLUMBUS	KSR	HD-P		
6	5 ATLANTA				
	4 NASHVILLE				
7	2 NEW ORLEANS				
8	B WESTPOINT WORKS				
	13 PRODUCTION PLANNING				
	14 DATA CENTER				
	15 MGR. OPERATIONS				
	16 SHIPPING				
	17 FINANCE				
9	H HEADQUARTERS				
	18 PERSONNEL				
	19 FINANCE				
	20 DATA CENTER				
10	21 BREMERTON	ASR	FD-ACU		
11	A BRADENBURG WORKS				
	22 PRODUCTION PLANNING				
	23 DATA CENTER				
	24 MGR. OPERATIONS				

LEGEND

③ Ⓑ	TERMINAL(S)
2	CIRCUIT NO.
——	PRIVATE LINE
----	PUBLIC LINE
ASR	AUTOMATIC SEND RECEIVE
KSR	KEYBOARD SEND RECEIVE
HD	HALF-DUPLEX
FD	FULL-DUPLEX
P	PRIVATE
ACU	AUTOMATIC CALL-UP

SCALE IN MILES
0 100 200 300
ALBERS EQUAL-AREA PROJECTION

DEPARTMENT OF COMMERCE
County boundaries as of April 1, 1960

IBIS - DOCUMENTATION PLAN
EXHIBIT 0.6

SUMMARY LEVELS

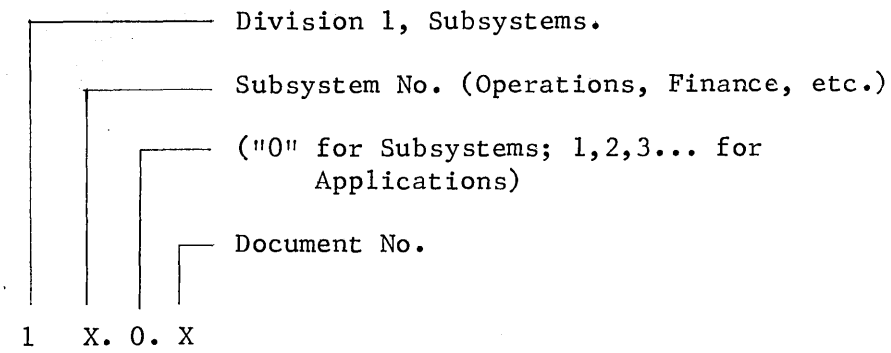
- SYSTEM OVERVIEW
- SUBSYSTEMS
- APPLICATIONS

SUBSYSTEMS

A Subsystem is a group of related applications that perform a major service for the business. The grouping can be as extensive or as restricted as the designer may require. Generally, a Subsystem is approximately equal to a major function of the business, Sales, Purchasing, etc.

The documentation of the Subsystem includes a general description, a general chart or diagram, a listing of the Applications included in the Subsystem, and an index to the contained documents, Figure 4. This level of documentation serves as the master index for the Applications that are included in the Subsystem.

Documents in this division are numbered and indexed, as follows:



General Description

Narrative description summarizes the subsystem design, its scope, objectives and characteristics. Specific features are described. The applications in the subsystem are specified and briefly described. A sample is shown, Exhibit 1.1.

General Chart(s)

The general chart is a diagram summary of related applications. It shows the major inputs and outputs for the group of Applications. Its purpose is to orient and summarize for the reader the logic of the applications in the subsystem, Exhibit 1.2.

Subsystem Index

The Subsystem Index is a detailed table of all contained Subsystem documentation. It shows, by Application, each procedure, program and files used. A form illustrates content, Exhibit 1.3.

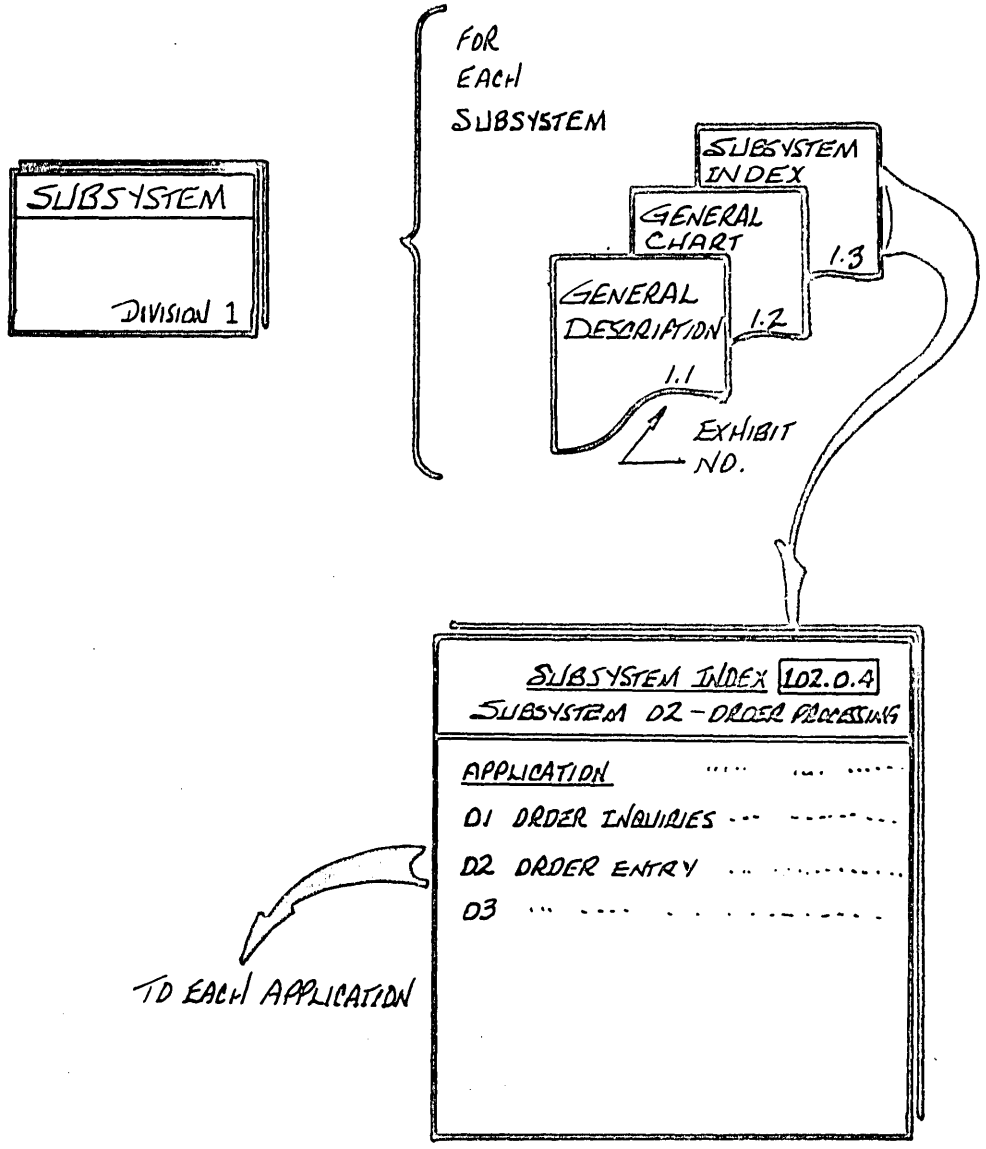


FIGURE 4 - SUBSYSTEM DOCUMENTATION

EDISON STEEL COMPANY

GENERAL DESCRIPTION - SUBSYSTEM 06

DOCUMENT
106.0.1

FINANCE

The Finance Subsystem monitors costs, audits financial transactions, maintains financial records and handles external dollars transactions. It receives information from Operations, Inventory, and Personnel Subsystems. It supplies information principally to Operations, Sales, Personnel and Management Subsystems.

Operations is the source of most Finance information. Shop operations generate order processing transactions, order shipments and manpower time reports. Finance analyzes the data and provides cost statements and performance analyses. Shipped orders initiate the billing and accounts receivable cycles.

The Inventory Subsystem provides periodic information on transactions and inventory levels. Finance evaluates stored product and monitors the committed funds.

The Personnel Subsystem maintains employee records including payroll data. Finance uses these records for payroll calculations. It writes the checks, analyzes the distribution of funds and returns employee records to the Personnel Subsystem.

Sales, as well as other operating components, receives periodic analyses on product costs.

--- etc. ---

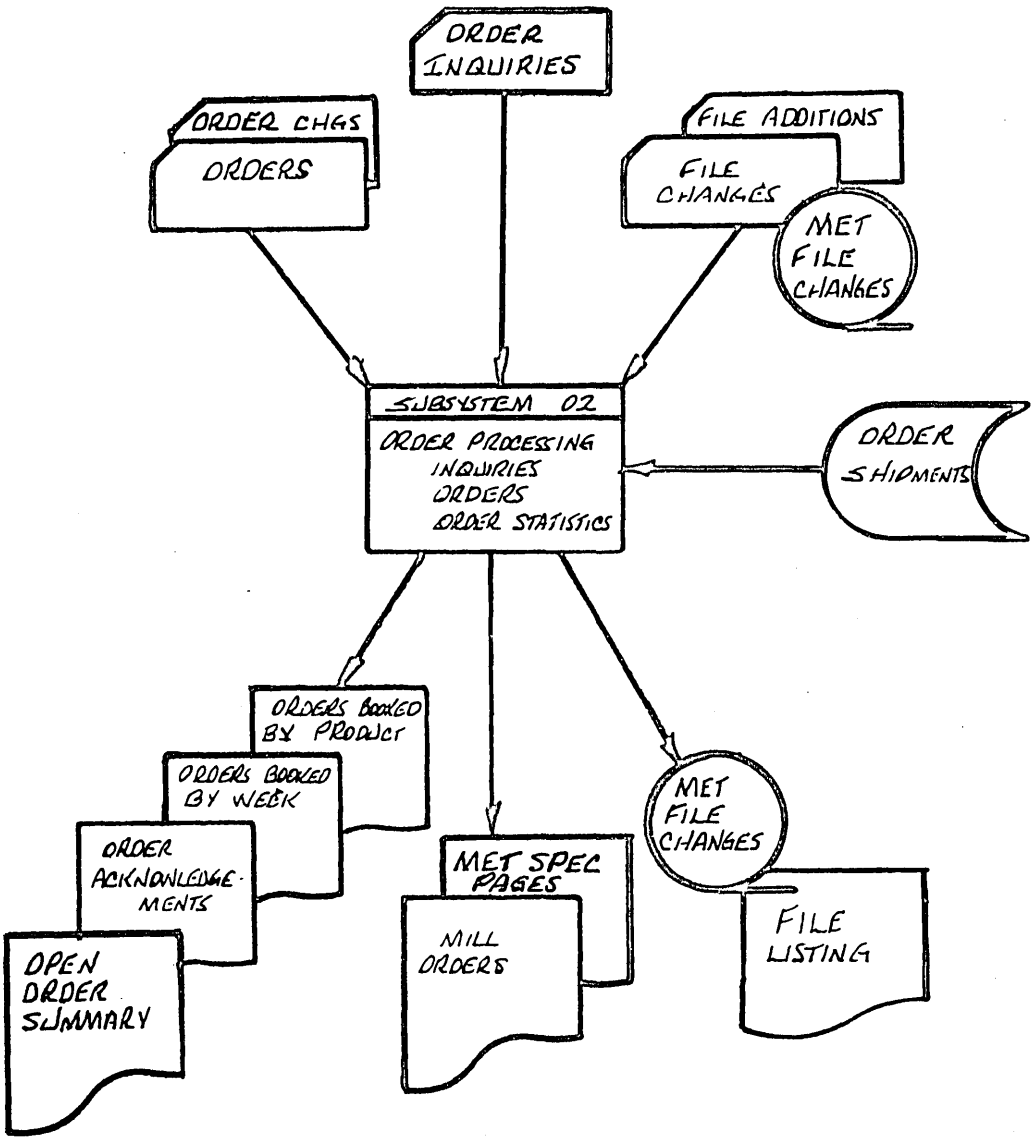
IBIS-DOCUMENTATION PLAN
EXHIBIT 1.1

DOCUMENT
102.02

EDISON STEEL COMPANY

GENERAL CHART - SUBSYSTEM 02

ORDER PROCESSING



IBIS-DOCUMENTATION PLAN
EXHIBIT 1.2

EDISON STEEL COMPANY

DOCUMENT
102.0.3

SUBSYSTEM INDEX

SUBSYSTEM 02 - ORDER PROCESSING

APPLICATION		OPERATING PROCEDURES	PROGRAMS	FILES USED
01	Order Inquiries	302.01.01	5027	6100
		02	5028	6102
		03	5014	6103
		04		6104
		05		6105
02	Order Entry	302.02.01	5002	6011 6008
		02	5003	6012 6016
		03	5004	6013 6025
		04	5005	6014 6026
		05	5006	6015 6027
		06	5007	6017
		07	5008	6018
			5009	
03			5045	6008
			5046	6010
			5047	
			5048	

— ETC. —

IBIS - DOCUMENTATION PLAN
EXHIBIT 1.3

SUMMARY LEVELS

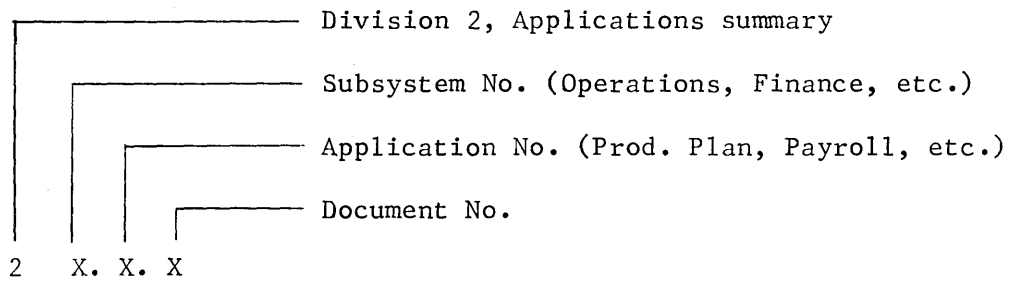
- SYSTEM OVERVIEW
- SUBSYSTEMS
- APPLICATIONS

APPLICATIONS

Applications are the working level of design documentation. Applications consist of one or more computer programs and the associated manual operating procedures and instructions. Both programs and related procedures perform a specific service for the business. In the document indexing plan, applications summary documents are assigned to a subsystem. For example, Payroll (Application 08) is assigned to the Finance subsystem (Subsystem 06).

Applications summary documentation includes a general description, a general chart or diagram, an application summary diagram and a program list. They form Division 2 in the total documentation plan. The major index for the set is the Application Summary diagram. It relates all applications program software, procedures, instructions, and data files. Applications summary documentation is illustrated, Figure 5.

Applications summary documents are indexed according to the following plan:



General Applications Description

The application description is a written summary of the application. It is the working level description which combines features of both generality and detail. It becomes, with the diagrams, a point of reference to answer questions of applicability of a design to other users. It describes to the reader the nature of the problem being solved, Exhibit 2.1.

General Chart

The general chart is a diagram summary of an application. It shows major inputs and outputs for the group of programs. Its purpose is to orient and summarize for the new reader, the essence of finer detail to follow, Exhibit 2.2.

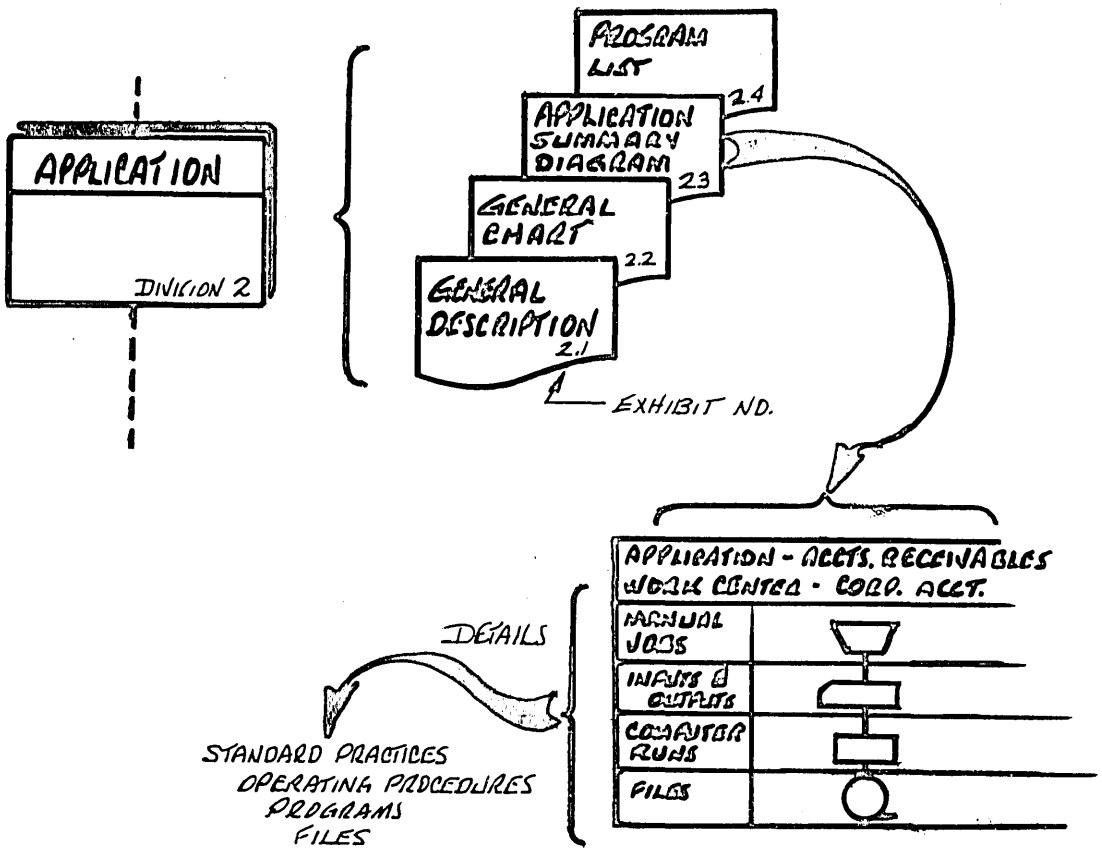


FIGURE 5- APPLICATIONS SUMMARY DOCUMENTATION

EDISON STEEL COMPANY	DOC. DIVISION	AP REFERENCE	SECTION	PAGE NUMBER
	APPLICATIONS	202.02	1	1
		SUPERSEDES ISSUE DATED	EFFECTIVE DATE OF THIS ISSUE	
TITLE: ORDER PROCESSING		XX/XX/XX	XX/XX/XX	
SUBJECT: ORDER ENTRY		WRITTEN BY: PDF	APPROVED BY: ABC	AUTHORIZATION BY: XYZ

GENERAL DESCRIPTION

The Order Entry Application consists of six programs. They enter new orders, process order inquiries and order changes and maintain customer and order files.

New orders (Program 5002) are processed manually, key punched and read as a batch. Batches can be once per day, twice per day, or as desired. New order batches may be combined with order changes (Program 5003). All cards for one order are read into the system at a time. Order data are verified for data content and the manufacturing operations are defined. Material requirements are developed; facilities are loaded and stock applied. Orders are either accepted (i.e. processing completed) or rejected. Rejected orders are listed on the console typer along with the reason rejected.

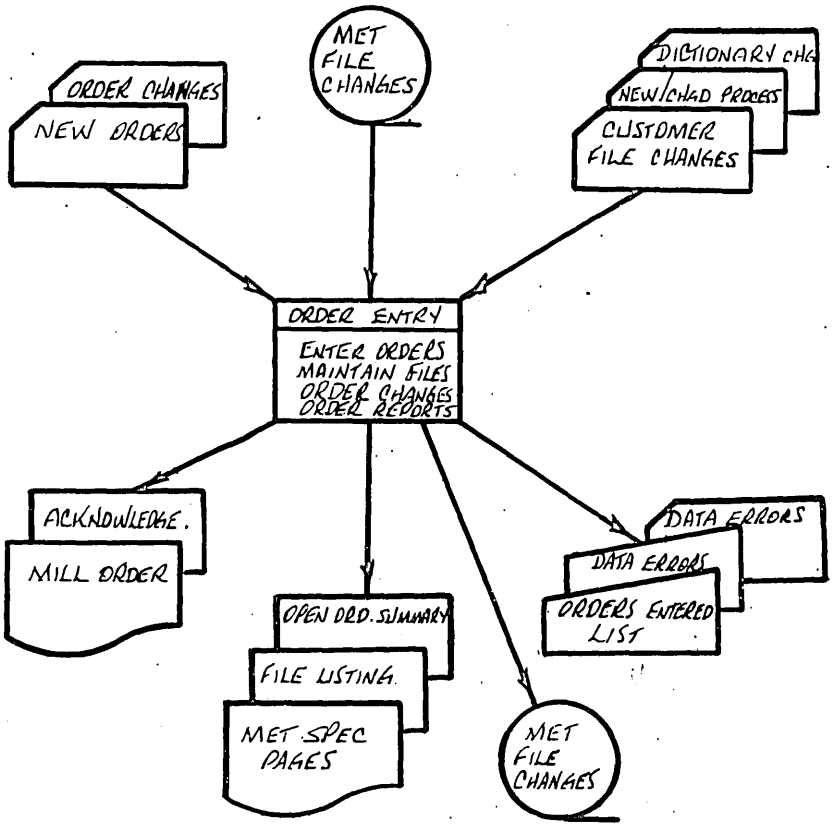
Inquiries (Program 5001) are "trial" orders. That is, each aspect of the new order program is carried out except that stock is not allocated, the facility load is not increased and an inquiry file is established. Inquiries either become orders within 24 hours or are cleared. Subsequent orders are matched, quoted price and delivery brought forward and the inquiry file cleared.

Each customer data file, ship-to file, process file or dictionary altered in New Orders (Program 5002) is identified ....

IBIS DOCUMENTATION PLAN
EXHIBIT 2.1

EDISON STEEL COMPANY	DOC. DIVISION: APPLICATIONS	AP REFERENCE: 202.02	SECTION: 2	PAGE NUMBER: 1
		SUPERSEDES ISSUE DATED: XX/XX/XX		EFFECTIVE DATE OF THIS ISSUE: YY/YY/YY
TITLE: ORDER PROCESSING		WRITTEN BY: GDF	APPROVED BY: ARC	AUTHORIZATION BY: XYZ
SUBJECT: ORDER ENTRY				

GENERAL CHART



IBIS-DOCUMENTATION PLAN
EXHIBIT 2.2

Application Summary Diagram

This high level run-to-run diagram is a graphic representation of the General Application Description. It identifies all of the individual programs (runs) within an application. It shows relationships among the programs from the standpoint of:

- Information flow
- Information storage media
- Common input/output
- Manual procedures which generate or use data from a program
- Organization or physical work centers involved

The diagram has a five-section format, Exhibit 2.3. Standard symbols are detailed, Appendix B. Each box or symbol used is labeled with a reference number. Each number refers to the document containing the next level of finer detail. For example, manual procedure "Sales Dress" is detailed in document 302.02.01. Notes may also be added outside boxes using the annotation symbol. Diagram sections are:

- Work Center Section - Work or activity centers which contribute to or use system information are specified. Some applications may take place completely within one center; others, such as production control, bridge many centers. Standard Practice Instructions document work center activity.

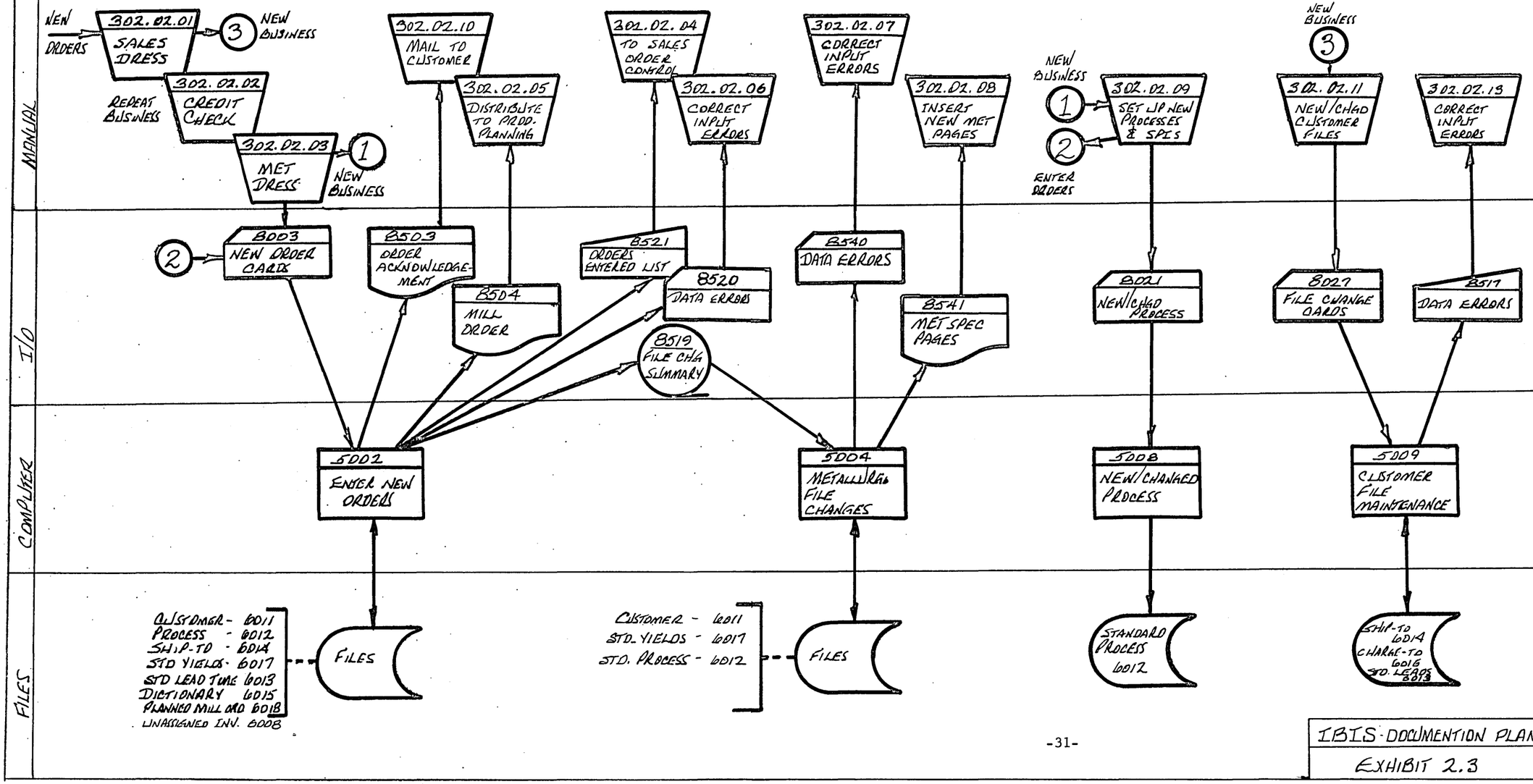
- Manual Jobs Section - Manual activities making use of system information or the preparation of information for the system are specified. Each manual Operating Procedure is referenced in the symbol. A brief statement of the procedure is made to illustrate the action taken by a person in the use of a system output. This action may produce a later system input.

- Input-Output Section - Each input and output (I/O) is shown and referenced to the next level of detail. In a tape-oriented application, this section will show media conversion. In an on-line application, inputs are on terminal devices; outputs are by typer, printer or displays.

- Computer Section - Computer actions and the referenced program or run are shown. A brief description of the program is used rather than the program name. Electronic accounting machine functions such as collating, sorting, etc., may also be shown here.

EDISON STEEL COMPANY	DOC. DIVISION: APPLICATION SUMMARY	AP REFERENCE: 202.02	SECTION: 3	PAGE NUMBER: 1 of 2
		SUPERSEDES ISSUE DATED: XX/XX/XX	EFFECTIVE DATE OF THIS ISSUE: YY/YY/YY	
TITLE: ORDER PROCESSING				
SUBJECT: ORDER ENTRY		WRITTEN BY: PKF	APPROVED BY: DEC	AUTHORIZATION BY: XYZ

APPLICATION SUMMARY DIAGRAM



IBIS-DOCUMENTION PLAN

EXHIBIT 2.3

- Files Section - Logical data files, tape, card or disc are shown and referenced to lower-level detail. The files may have been created as the result of another application. If so, reference is made to the creating application by a note to aid clarity if needed.

Program List

The Program List is a tabular index of each program in the application. It shows program running sequence, where applicable, as well as identifies inputs, formats, output formats and files used, Exhibit 2.4.

EDISON STEEL COMPANY	DOC. DIVISION: APPLICATIONS	AP REFERENCE: 202.02	SECTION: 4	PAGE NUMBER: 1
TITLE: ORDER PROCESSING		SUPERSEDES ISSUE DATED: XX/XX/XX		EFFECTIVE DATE OF THIS ISSUE: YY/YY/YY
SUBJECT: ORDER ENTRY		WRITTEN BY: GDF	APPROVED BY: ABC	AUTHORIZATION BY: XYZ

PROGRAM LIST

PROGRAM NO.	PROGRAM NAME	OPERATING PROCEDURE	INPUT NOS.	OUTPUT NOS.	FILES USED
5002	ENTER NEW ORDERS	302.02. 03 05 10	8003	8503 8520 8504 8521 8519	6011 6014 6008 6012 6017 6025 6013 6015 6026 6016 6018 6027
5003	ORDER CHANGES	15 16 17	8014	8526 8503 8504 8505	6011 6014 6012 6015 6013 6017
5004	MET FILE CHANGES	01	8519	8540 8541	6011 6017 6012
5005	OPEN ORDER SUMMARY	21	8063		
5006	FILE LISTING	12 13	8021		
5007	DICTIONARY CHGS	14	8022	— ETC —	
5008	NEW/CHANGED PROCESS	09	8021		
5009	CUSTOMER FILE MAINTENANCE	11	8027		

IBIS-DOCUMENTATION PLAN
EXHIBIT 2.4

DETAIL LEVELS

- OPERATING PROCEDURES
- STANDARD PRACTICE INSTRUCTIONS
- APPLICATION PROGRAMS
- FILES
- OPERATING SYSTEMS PROGRAMS
- FORMS AND FORMATS

OPERATING PROCEDURES

Operating Procedures are the manual actions and decisions which constitute a major part of every integrated business system. They represent the non-programmed part of the information loop. All human decision-making and the handling of non-standard business events are included here.

These manual actions (1) either use information from the computerized portion of the information loop, (2) originate information to be entered into the computer, or (3) process information by another manual activity. Documents in this detailed level of information are precisely related to programs, program inputs and outputs and to physical work centers, Figure 6.

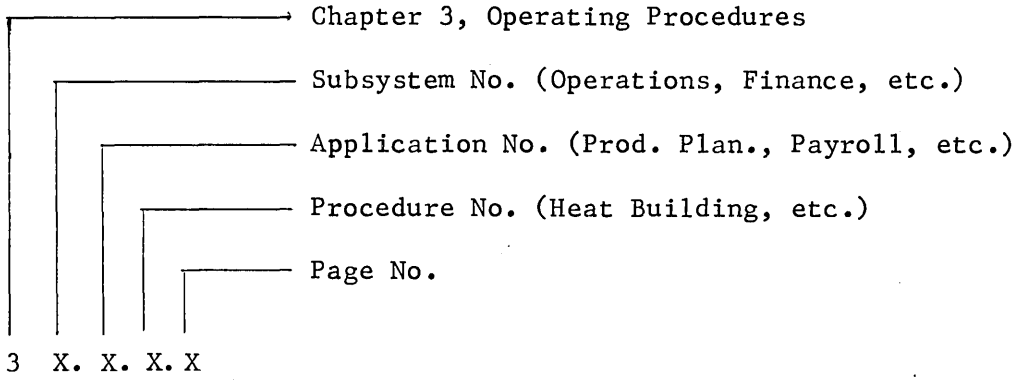
Key documents in the figure are the Subsystem Diagram, Exhibit 0.2, and the Application Summary Diagram, Exhibit 2.3. Each application indexed on the Subsystem Diagram is expanded on an Application Summary Diagram. Manual job "X" provides the information for another manual job (Operating Procedure) "Y". This procedure involves the set up of a facility through Standard Practice "10". A system input, "C", terminates the manual procedure.

Input C initiates program "A" which uses file "F" and outputs report "D". The report is used at a subsequent facility in operating procedure "Z".

Procedures, practices and programs will all be described in greater detail.

Operating Procedures are Division 3 in the documentation plan.

Procedures are organized by the natural business units, applications and subsystems. That is, Order Editing, a procedure, is part of order entry, an application. Order entry, in turn, is part of the Order Processing Subsystem. Indexing of procedures is as follows:



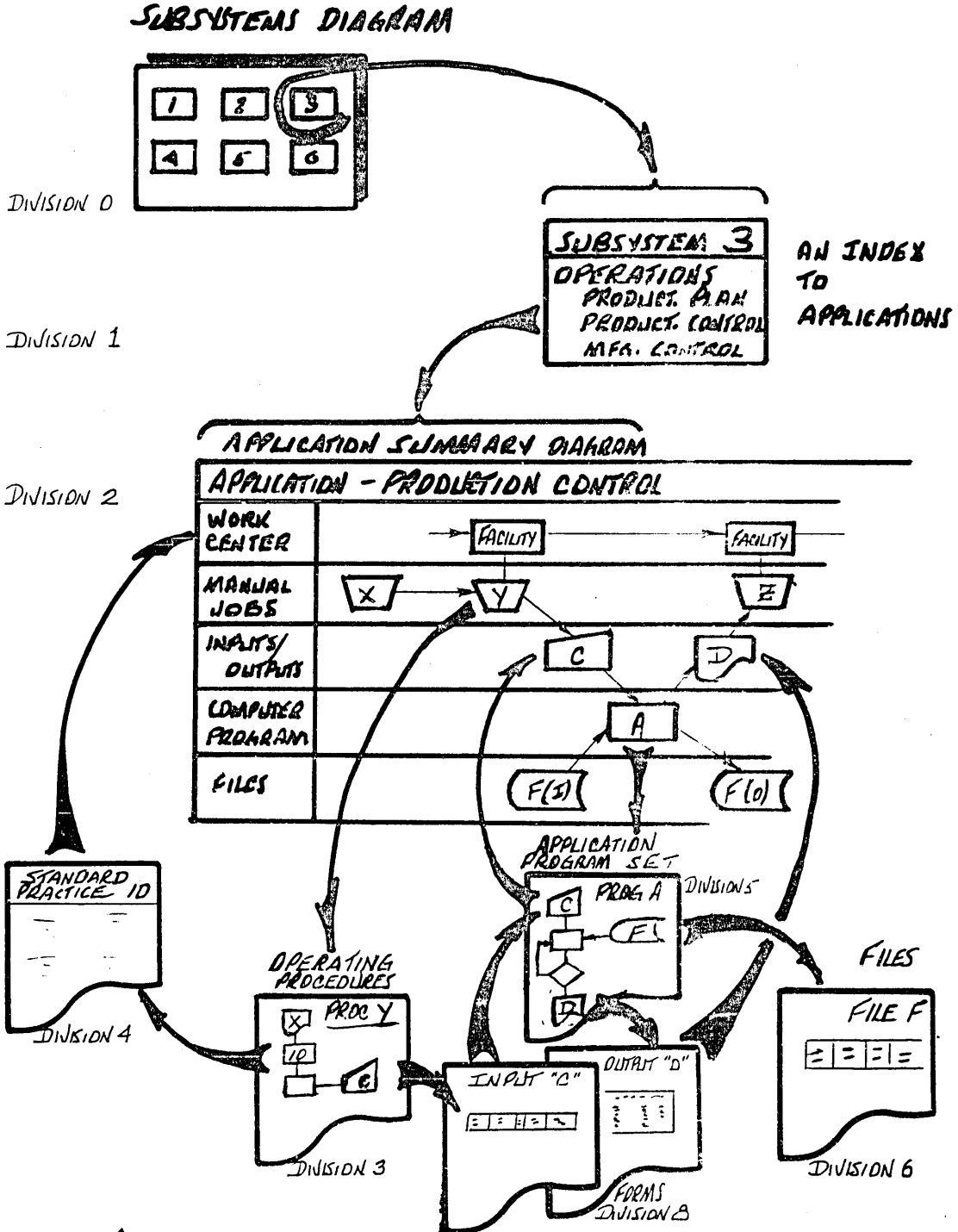


FIGURE 6 - RELATIONSHIPS OF KEY DOCUMENTS

Procedures, like programs, make reference to forms and reports. Forms and reports are analogous to input and output formats of programs. All forms and reports are catalogued and indexed in Division 8, Forms and Formats.

A list of typical Operating Procedures follows, Exhibit 3.1. Procedures are required in a business for manufacturing support as well as manufacturing areas. Typical support procedures are Credit Checking and Order Editing. Typical manufacturing procedures are Heat Building and Mold Drag Build-up. Mold Drag Build-up is illustrated, Exhibit 3.2.

Diagram conventions for the basic Operating Procedure include:

Inputs - Top, left.
Outputs - Bottom, right.
Show each action by flow and decision boxes.
Specify individual responsible for each action.
State, through notes, each action in detail.
Reference each input, output and Standard Practice used.

The example shows a melt shop schedule and mold list as inputs. Molds are selected according to a Standard Practice Instruction (SPI) and entered on a copy of the schedule. Eventually a crew selects the designated molds and enters the results into the system through a data terminal.

The format of this exhibit is familiar to programmers and analysts. Alternatives to the flowchart are possible, where required. The procedure may be stated as a decision table, Exhibit 3.3 or an illustrative cartoon, Exhibit 3.4. In each case, information content contains a purpose, gives a sequence of events, and makes reference to other information in the plan.

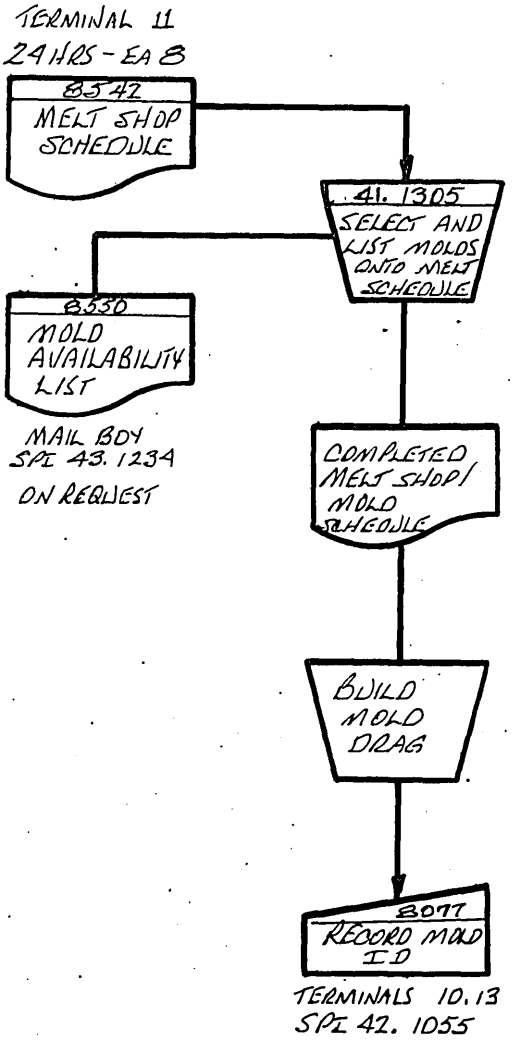
EDISON STEEL COMPANY	DOC. DIVISION: OPERATING PROCEDURE	D.P. REFERENCE: 300.00	SECTION: 1.	PAGE NUMBER: 1
		SUPERSEDES ISSUE DATED: XX/XX/XX	EFFECTIVE DATE OF THIS ISSUE: YY/YY/YY	
TITLE: OPERATING PROCEDURES		WRITTEN BY: CAOF	APPROVED BY: ABC	AUTHORIZATION BY: JCJ
SUBJECT: TABLE OF CONTENTS				

IBIS- DOCUMENTATION PLAN
EXHIBIT 3.1

EDISON STEEL COMPANY	DOC. DIVISION: OPERATING PROCEDURE	OP REFERENCE: 303.04	SECTION: 01	PAGE NUMBER: 1
		SUPERSEDES ISSUE DATED: XX/xx/xx	EFFECTIVE DATE OF THIS ISSUE: YY/yy/YY	
TITLE: OPERATIONS		WRITTEN BY: [illegible]	APPROVED BY: [illegible]	AUTHORIZATION BY: [illegible]
SUBJECT: MOLD DRAG				

MOLD DRAG BUILDUP

PURPOSE: TO ASSEMBLE A MOLD STRING FOR EACH SCHEDULED HEAT AND TO INFORM THE SYSTEM OF MOLD IDENTITIES SELECTED.



MOLD SCHEDULER

SELECT MOLDS FROM MOLD AVAILABILITY LIST PER SPI. ENTER MOLD NOS. ONTO MELT SCHEDULE BY HEAT.

MOLD SCHEDULER

DISTRIBUTE COMPLETED MELT SHOP/MOLD SCHEDULE TO BUILDUP CREW 8 HRS PRIOR TO START OF DRAGS

MOLD BUILDUP CREW

ASSEMBLE REQUIRED MOLDS ONTO BUGGIES BY DRAG; ONE DRAG PER HEAT.
REF SPI 41.1320

MOLD SHOP RECORDER

RECORD ON TERMINAL FOR EACH MOLD PLACED ON DRAG:-

- MELT SHOP SEQ. NO.
- TRAIN NO.
- POSITION ON TRAIN
- MOLD NO.

IBIS DOCUMENTATION PLAN
EXHIBIT 3.2

EDISON STEEL COMPANY	DOC. DIVISION: OPERATING PROCEDURES	OP REFERENCE: 302.02	SECTION: .06	PAGE NUMBER: 1
TITLE: ORDER PROCESSING		SUPERSEDES ISSUE DATED: XX/XX/XX		EFFECTIVE DATE OF THIS ISSUE: YY/YY/YY
SUBJECT: NEW ORDERS		WRITTEN BY: CDF	APPROVED BY: ABC	AUTHORIZATION BY: XYZ

DEVELOP PROCESS SEQUENCE

PURPOSE: TO DEVELOP THE PROCESSING SEQUENCE FOR HOT ROLLED COILS AND SHEETS FROM A DRESSED STATEMENT OF A SALES ORDER ITEM.

TABLE 100

–	FAC (1)	GO TO
–	HSM	110

TABLE 110

SPECIF-1	SPECIF-4	FAC (2)	GO TO
SHEET	> .187"	SHEAR	120
SHEET	≤ .187	–	130
COIL	–	–	140
–	–	–	ERROR

TABLE 120

SPECIF-2	SPECIF-3	FAC(3)	FAC(4)	FAC(5)	FAC(6)	GO TO
PKL	TRIM	LEVEL	RESHR	B-PKL	WASH	SHIP
NO PKL	TRIM	LEVEL	RESHR	–	–	SHIP
PKL	MILL E.	B-PKL	WASH	–	–	SHIP
NO PKL	MILL E.	–	–	–	–	SHIP

TABLE 130

SPECIF-2	SPECIF-3	FAC(2)	FAC(3)	FAC(4)	FAC(5)	GO TO
PKL	TRIM	C-PKL	SHEAR	LEVEL	RESHR	SHIP
NO PKL	TRIM	SHEAR	LEVEL	RESHR	–	SHIP
PKL	MILL E.	C-PKL	SHEAR	–	–	SHIP
NO PKL	MILL E.	SHEAR	–	–	–	SHIP

TABLE 140

SPECIF-2	SPECIF-3	FAC (2)	GO TO
PICKLE	–	CONT. PICKLE	SHIP
NO PICKLE	TRIM EDGE	TRIM	
NO PICKLE	MILL EDGE	–	
–			

– ETC – ETC – ETC –

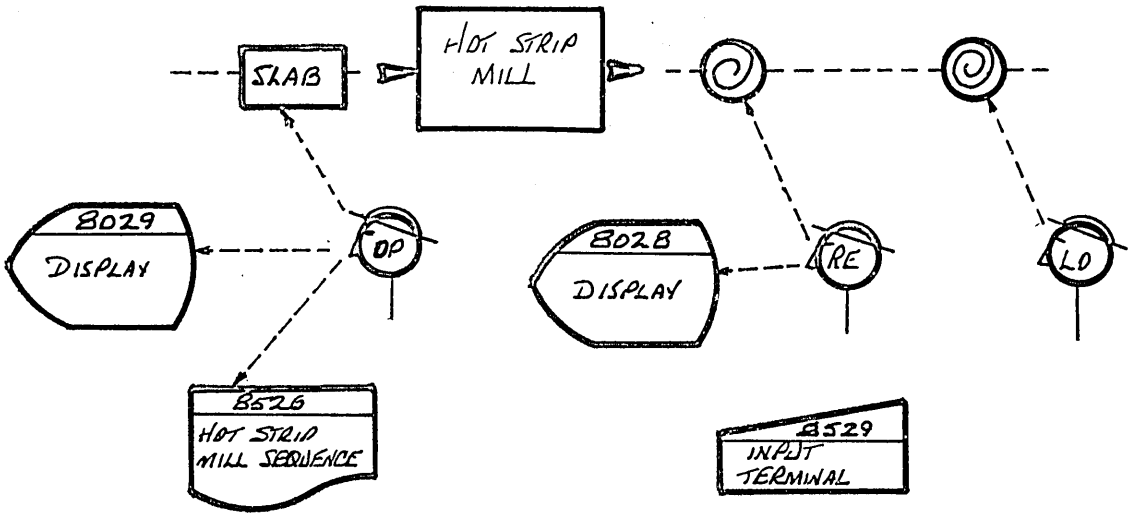
IBIS-DOCUMENTATION PLAN
EXHIBIT 3.3

OPERATING PROCEDURE
303.0503

EDISON STEEL COMPANY

ORDER TRACKING - HOT STRIP MILL

PURPOSE: TO TRACK UNITS OF STEEL THROUGH THE HOT STRIP MILL USING THE SYSTEM AS A SOURCE OF INFORMATION AND A RECEIVER OF ROLLING RESULTS



OP

FROM DP 303.0502 FACILITY OPERATOR OBSERVES NEXT SLAB ID ON DISPLAY AND COMPARES WITH SCHEDULE. HE ALSO OBSERVES AUTOMATIC MILL SETTINGS. SPI 41.1008.

IF SETTINGS NOT PROPER FOR SCHEDULED SLAB, HE SWITCHES MILL TO "MANUAL" AND FOLLOWS SPI 41.1010

IF DISPLAY AND SEQUENCE DISAGREE, USE INFORMATION FROM DISPLAY AND TAKE ACTION ACCORDING TO SPI 41.1011

RE

RECORDER NOTES COIL NO. AND LOCATION OF COIL BEING DISCHARGED ON DISPLAY. HE MARKS COIL WITH NO. AND LOCATION.

HE ENTERS COIL NO. INTO TERMINAL PER SPI 42.1007

LD

LIFT OPERATOR MOVES COIL TO LOCATION DESIGNATED ON COIL.

IBIS-DOCUMENTATION PLAN
EXHIBIT 3.4

DETAIL LEVELS

- OPERATING PROCEDURES
- STANDARD PRACTICE INSTRUCTIONS
- APPLICATION PROGRAMS
- FILES
- OPERATING SYSTEMS PROGRAMS
- FORMS AND FORMATS

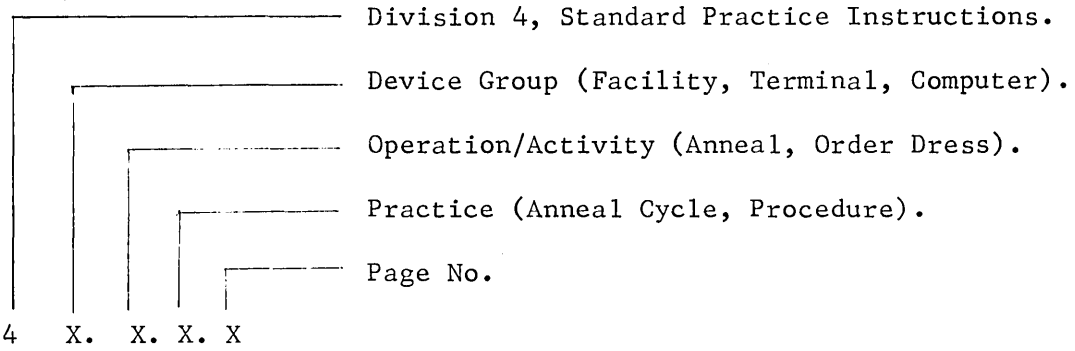
STANDARD PRACTICE INSTRUCTIONS

Standard Practice Instructions are Division 4 in the documentation plan. They are the recipes or "how-to" instructions for the operation of all production facilities, terminal devices, and for computer room conventions. In other industries, SPI's may be called "Manufacturing Practices", "Standard Procedures", etc.

On production facilities, SPI's organize and state in procedural language each of the manufacturing practices used. "New" business in the manufacturing works initiates the required new SPI's. All repeat business uses established SPI's in differing combinations to produce all products.

There are SPI's for the many annealing cycles, roll pass schedules, working temperatures and identification practices. An abbreviated example follows.

SPI's are organized by manufacturing operation in the production area, by terminal type in the terminal area and by job within work center in the computer area. The indexing of SPI's follows this plan:



Standard Practices (Facilities) are documented according to the following plan, Figure 7.

All operations are classified into a table of contents. For instance, annealing is an operation. For each operation chapter in the volume, an index or "grade list" references each annealing cycle with the associated product and hardness spec. Each annealing cycle indexed is described in detail.

Illustrated here is an abbreviated table of contents, Exhibit 4.1, showing 20 typical metals plant operations. Annealing operations are indexed with each product type, Exhibit 4.2. Given the product and hardness specification (among other facts), the proper annealing cycle can be selected. For example, bar product grade 207 with a BHN hardness spec of 197 requires cycle 50. Cycle 50 is detailed, Exhibit 4.3.

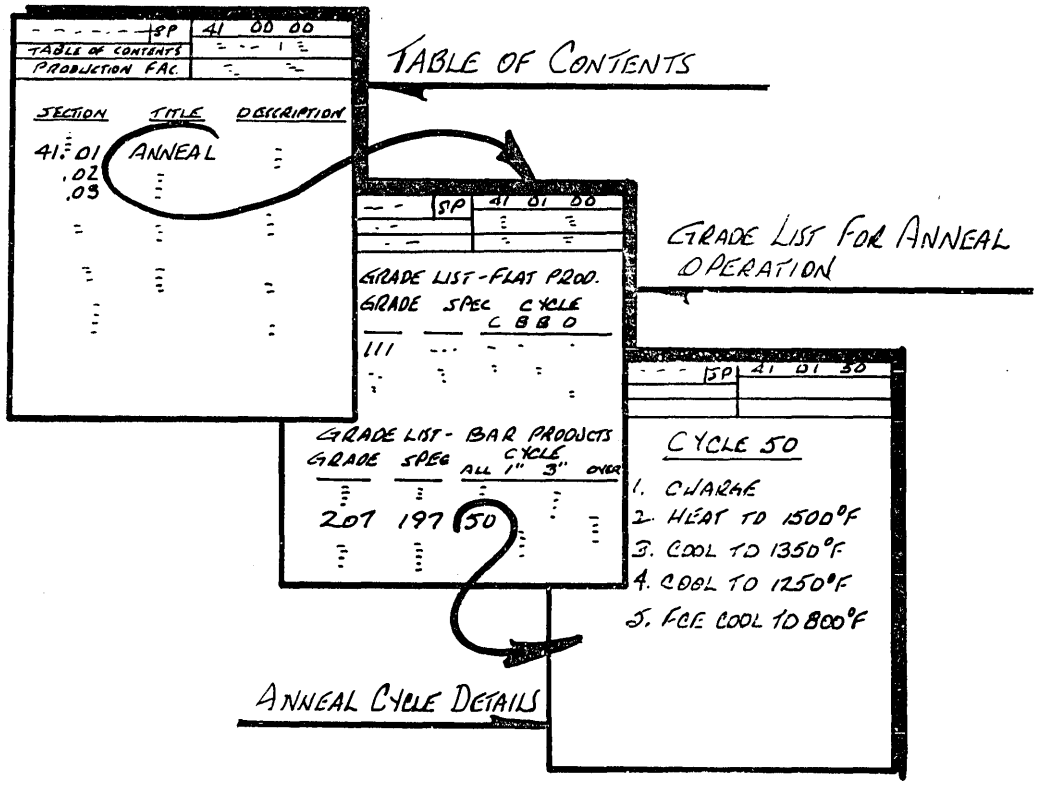


FIGURE 7 - STANDARD PRACTICE INSTRUCTION DOCUMENTATION

EDISON STEEL COMPANY	DDC. DIVISION: STANDARD PRACTICES	SPE REFERENCE: 41.00	SECTION: 00	PAGE NUMBER: 1
		SUPERSEDES ISSUE DATED: xx/xx/xx		EFFECTIVE DATE OF THIS ISSUE: yy/yy/yy
TITLE: PRODUCTION FACILITIES				
SUBJECT: TABLE OF CONTENTS		WRITTEN BY: PDF	APPROVED BY: ABC	AUTHORIZATION BY: XYZ

OPERATION	EXAMPLES
4. STANDARD PRACTICE INSTRUCTIONS	
1. PRODUCTION FACILITIES	
.01 Anneal	Subcritical, Full Soft, or Critical
.02 Cast	Ingot or Continuous
.03 Clean	Excl. Pickle or Condition
.04 Coat	
.05 Cold Work	Excl. Minor Yielding Operations
.06 Cool	
.07 Condition	Scarf, Blast, Pickle, Grind
.08 Cut	Shear, Slit
.09 Finish	Grind, Turn, Temper Roll
.10 Hot Work	Roll, Press, Forge
.11 Heat Treat	Except Anneal
.12 Inspect	Vis, Dim (See Tests)
.13 Melt	BOF, OH. Elec.
.14 Mold Prep.	
.15 Material Handle	Incl. Slab Yard; Coil Yard
.16 Package	
.17 Ship	
.18 Straighten	Flatten, Stretch, Bump, Roll
.19 Strip	Ingot
.20 Test	Mill, Lab, Sample, Analyze

IBIS-DOCUMENTATION PLAN
EXHIBIT 4.1

EDISON STEEL COMPANY	DOC. DIVISION: STANDARD PRACTICES	SPI REFERENCE: 41.01	SECTION: 00	PAGE NUMBER: 1
TITLE: PRODUCTION FACILITIES		SUPERSEDES ISSUE DATED: XX/XX/XX	EFFECTIVE DATE OF THIS ISSUE: YY/YY/YY	
SUBJECT: ANNEAL		WRITTEN BY: [illegible]	APPROVED BY: [illegible]	AUTHORIZATION BY: JPR

GRADE LIST INDEX

FLAT ROLLED PRODUCTS

GRADE	HARDNESS (R_{30T})	CYCLE: CONT.	BOX (8STK)	BOX (1STK)	OPEN
111	42	10	20	30	40
116	40	10	20	30	40
155	44	14	21	31	41
165	42	14	21	31	41
170	44	16	22	32	42
171	42	16	22	32	42

— ETC —

BAR PRODUCTS

GRADE	HARDNESS (BHN)	CYCLE: ALL SIZES	TO 1"ϕ	TO 2½"ϕ	OVER 2½"ϕ
192	207		50	53	54
207	197	50			
208	197	51			
214	207		50	54	55
216	197	51			

— ETC —

IBIS - DOCUMENTATION PLAN
EXHIBIT 4.2

EDISON STEEL COMPANY	DOC. DIVISION STANDARD PRACTICES	SPI REFERENCE 41.01	SECTION 50	PAGE NUMBER 1
TITLE PRODUCTION FACILITIES		SUPERSEDES ISSUE DATED XX/XX/XX		EFFECTIVE DATE OF THIS ISSUE YY/YY/YY
SUBJECT ANNEAL		WRITTEN BY	APPROVED BY	AUTHORIZATION BY

CYCLE 50

PRACTICE CODE 50-OPEN ANNEAL 1500/3 HRS.

1. See Practice 41.01.91 For Furnace Atmosphere Control.
2. See Practice 41.01.90 For Furnace Operating Instructions.
3. Charge Load of Bars Into Any of the Open Anneal Furnaces Max. Load, 15,000 Lbs.
4. Heat Furnace to 1500° F. Equalize and Hold at 1500° ± 25° F For 3 Hrs.
5. Cool Furnace to 1350° F. Equalize and Hold at 1350° ± 25° F For 4 Hrs.
6. Cool Furnace to 1250° F. Equalize and Hold at 1250° ± 25° F For 3 Hrs.
7. Shut Off Fire and Furnace Cool to 800° F.
8. Pull Charge.

IBIS-DOCUMENTATION PLAN
EXHIBIT 4.3

Organization of SPI's in this fashion makes it possible to use stated practices for many products and to codify practices.

On terminals, SPI's are the instructions for operation of the device. Included are:

- Startup routine
- Shutdown routine
- Checkout
- Conditions for use
- Procedures for failures.

Specific message formats for input and output and their interpretation are included under each Application Program (Operating Instructions). Maintenance and wiring details are included under Hardware.

Format and content follows the examples in Standard Practices - (Facilities).

In the computer room, SPI's are suited to the description of conventions, such as:

- Programming
- Tape labeling
- Storage - Tapes, cards, programs
- Documentation
- Audit and control
- System load and start
- Fallback and restart.

Specific instructions for the running or request of a program are included under each Application Program (Operator Instructions). General considerations for the Operating System software are included under that heading.

Format and content follows the examples in Standard Practices - (Facilities).

DETAIL LEVELS

- OPERATING PROCEDURES
- STANDARD PRACTICE INSTRUCTIONS
- APPLICATION PROGRAMS
- FILES
- OPERATING SYSTEMS PROGRAMS
- FORMS AND FORMATS

APPLICATION PROGRAMS

Application programs are the third level of software. The first two levels of software are: (1) computer language such as COBOL, FORTRAN, MAP, GECOM, etc.; (2) operating system programs which generate and schedule the computer resources and include executive programs, monitors, etc.

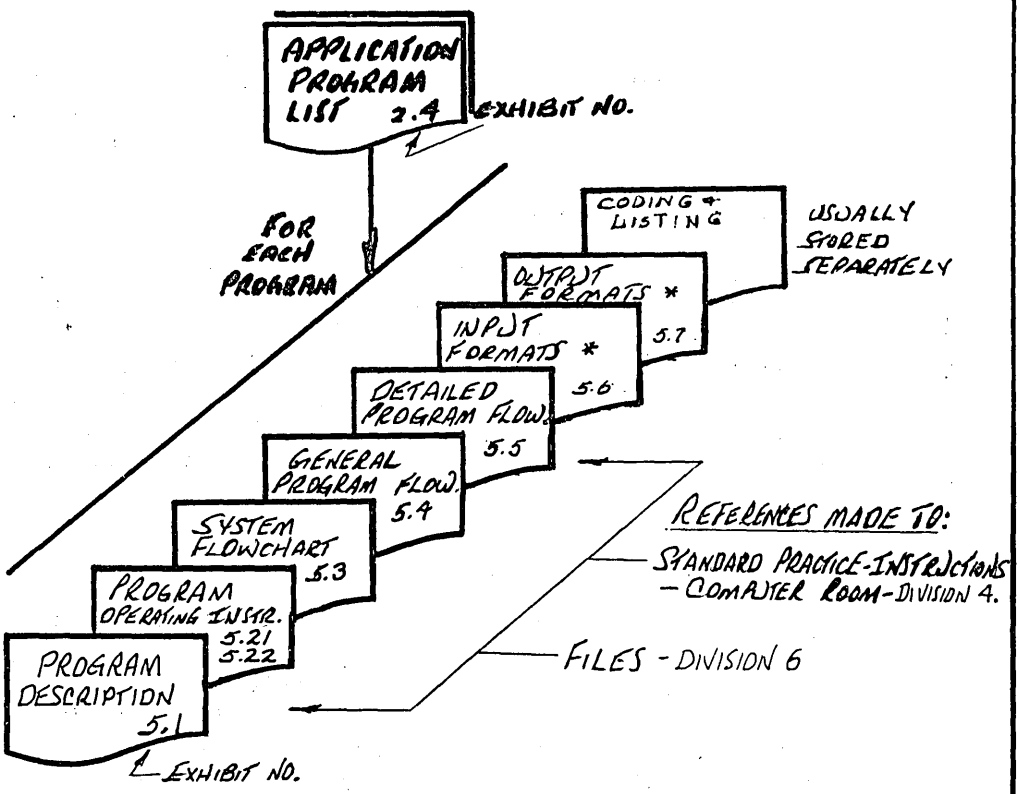
Application programs (runs) are Division 5 in the documentation plan. In a broad definition, Applications Programs include all of the business-oriented tactics and operating data which are internal to the information system. They encompass not only the logic of business operation but also the information sets present in the business. Information sets of data are the logical files and elements or fields of data. Collections of elements become data sets or records. Collections of similar records become files. When records are entered through an input device, they are called transactions.

This section will illustrate the desired programming documents and descriptions. Examples have been chosen to illustrate the information content desired at each level. For example, a System Flowchart summarizes a run or program, a General Program Flowchart states "what" is happening, and a Detailed Program Flowchart states "how" it is done.

Programs are documented in sets by program. Sets are assembled into applications and subsystems. Programs for each application are listed on a Program List, along with the associated inputs, outputs and file definitions, Exhibit 2.4. Documents within a program set consist of the following, Figure 8:

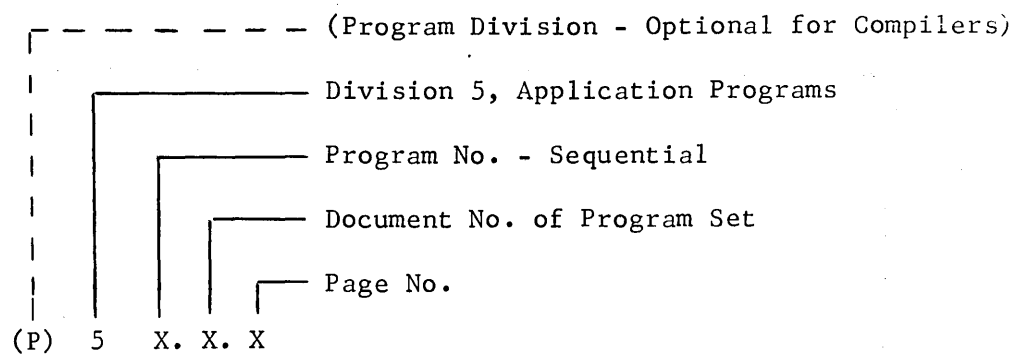
- Program description
- Operating instructions and error messages
- Flowcharts
- Input and output summaries
- Coding and listing

Application programs are indexed using reference coding. Whereas all previous documentation used interpretive coding containing readable intelligence, programs and subsequent documents use the more compact and non-interpretable reference numbering. Indexing is as follows:



* COMPLETE INPUT-OUTPUT DATA AND FORMATS ARE CONTAINED IN DIVISION 8.

FIGURE 8 - APPLICATION PROGRAM DOCUMENT SET



Each program set is numbered sequentially within the division; that is, 5001, 5002, etc. Not all compilers will accept this convention, however. Therefore, an optional "P" or other appropriate alphabetic character may be added to permit reference within the software system.

Program Description

A Program Description contains a narrative of each individual program. It outlines, in words, what is described in flowcharts. But, in addition, it provides the programmer, system designer and other interested personnel details of purpose and where the program relates to the whole system. Significant aspects of the data processing approach are explained. Special considerations for the program are described. For example, if an extra file is created on the last run of the month, (Exhibit 5.1).

Operating Instructions

Operating Instructions tell an operator how to set up this equipment, initiate settings, tapes to mount, cards to prepare, etc. They include console inputs to "call" programs as well as additional inputs required for the program after its "calling" or loading. Should problems arise in program execution, console or other device messages will be output. Error messages for each program and corrective actions are also listed.

Instructions are required for computer room and for remote locations. Computer room instructions will be for batch programs and on-line program "calls" or requests.

Each of three modes of program execution has similarities and some differences in detail. Common to the second generation, batch, computer utility is a Console Operator's Guide, Exhibit 5.21. This familiar document serves for the unscheduled and for the scheduled business system program.

EDISON STEEL COMPANY	DOC. DIVISION: APPLICATION PROGRAMS	AP REFERENCE: 5002	SECTION: 2	PAGE NUMBER: 1
TITLE: ENTER NEW ORDERS		SUPERSEDES ISSUE DATED: XX/XX/XX		EFFECTIVE DATE OF THIS ISSUE: XX/XX/XX
SUBJECT: PROGRAM DESCRIPTION		WRITTEN BY: PDF	APPROVED BY: ABC	AUTHORIZATION BY: XYZ

PURPOSE: To process new customer orders and add them to current order backlog preparatory to manufacture.

DESCRIPTION:

The Enter New Orders program reads cards containing mill order data and verifies that data. It establishes new files, prints Mill Work Tickets, and several console messages as well as punches cards to identify customer files changed during the run.

Cards are read and processed one mill order at a time. Since the loading of a mill order into a Mill Order File is the System's major source of operation and production control information, extensive data verification is performed. Verification includes character and field editing as well as validity checking of incoming codes and file references. For this reason, additions to the Special Instruction dictionary, a feature of the Enter New Orders program, are made prior to verification. New special instructions are entered into the Special Instruction dictionary for later use on this order and for other orders.

Data verification is accomplished during building of the mill order record in core storage. Basic files such as the Standard Process File, Ship-to File, and Customer-Product File and the four code dictionaries are brought into core storage as required. Mill orders that fail verification are by-passed. A console error message identifies the orders and each of the errors detected. The Dictionary Lookup Routine (DLU) is detailed in program 5910.

Each mill order loaded is analyzed to determine if it is for "new" or "repeat" business. Repeat business has had a customer-product record established on a previous order which pertains to this reorder. A product serial number on card 1 is required. Orders for new business require data from cards 2, 3, and possibly 4 to establish the new Customer-Product File record. New customer records are identified for later printing and are used in manual activities of repeat business checking during order entry. Each new or altered Customer-Product File is identified by a product serial number and a customer number punched onto a finder card.

The Customer-Product File accumulates the number of orders year-to-date and order weights for each customer's repeat business. In addition, these data provide a convenient means for file maintenance. Entering of date and weight data from this order completes the Customer-Product File transactions. . . .

IRLS-DOCUMENTATION PLAN
EXHIBIT 5.1

GE - 400 CONSOLE OPERATORS GUIDE

DOCUMENT 5002.2

Program Number 5002 Job Code IBIS Date Installed 4/22/XX

Program Title ENTER NEW ORDERS

Maintenance Programmer PDF Plant Extension x548 Home Phone 679-9046

Card Reader	Card Punch	Printer (2)	Disc Storage Units		
Yes (✓) No ( )	Yes (✓) No ( )	Yes (✓) No ( )	Unit Number	File Project	Indicate Discs Used By Program
Source: 8003 MET. SPECS. OP302.0203	Card Number: 8519 Label: FILE CHANGES Route To: 5003	Form Number: 042 (1) 040 (2) Copies: 3(1) 5(2) VFU Tape: Route To: PP-OP302.0205 S-OP302.0210	I		IDS

MAGNETIC TAPE FILES

IN	OUT	DRIVE	SAVE	LEAVE MOUNTED	FILE IDENTIFICATION	RETURN	EXTERNAL LABEL TITLE	TO NEXT PROGRAM
	✓	0	✓		8519-DATE TIME		FILE CHANGE SUMMARY	5003
		1						
		2						
		3						
		4						
		5						
		6						
		7						

Special Instructions

CF 256A

IBIS - DOCUMENTATION PLAN
EXHIBIT 5.21

For the on-line program call, no cards or tapes are specified. Program and data are already on disc. The man-computer interface may be a computer room or the shop. Abbreviated instructions in this case are illustrated, Exhibit 5.22.

Flowcharts

Flowcharts are a graphical representation of program logic. They are general for some uses or detailed for others. A program (run) summary is a System Flowchart. Program details are contained in (1) a General Program Flowchart or (2) a Detailed Program Flowchart. In selected instances, such as short, listing programs, maintenance of all levels might be considered superfluous. However, within a mix of large programs, programs which must be maintained by other than the original programmer, and in a system with a large number of programs, complete documentation is necessary.

All flowchart levels use the latest ASA flowcharting symbols. Several additional symbols have been added to permit specifications of automatic inputs and reference outputs, Appendix A.

System Flowcharts

System Flowcharts are the most general diagrammatic description of a program, Exhibit 5.3. They relate directly to the Application Summary Diagram, Exhibit 2.3. Only inputs, outputs and files are shown for a program.

In a conventional tape system, this is a simple run diagram. It is a commonly used level of detail, especially in the design phase of a system. Principal use in later documentation is in scanning programs to locate one of interest for more detailed review.

Inputs are at the top; outputs at the bottom. Files are to the right of the identified program. Standard symbols are set forth in Appendix A. Horizontal box stripes contain references to I/O document formats.

General Program Flowcharts

General Program Flowcharts are the broadest level of logic within the individual program. This chart is designed to answer the question, "What is happening?" within program logic. It conveys to the reader "what" must be done to the input data to produce the required output. As such, program logic must state explicitly all data used, the decisions and processing steps required. This level chart is not concerned with the "how" rules of programming logic dealing with, for example, setting of switches, checking for end-of-file, etc.

EDISON STEEL COMPANY	DOC. DIVISION: APPLICATION PROGRAMS	AP REFERENCE: 5021	SECTION: .2	PAGE NUMBER: 1
		SUPERSEDES ISSUE DATED: XX/XX/XX		EFFECTIVE DATE OF THIS ISSUE: YY/YY/YY
TITLE: HOT STRIP MILL SEQUENCE				
SUBJECT: PROGRAM OPERATING INSTRUCTIONS		WRITTEN BY	APPROVED BY	AUTHORIZATION BY

Purpose: To request a new hot strip mill sequence.

Valid Terminals: #18 Hot Mill Superintendent's Office.
#19 Hot Mill Production Office.

Terminal Operating Instructions: SPI 42.2817.

Program Operating Instructions:

1. Press "Inquiry Request" button.
2. Key in one of the following messages: INPUT 8119

   a. For a warmup sequence.
   17SSttWuffpppp

   b. For a continuation sequence, product type supplied
   17SSttCuffppppww

   c. For a continuation sequence, mill order supplied
   17SSttMunnnnnnnn

   where SS = Shift; any number, 01-21
   tt = Length of hours for sequence
   u = Unflag indicator; blank - no unflag
   any char. - unflag
   ff = Finish or texture; 01-07 for finish
   70-79 for texture
   pppp = Product type; each digit is a 0 or 1
   ww = Width in inches
   nnnnnnnn = A valid mill order number

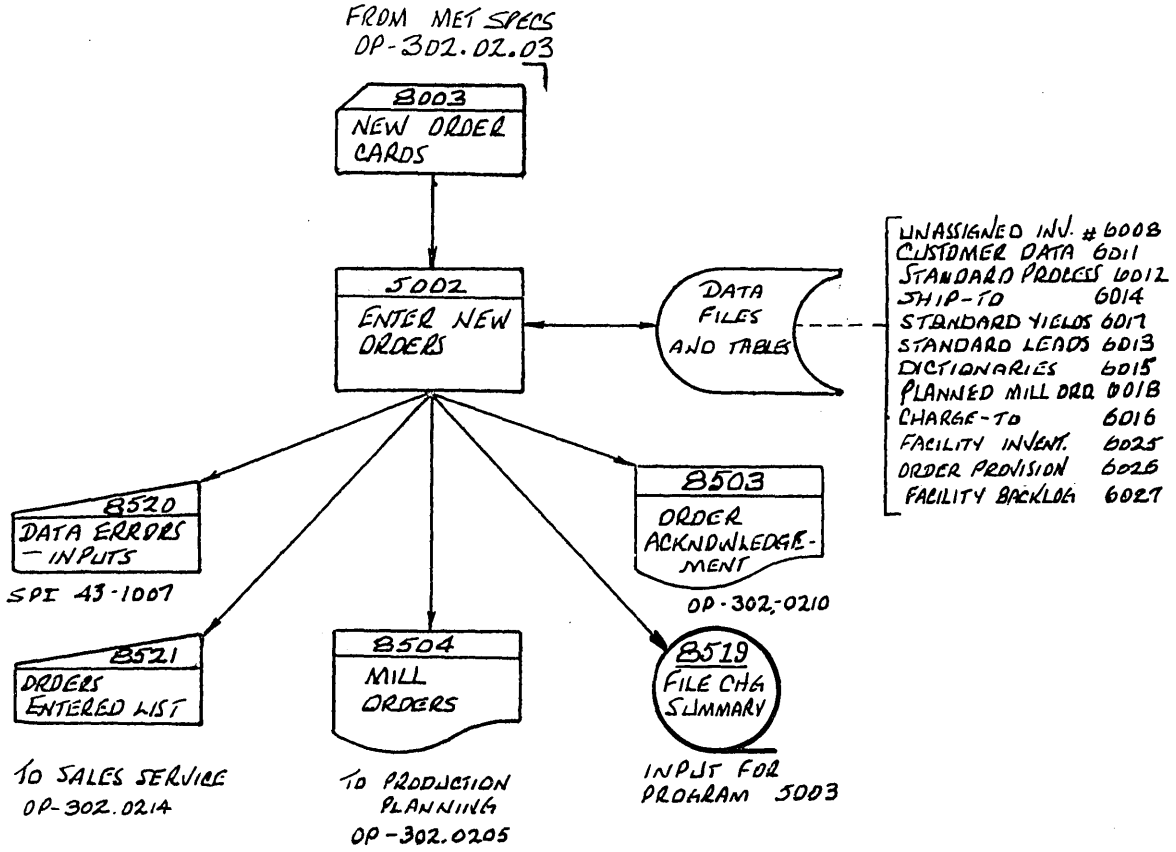
3. Press "Inquiry Release" button.
4. No further action is required.

Summary of Terminal Messages:

Message	Action
R INVALID MO NO	Check Mill Order Number and restart from 1.

IBIS-DOCUMENTATION PLAN
EXHIBIT 5.22

EDISON STEEL COMPANY	DDC. DIVISION: APPLICATION PROGRAMS	AP REFERENCE: 5002	SECTION: 3	PAGE NUMBER: 1
TITLE: ENTER NEW ORDERS		SUPERSEDES ISSUE DATED: xx/xx/xx		EFFECTIVE DATE OF THIS ISSUE: yy/yy/yy
SUBJECT: SYSTEM FLOWCHART		WRITTEN BY: DRF	APPROVED BY: ABC	AUTHORIZATION BY: XYZ



IRIS-DOCUMENTATION PLAN
EXHIBIT 5.3

This level of chart may also be shown as a decision table in appropriate cases. Here inputs, outputs and files will be shown with the main processing box containing a reference to the table. Exhibit 3.3, Operating Procedures, is an example of a decision table.

To illustrate the common form of the General Program Flowchart, a question is asked, "Is this new business?" - Exhibit 5.4. It remains for the next level of chart, the Detailed Program Flowchart, to expand on "how" new business is detected (see Detailed Program Flowcharts below).

This chart is generally the most detailed logic level possible without heavy hardware influence. General practice in documentation is to strive to place the logic of even large programs on one page. Vertical box stripes are used to indicate detailed routines. Notes can be used to clarify small details. Horizontal stripes are used to cross reference input or output formats.

Detailed Program Flowcharts

Detailed Program Flowcharts are the programmer's working document. They answer the question "How" the specified logic is accomplished within the hardware/software system. These charts graphically illustrate the sequence of logical and data manipulation operations of each program and how each is accomplished.

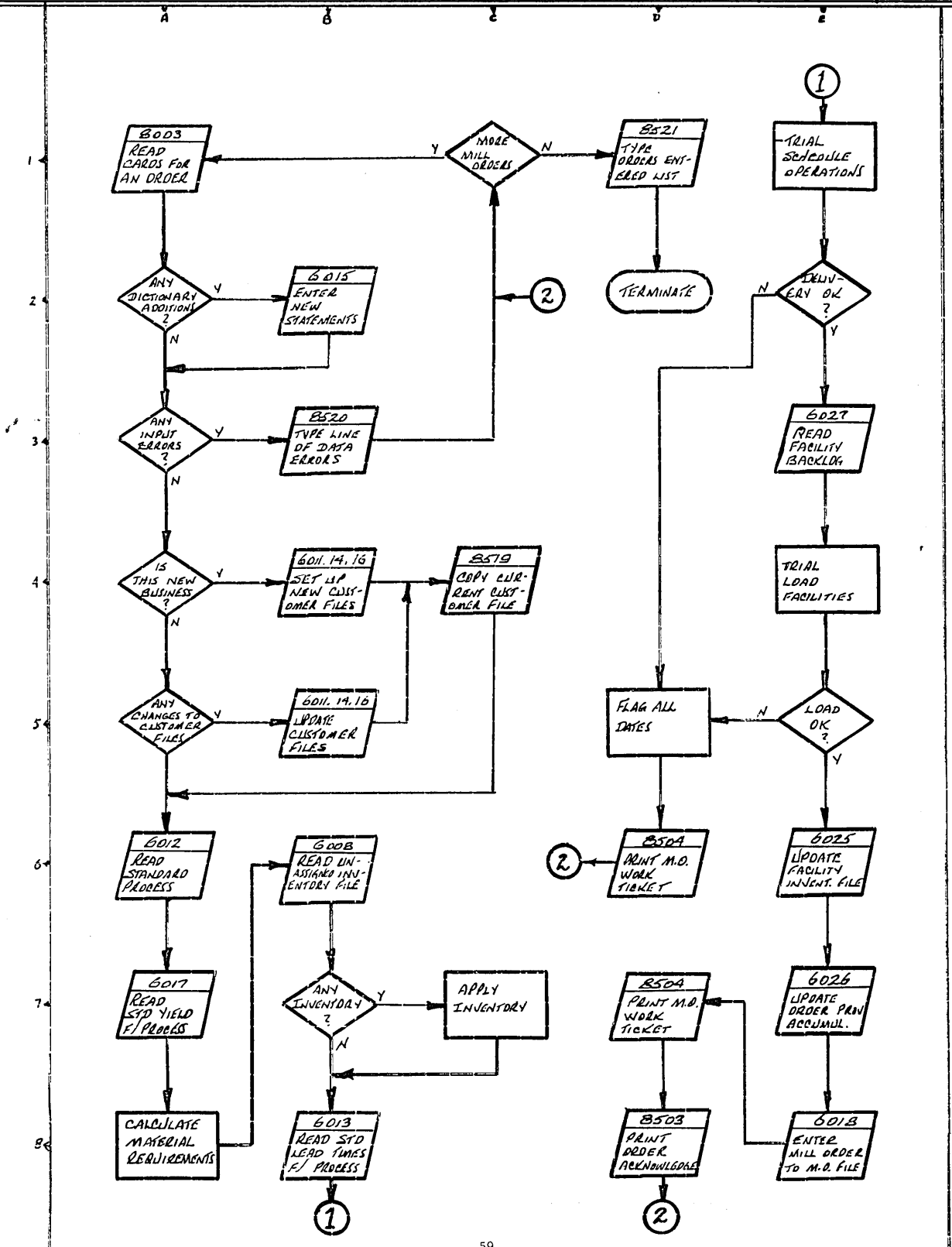
In the illustration, the "how" of determining new business is detected by a lack of a "product serial number" in card format No. 4, Exhibit 5.5. Detailed charts reference subroutines by box striping. In most cases, this flowchart level is detailed enough for coding. In certain programs, an additional level of detail may be required.

A page at this level may contain only a routine specified by a striped box at the general level. All names of routines, input/output formats, files, etc. of one level are to be cross referenced to the other program flowchart levels and to program listing. Notes are to be used as required. Standard flowcharting symbols are used, Appendix A.

Inputs and Outputs

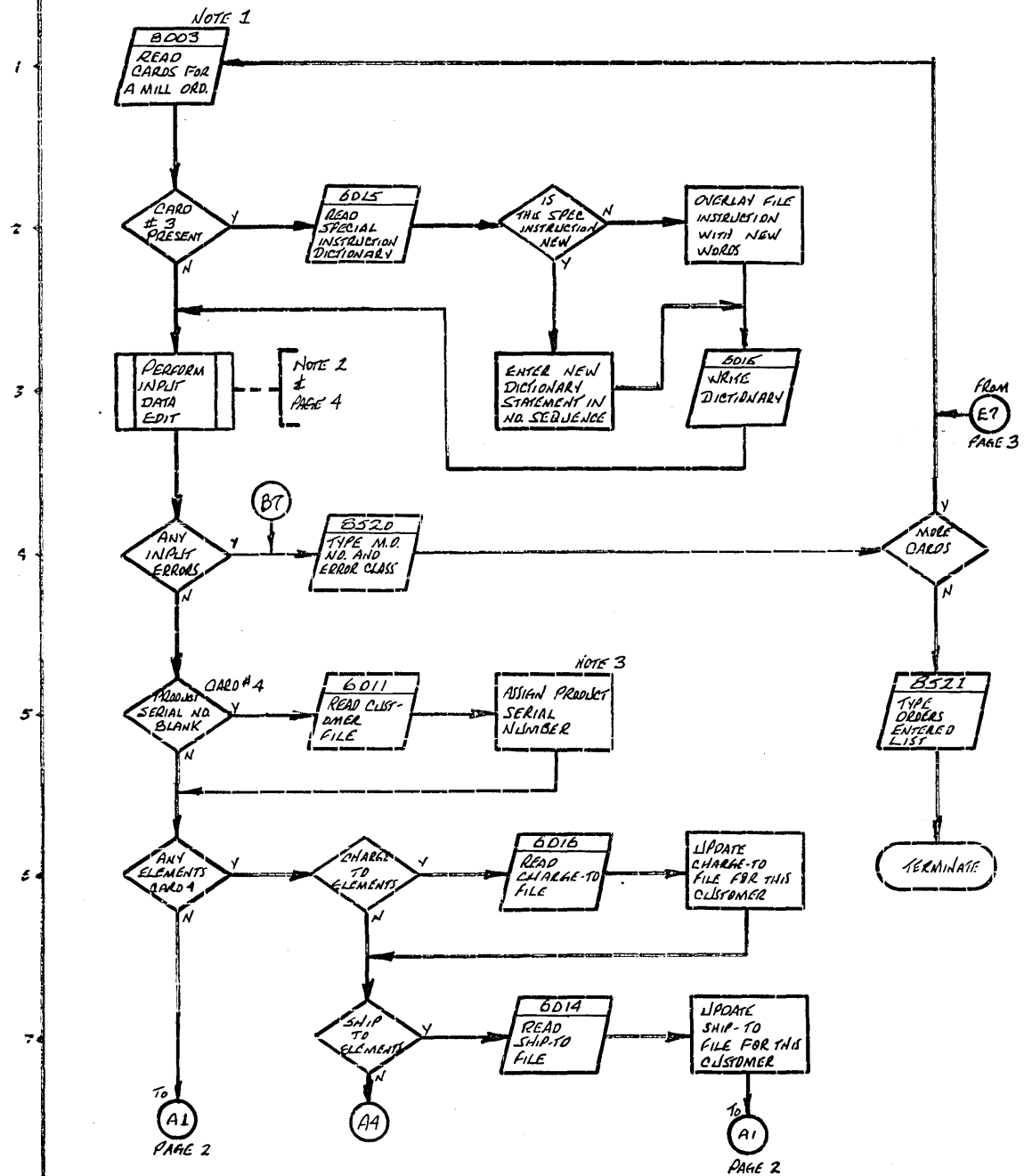
In the program document set, it is often customary and convenient to include a copy of input and output formats for each program. However, greatest flexibility in documentation of a major system is obtained by making I/O a separate document division. Therefore, complete I/O formats are shown in Forms and Formats, Division 8. A data element summary is shown in this program set, Exhibit 5.6 - Input, Exhibit 5.7 - Output.

EDISON STEEL COMPANY	SUPERCEDES ISSUE DATED xx/xx/xx	DOCUMENT DIVISION APPLICATION PROGRAMS	AP REFERENCE 5002	SECTION 4	PAGE 1
TITLE ENTER NEW ORDERS	EFFECTIVE DATE OF THIS ISSUE yy/yy/yy	WRITTEN BY CBF	APPROVED BY CBC	AUTHORIZATION BY 743	
SUBJECT GENERAL PROGRAM FLOWCHART					



IBIS-DOCUMENTATION PLAN
EXHIBIT 5.4

EDISON STEEL COMPANY	SUPERCEDES ISSUE DATED	DOCUMENT DIVISION	DP REFERENCE	SECTION	PAGE
	XX/XX/XX	APPLICATION PROGRAMS	5002	5	1/4
TITLE ENTER NEW ORDERS	EFFECTIVE DATE OF THIS ISSUE	WRITTEN BY	APPROVED BY	AUTHORIZATION BY	
SUBJECT DETAILED PROGRAM FLOWCHART	YY/YY/YY	GRP	eBC	XYZ.	



NOTES:

1. THERE ARE FIVE FORMATS POSSIBLE. CARD 1 & 2 ARE NECESSARY; CARD 3 ONLY IF SPECIAL INSTRUCTIONS ARE TO BE ALTERED; CARD 4 IF CUSTOMER DATA IS ALTERED; CARD 5 IF CUSTOMER DATA IS TOBE ALTERED OR ADDED.
2. THIS ROUTINE ALSO USED IN PROGRAMS 5001, 5003. CHECKS ARE MADE FOR NECESSARY CARDS. MISSING DATA ELEMENTS & VALID FILE REFERENCES.
3. CUSTOMER FILE HEADER CONTAINS LAST NO. USED.

EDISON STEEL COMPANY	DOC. DIVISION: APPLICATION PROGRAMS	AP REFERENCE: 5270	SECTION: 6	PAGE NUMBER: 1
		SUPERSEDES ISSUE DATED: xx/xx/xx		EFFECTIVE DATE OF THIS ISSUE: yy/yy/yy
TITLE: PRODUCTION STATUS REPORTING		WRITTEN BY: CDF	APPROVED BY: ABC	AUTHORIZATION BY: XYZ
SUBJECT: INPUT FORMAT				

INPUT 8111 — PRODUCTION STATUS CARDS. #1, 2, 3.

CARD COLS	FIELD NAME	MNEMONIC	PICTURE	VALUE LIMITS	UNITS	NOTES
CARD 1						
1	PROGRAM IDENT.	XIDEN	A	A - Z	-	-
2	CARD CODE	XCC	9	1 - 3	-	-
3-4	FACILITY NO.	XFACN	99	10 - 90	-	-
5-6	SHIFT NO.	XSHFT	9	1 - 3	-	-
7-14	MILL ORDER NO.	XMILNØ	9(8)	10^6 - 9(8)	-	-
15-17	LIFTS	XLIFT	999	0 - 999	NO.	1
18-23			-			
	-ETC-		-			
			-			
			-			
			-			
			-			
CARD 2	-ETC-					
			-			
			-			
			-			

NOTE 1 - A LIFT IS AN INGOT, SLAB. COIL, SLING OR PALLET

IBIS - DOCUMENTATION PLAN
EXHIBIT 5.6

EDISON STEEL COMPANY	DOC. DIVISION: APPLICATION PROGRAMS	AP REFERENCE: 5002	SECTION: 7	PAGE NUMBER: 1
TITLE: ENTER NEW ORDERS		SUPERSEDES ISSUE DATED: xx/xx/xx	EFFECTIVE DATE OF THIS ISSUE: yy/yy/yy	
SUBJECT: OUTPUT FORMAT		WRITTEN BY: [illegible]	APPROVED BY: [illegible]	AUTHORIZATION BY: [illegible]

OUTPUT 8521 ORDERS ENTERED LIST

COLS	FIELD NAME	MNEMONIC	PICTURE	VALUE LIMITS	UNITS	NOTES
HEADER						
11-22	MSG IDENT.	XID	X(17)	-	-	-
23-45	MSG TITLE	XTITLE	A(23)	-	-	-
46-65	DATE	XDATE	X(29)	-	-	-
DATA						
11-65	MILL ORDER NO.	XMILNO	X(55)	-	-	-
	-					
	-					
	-					

Coding and Listing

Coding translates the logic defined in Detailed Program Flowcharts into computer instructions. Coding will usually be in one "language" for any one business system, such as:

- Assembly language - PAL, BAP - lowest level, machine dependent
- Macro assembly language - MAP, GEMAP
- Compiler language COBOL - FORTRAN - highest level, most machine independent

For several reasons, compiler languages are to be recommended over the assembly or even most macro-languages. Not only does the highest level, machine independent language improve the coordination of programmer efforts, it enhances the quality of documentation.

In general, the program listing will become part of each program's document set. It will be program numbered using the same coding plan shown on flowcharts above. Storage will usually be separate from the flowcharts themselves. Since listing formats are largely dependent on the compiler, it is not necessary to include a sample here as a standard.

DETAIL LEVELS

- OPERATING PROCEDURES
- STANDARD PRACTICE INSTRUCTIONS
- APPLICATION PROGRAMS
- FILES
- OPERATING SYSTEMS PROGRAMS
- FORMS AND FORMATS

FILES

Files contain all of the system's business information. Files may be on magnetic tape, cards, drum or disc. In the integrated system emphasized here, all active business data files will be on direct access (drum, disc) devices. Dedicated storage areas for programs and tables may also be included in a general file definition.

Files are Division 6 of the plan. They are grouped together because of the large degree of interaction between many programs and a single file. Files are often used as the interface between subsystems. For example, an Employee History file in the Personnel Subsystem is the interface to the Finance Subsystem for payroll.

Files are indexed by numbering files sequentially from 6001, up. Blocking by tables, data files, programs, etc. is optional.

Files may be described as made up to logical records or hardware records. Logical records contain the application-defined data elements such as those associated with a single event or transaction. Hardware files are a collection of logical records adjusted to hardware limits such as a drum track, disc track or cylinder, or a tape block. Documentation here is based upon logical file record formats.

All logical files for the system and the programs where used are listed on a File List, Exhibit 6.1. This list is a table of contents for the division.

Logical file records are illustrated with data elements (fields), sequential element number and size in characters, Exhibit 6.2. A table defines data characteristics for each element on a File List. The list is the table of contents for the division.

Logical files in the integrated system are related to many other files. Customer files relate to Open Order Items. Facilities have Inventory and Backlog Files. When integrated file software techniques are used (Integrated Data Store), files not only have a logical relationship but also a software linkage as well. File relationships are illustrated on a File Diagram for the Order Processing Subsystem, Subsystem 02, Exhibit 6.3.

In the large integrated system, file information element definitions and control disciplines become very important. Stand-alone applications can tolerate specialized element definitions and codes. The integrated system stands or falls on the ability to use common data definitions throughout all using programs. A "where-used" element definition list is particularly useful in the largest systems for numeric assignment, Exhibit 6.4. New programs being written will have a ready access to valid information elements.

EDISON STEEL COMPANY	DOC. DIVISION: FILES	F REFERENCE: 6000	SECTION: -	PAGE NUMBER: 01
		SUPERSEDES ISSUE DATED: xx/xx/xx		EFFECTIVE DATE OF THIS ISSUE: yy/yy/yy
TITLE: FILE LIST		WRITTEN BY: PDF	APPROVED BY: ABC	AUTHORIZATION BY: GHQ
SUBJECT				

FILE NO.	FILE NAME	PROGRAMS WHERE USED
F 6001	EMPLOYEE	
6002	JOB AND RATE TABLE	
6003	STORES INVENTORY	
6004	VENDOR HISTORY	
6005	OPEN PURCHASE ORDER	— ETC. —
6006	ACCOUNTS PAYABLE	
6007	(NOT USED)	
6008	UNASSIGNED INVENTORY	
6009	CUSTOMER-PRODUCT	
6010	ORDER ITEM	
6011	CUSTOMER HEADER	5001,5002,5003,5116
6012	STANDARD PROCESS	5001,5002,5003,5004
6013	STANDARD LEAD TIME	5001,5002,5003,5011
6014	SHIP-TO	5001,5002,5003,5116
6015	ENGLISH DICTIONARY	(*)
6016	CHARGE-TO	5001,5002,5003,5116,5121
6017	STANDARD YIELDS	5001,5002,5011,5117
6018	MILL ORDER	5002,5003,5212,5126
6019	CUSTOMER ORDER	5001,5002,5003,5101
6020	OPERATIONS	
6021	OPERATING SCHEDULE	
6022	LOCATION	
6023	PRODUCTION RECORD	
6024		
6025		— ETC. —
6026	— ETC. —	
6027		

IBIS-DOCUMENTATION PLAN
EXHIBIT 6.1

EDISON STEEL COMPANY	DOC. DIVISION: FILES	FILE REFERENCE: 6014	SECTION: –	PAGE NUMBER: 1
		SUPERSEDES ISSUE DATED: XX/XX/XX		EFFECTIVE DATE OF THIS ISSUE: YY/YY/YY
TITLE: SHIP-TO				
SUBJECT: FILE RECORD LAYOUT		WRITTEN BY: GF	APPROVED BY: ABC	AUTHORIZATION BY: XYZ

STORAGE MEDIA: DISC

DESCRIPTION:

Each ship-to location for a customer is assigned a number and a file record.

RECORD

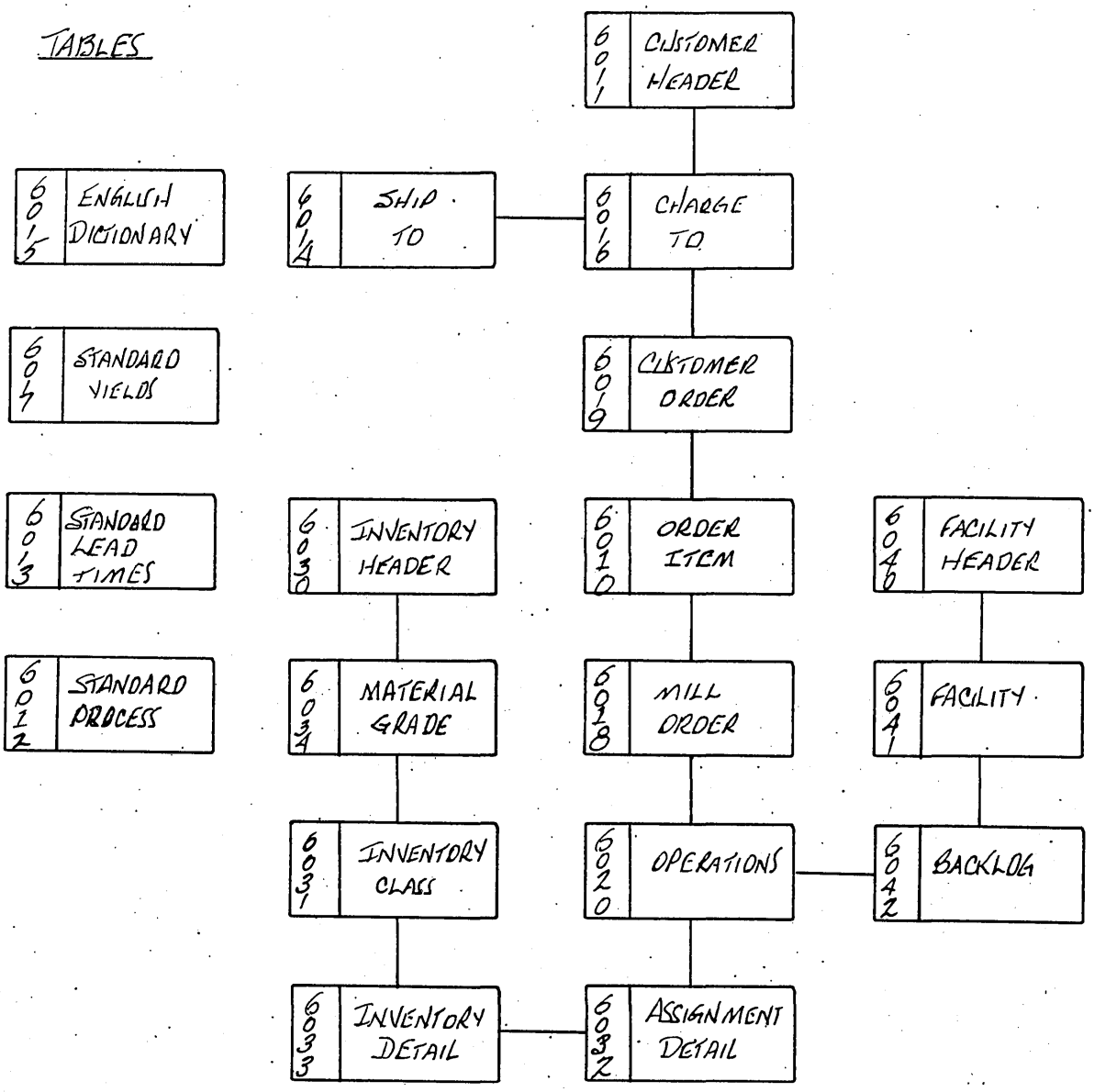
1 4 SHIP-TO NO.	2 4 CUST. NO.	3 10 CUST. NAME (ABBR)	4 30 CUST. NAME (FULL)	5 30 ADDRESS (LINE 1)	6 30 ADDRESS (LINE 2)	7 30 ADDRESS (LINE 3)	8 4 CHARGE-TO NO.	9 PAPERS – NO. 4: S/N 1 | B/L 1 | C/A 1 | INV. 1	ETC.

ELEM. NO.	CHARS.	ELEMENT NAME	MNEMONIC	PICTURE	VALUE LIMITS	UNITS	NOTES
1	1- 4	SHIP-TO NO.	YSHPTO	9999	1000 - 9999	-	-
2	5- 8	CUSTOMER NO.	YCUST	9999	1000 - 9999	-	-
3	9-18	CUST NAME (ABBREV.)	YNAMAB	A(10)	-	-	1
4	19-48	CUST NAME (FULL)	YNAME	A(30)	-	-	-
5		- ETC -					

EDISON STEEL COMPANY	DOC. DIVISION: FILES	F REFERENCE: 6000	SECTION: 02	PAGE NUMBER: 1
		SUPERSEDES ISSUE DATED: XX/XX/XX		EFFECTIVE DATE OF THIS ISSUE: YY/YY/YY
TITLE: FILE DIAGRAM				
SUBJECT: ORDER PROCESSING		WRITTEN BY: PDF	APPROVED BY: ABC	AUTHORIZATION BY: GHQ

LINKED FILES

TABLES



EDISON STEEL COMPANY	DOC. DIVISION: FILES	REFERENCE: F 6000	SECTION: 90	PAGE NUMBER: 1
TITLE: FILE ELEMENT LIST		SUPERSEDES ISSUE DATED: xx/xx/xx	EFFECTIVE DATE OF THIS ISSUE: yy/yy/yy	
SUBJECT		WRITTEN BY: PDF	APPROVED BY: ABC	AUTHORIZATION BY: GHQ

ELEMENT	MNEMONIC	DEFINITION	FILES USED IN
CUSTOMER NO.	YCUST	Sequentially assigned to each customer on "Current Customer List," Form 8XXX. No blocking used.	6019, 6010, 6011
SHIP-TO NO.	YSHPTO	Sequentially assigned to each ship drop address. No blocking used.	6014, 6016

-ETC-

IBIS-DOCUMENTATION PLAN

EXHIBIT 6.4

DETAIL LEVELS

- OPERATING PROCEDURES
- STANDARD PRACTICE INSTRUCTIONS
- APPLICATION PROGRAMS
- FILES
- **OPERATING SYSTEMS PROGRAMS**
- FORMS AND FORMATS

OPERATING SYSTEMS PROGRAMS

Operating Systems software consists of those programs which are associated with the operation of the computer equipment. Included are the operating executive (Monitor or Supervisor), the various program language compilers and utility programs (sort, merge, linear program, loader). Of special importance in documentation for the large system are the Application Manuals and Operating System Manuals.

Operating Systems programs are Division 7 of the documentation plan. The division consists of a document list (table of contents) in addition to the working papers. Documents are numbered sequentially, thusly:

7001, 7002, etc.

Each computer system hardware complex will operate under its appropriate executive or monitor program. Application programs will be queued, called and operated remotely or locally based on priorities and resource requirements. Queuing and resource allocation are functions of the executive. Therefore, each application program written must follow very definite rules for it to operate within the matrix. The Application Manual defines program interface rules.

Manuals for Operating Systems such as GECOS, DAPS, or Monitor are all supplied by the General Electric Company. Since each operating system is designed modular, all features may not be used; additional features added. A list of the included features and special routines is required here.

Routines and utility programs written for general use in the user's business are best listed in this section along with the computer supplier's utility programs.

DETAIL LEVELS

- OPERATING PROCEDURES
- STANDARD PRACTICE INSTRUCTIONS
- APPLICATION PROGRAMS
- FILES
- OPERATING SYSTEMS PROGRAMS
- FORMS AND FORMATS

FORMS AND FORMATS

Forms and Formats, Division 8, include the input to and the output from the computer system. In addition, these forms as well as additional hardcopy documents are used in manual Operating Procedures. Forms and Formats include:

Hardcopy documents; reports and cards
Visual displays; lights, digital, cathode ray
Switch settings; rotary switch, sense

Inputs are numbered sequentially within the Division. Numbers are blocked 8000 - 8499. Outputs are numbered sequentially from 8500 - 8999.

Inputs may be by cards, digital terminals, tape or typers. Contact sense and analog I/O is included under Division 9, Hardware. Illustrated here are examples of card inputs and a type (or digital terminal) input. Card inputs illustrate the many data elements (fields) for each card. In addition, information about each element is included in a table. These data are often critical to the programming effort, Exhibit 8.1.

A second input format, a typer or digital terminal, illustrates a work request for a new schedule, Exhibit 8.2. Similar to card inputs, each data element is shown. Element characteristics are described in the table.

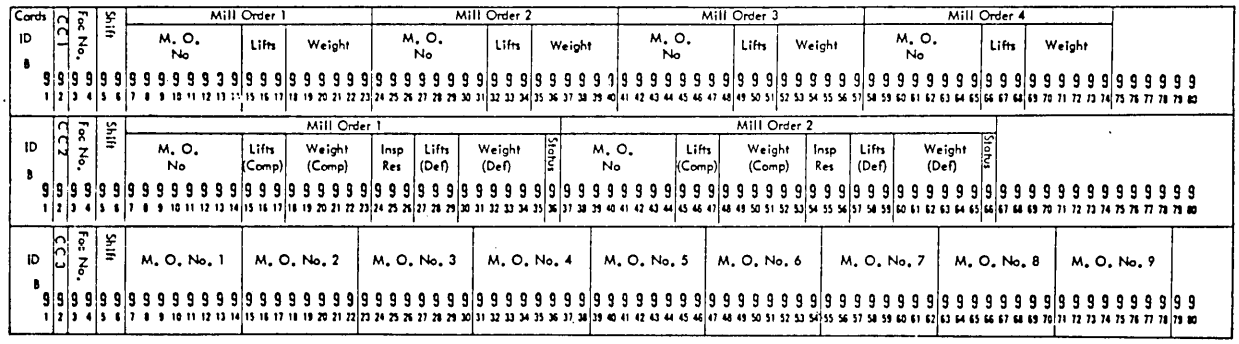
Outputs from the information system include printers, typers, digital displays, analog and contact sense. Automatic outputs to analog or contact devices are described in Division 9, Hardware. Illustrated here are a typer (or video display) and a line printer output. The typer output is illustrated with headers and data, Exhibit 8.3. Column headings are shown for programming convenience. Data elements are described in the lower table.

Printer outputs follow the same plan described, Exhibit 8.4. Headers and data are illustrated. Printer outputs are illustrated on a Printer Layout Form to illustrate column spacing.

EDISON STEEL COMPANY	DOC. DIVISION: FORMS AND FORMATS	FF REFERENCE: 8111	SECTION: -	PAGE NUMBER: 1
		SUPERSEDES ISSUE DATED: XX/XX/XX		EFFECTIVE DATE OF THIS ISSUE: YY/YY/YY
TITLE: PRODUCTION STATUS REPORTING		WRITTEN BY: CWF	APPROVED BY: WBC	AUTHORIZATION BY: [signature]
SUBJECT: INPUT FORMATS				

REFERENCE
PROGRAM 5270

CARDS REPRESENT 3 PRODUCTION REPORTING SITUATIONS:
CARD 1. - PRIME PRODUCTION
2 - OFF STANDARD PRODUCTION
3 - SCHEDULED BUT NOT PRODUCED



CC 1 = Acceptable Material CC 2 = Defective Material CC 3 = Sequenced But Not Produced

CARD COLS	FIELD NAME	MNEMONIC	PICTURE	VALUE LIMITS	UNITS	NOTES
CARD 1						
1	PROGRAM IDENT.	XIDEN	A	A - Z	-	-
2	CARD CODE	XCC	9	1 - 3	-	-
3-4	FACILITY NO.	XFACN	99	10 - 90	-	-
5-6	SHIFT NO.	XSHFT	9	1 - 3	-	-
7-14	MILL ORDER NO.	XMILNØ	9(8)	10^6 - 9(8)	-	-
15-17	LIFTS	XLIFT	999	0 - 999	NO.	1
18-23			-			
	-ETC-		-			
			-			
			-			
			-			
			-			
			-			
CARD 2						
			-			
			-			
			-			

IRIS-DOCUMENTATION PLAN
EXHIBIT 8.1

EDISON STEEL COMPANY	DOC. DIVISION: FORMS AND FORMATS.	FF REFERENCE: 8119	SECTION: -	PAGE NUMBER: 1
		SUPERSEDES ISSUE DATED: XX/XX/XX	EFFECTIVE DATE OF THIS ISSUE: YY/YY/YY	
TITLE: HOT STRIP MILL SEQUENCE				
SUBJECT: INPUT FORMAT		WRITTEN BY: [illegible]	APPROVED BY: [illegible]	AUTHORIZATION BY: [illegible]

REFERENCE
PROGRAM 5D21

THIS INPUT SPECIFIES THE TYPE OF SEQUENCE DESIRED FOR A HOT STRIP MILL ROUND OR SHIFT. WARMUP, CONTINUATION, OR COMBINATIONS CAN BE REQUESTED. TYPE OF MATERIAL AND PRODUCTS ARE OPTIONS.

ELEMENT	1 FAC NO.	2 SHIFT NO.	3 TIME	4 CONT-UATION	5 UNFLAG	6 TEXTURE	7 PRODUCT TYPE	8 START SIZE
COLUMN	1 2	3 4	5 6	7	8	9 10	11 12 13 14	15 16

COLUMN	NAME	MNEMONIC	PICTURE	VALUE LIMITS	UNITS	NOTES
1 - 2	FACILITY NUMBER					
3 - 4	SHIFT NO.		1			
5 - 6	TIME		-ETC-			
7			1			
8	1					
9 -10						
11 -14	-ETC-					
15 -16	1					

EDISON STEEL COMPANY	DOC. DIVISION: FORMS AND FORMATS	FF REFERENCE: 8521	SECTION: —	PAGE NUMBER: 1
		SUPERSEDES ISSUE DATED: XX/XX/XX		EFFECTIVE DATE OF THIS ISSUE: YY/YY/YY
TITLE: ENTER NEW ORDERS		WRITTEN BY: CRF	APPROVED BY: CRC	AUTHORIZATION BY: GHJ
SUBJECT: OUTPUT FORMAT				

REFERENCE
PROGRAM 5002

ONE LIST IS PRODUCED FOR EACH ORDER BATCH

COLUMN: 11 25 40 46 52 60 66

HEADER:

MSG 8521 ORDERS ENTERED DATE 1403 10/12/67

DATA:

19999800	20000000	20000100	20000300
20000400	20000500	20000600	20000700
20000900	20001000	20001101	20001102
20001200	20001300	20001401	20001402
.	.		
.	.		
.	.		
.	.		
.	.		
20010600	20010700		

COLS	FIELD NAME	MNEMONIC	PICTURE	VALUE LIMITS	UNITS	NOTES
HEADER						
11-22	MSG IDENT.	XID	X(17)	-	-	-
23-45	MSG TITLE	XTITLE	A(23)	-	-	-
46-65	DATE	XDATE	X(29)	-	-	-
DATA						
11-65	MILL ORDER NO.	XMILNO	X(55)	-	-	-
	-					
	-					
	-					

EDISON STEEL COMPANY	DOC. DIVISION: FORMS AND FORMATS	FF. REFERENCE: 8504	SECTION: -	PAGE NUMBER: 1
		SUPERSEDES ISSUE DATED: XX/XX/XX	EFFECTIVE DATE OF THIS ISSUE: YY/YY/YY	
TITLE: ENTER NEW ORDERS				
SUBJECT: OUTPUT FORMAT		WRITTEN BY: CDC	APPROVED BY: CBR	AUTHORIZATION BY: XYZ

REFERENCE PROGRAM 5002

ONE MILL ORDER-WORK TICKET IS PRODUCED FOR EACH ENTERED ORDER.

MILL WORK TICKET

HEADER 1 LINE 1	M.O. ITEM #1 (10 CHAR.)	CUSTOMER 2 (13)	SHIP-TO NO. 3 (4)	CUSTOMER NO. 4 (4)	CUSTOMER ORDER NO. 5 (25)	DATE PROM 6 (3)	QUAL 7 (2)	SPEC NO. 8 (4)	PROC NO. 9 (3)				
HEADER 2 LINE 2	PRODUCT GROUP 10 (40)			ORDERED WEIGHT 11 (6)	INGOT SPEC 12 (8)	ORDERED SIZE 13 (23)							
HEADER 3 HEADER 4	OPER NO	FAC NO	OPERATION DESCRIPTION	SIZE T	W	L	PROC CODE	DATE SCHD	LFTS SCHD	WEIGHT SCHED	SPECIAL INSTRUCTIONS		
LINE 3	14 (2)	15 (2)	16 (30)	17 (23)			18 (3)	19 (3)	20 (3)	21 (6)	22 (25)		
LINE 4													
LINE 5													

-ETC-

ELEMENT TABLE	ELEM. NO.	COLUMN NOS.	ELEMENT NAME	MNEMONIC	PICTURE	VALUE LIMITS	UNITS	NOTES
HEADER 1 LINE 1	1	4 - 13	M.O. ITEM	MOTEM	9(10)	$10^7 - 10^8$	-	1
	2	15 - 27	CUSTOMER	MCUST	A (13)	-	-	-
	3	29 - 39	SHIP-TO NO.	MSHIP	9 (4)	$10^3 - 10^4$	-	-
	4	41 - 58	CUSTOMER NO.	MCUNO	9 (4)	$10^3 - 10^4$	-	-
	5	60 - 84	CUST. ORD. NO.	MORD	X (25)	-	-	-
	6	88 - 94	DATE PROM	MDATE	9 (3)	000 - 533	DEC. WEEK	-
	7	-	-	-	-	-	-	-
	8	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	-
HEADER 2 LINE 2	11	-	-	-	-	-	-	-
	12	-	-	-	-	-	-	-
	13	-	-	-	-	-	-	-

-ETC-

NOTE 1: RIGHT 2 DIG = 00 FOR NORMAL ORDER. SPLITS ARE 01, UP.

1. HARDWARE

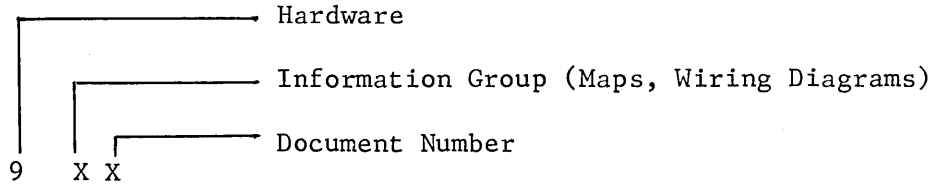
HARDWARE

Hardware documentation is Division 9 of the plan. In the broad documentation plan of the integrated system, hardware information will cover computer and facility data and the Machine Practices for operation of devices. These facts are concerned principally with the physical characteristics of devices which are on the fringes of the business system. For example, Machine Practices state startup, adjustment and malfunction practices for the operation of machines or devices. Standard Practice Instructions (Division 4) state the operating cycles or setting to make products. Facility SPI's are the annealing or rolling cycles.

Hardware documentation includes the following typical information:

- Computer Configurations
- Computer and Peripheral Operating Manuals
- Computer System Maps
- Facilities Layouts
- Wiring Diagrams
- Terminal Descriptions
- Sensor Descriptions
- Machine Practice Instructions.

Document indexing is according to the following plan:



Computer Configurations

Configurations identify and locate each item of computer equipment. They show specific features and linkages between components. Each configuration diagram and its equipment list will be numbered and listed on a Division 9 table of contents.

Computer and Peripheral Operating Manuals

These data, like Operating Systems Manuals, are supplied by the computer builder, General Electric. Manuals will be numbered, listed on the table of contents and filed separately.

Computer System Maps

Maps are the graphic representation of physical memory assignment. With second-generation uniprogramming systems, memory assignment (core, drum, disc) has been relatively rigid. Even with the use of multiprogramming and integrated data files, a degree of dedication still exists. Maps assign dedicated areas of memory to the various software functions. Information is similar for core, drum and disc.

In each computer of the integrated system, core memory will be allocated to the many processing functions in accordance with the purpose of each machine. That is, a communications data controller doing largely message switching will have a dedicated executive area and several series of message blocks for assembling messages from a communications line. A communications-linked processor will have a dedicated area for the operating system, one for communications processing, an area for high-use routines and the bulk of store for multi-program processing.

A suitable convention for illustrating a core store map to the designer or programmer is as follows, Exhibit 9.1.

Drum store is most often used as an extension of core store with dedicated areas for programs, routines, tables and short-term data or work area buffers. Therefore, a map of drum store will vary only in the difference between core addressing increments and the increment of drum addressability. A suitable drum map convention follows, Exhibit 9.2.

Disc store is used for programs and data files principally. Files may be accessed directly as with a core or drum store, by file indices and Read/Write Macros, by hi-level language macros such as IDS or by other specialized techniques. Each technique will alter the disc file map. However, data content will normally contain the data illustrated, Exhibit 9.3.

Facilities Layouts

Facility layouts are a plan view of all physical production and support facilities in system scope. A copy is marked with terminal locations, computer sites and cable runs. A plan view of individual facilities is marked with individual data input and output terminals and sensors. A symbol set suitable for charting is included, Appendix C.

Wiring Diagrams

Wiring diagrams for use in maintenance and modification are included on all devices maintained. Included are cable run details, sensor wiring, terminals and equipment for which there are no supplier maintenance contracts.

EDISON STEEL COMPANY	DOC. DIVISION: HARDWARE	HD REFERENCE: 9301	SECTION:	PAGE NUMBER: 1
		SUPERSEDES ISSUE DATED: XX/XX/XX		EFFECTIVE DATE OF THIS ISSUE: YY/YY/YY
TITLE: COMPUTER SYSTEM MAPS				
SUBJECT: LOUISVILLE-DATA PROC. MACH.		WRITTEN BY: GWF	APPROVED BY: ABC	AUTHORIZATION BY: XYZ

CORE STORE MAP

START ADDRESS-(X)$_8$	END ADDRESS-(X)$_8$	MEMORY WORDS	DESCRIPTION	NOTES
000000	037777	16,384	GECOS	A
040000	047777	4096	COMMUNICATIONS DRIVER	
050000	051777	1024	" BUFFER	
052000	061777	4096	" MONITOR	B
062000	065777	2048	" TABLE	
066000	067777	1024	NOT USED	C
070000	177777	30864	OPERATING PROGRAMS	D
		65,536		

NOTES:

A. — ETC —

B.

C.

D.

EDISON STEEL COMPANY	DOC. DIVISION: HARDWARE	HD REFERENCE: 9302	SECTION: -	PAGE NUMBER: 1
TITLE: COMPUTER SYSTEM MAPS		SUPERSEDES ISSUE DATED: xx/xx/xx	EFFECTIVE DATE OF THIS ISSUE: YY/YY/YY	
SUBJECT: BRADENBURG - DATA CONTROLLER		WRITTEN BY: DJF	APPROVED BY: WBR	AUTHORIZATION BY: JWB

DRUM STORE MAP

START WORD ADDRESS - X_8	NO WORDS	FILE	
		FILE NO.	FILE NAME
00000	4096	-	MONITOR
10000	512	6230	MESSAGE DECODER
11000	256	6231	MESSAGE TRANSMITTER
14000	= = =		
20000	8192	6241	TELETYPE MESSAGE AREA
40000	2048	6242	IN/OUT BUFFERS
44000	= = = = =		
	- ETC -		

IBIS-DOCUMENTATION PLAN

EXHIBIT 9.2

EDISON STEEL COMPANY	DOC. DIVISION: HARDWARE	LD REFERENCE: 9303	SECTION: —	PAGE NUMBER: 1
TITLE: COMPUTER SYSTEM MAPS		SUPERSEDES ISSUE DATED: XX/XX/XX		EFFECTIVE DATE OF THIS ISSUE: YY/YY/YY
SUBJECT: BRADENBURG-DATA PROC. MACH.		WRITTEN BY: CDF	APPROVED BY: ABC	AUTHORIZATION BY: XYZ

DISC STORE MAP

CYLINDER NO.	START TRACK ADDRESS	NO. TRACKS	FILE	
			FILE NO.	FILE NAME
0	0000	1	431	OPEN ORDER FILE - DIRECTORY TRACK
	0001	39	431	OPEN ORDER FILE
1	0040	1	432	CUSTOMER DATA FILE - DIRECTORY TRACK
	0041	39	432	CUSTOMER DATA FILE
		—ETC	—	

Terminal Descriptions

Descriptions of terminals include those hardware data on power, signal characteristics, location, signal conversion filtering or shielding conditions.

Sensor Descriptions

Descriptions of sensors include analog and contact sense devices or terminals. Data on analog signals includes location, transducer characteristics, signal properties, range, and scan rate. Contact sense data identify device, location, initiating source, normal position and timing.

Analog and digital input and output tables are illustrated, Exhibits 9.4 - 9.7.

EDISON STEEL COMPANY	DOC. DIVISION: HARDWARE	HD REFERENCE: 9701	SECTION:	PAGE NUMBER: 1
		SUPERSEDES ISSUE DATED: xx/xx/xx		EFFECTIVE DATE OF THIS ISSUE: YY/YY/YY
TITLE: SENSOR DESCRIPTIONS		WRITTEN BY: DAR	APPROVED BY: ABC	AUTHORIZATION BY: EJR
SUBJECT: DIGITAL OUTPUTS				

Point No.	Description	Type		Form	Rating		Code		
		Timed	Bistable		ma	V	Dec.	Bin.	BCD

IBIS - DOCUMENTATION PLAN
EXHIBIT 9.4

EDISON STEEL COMPANY	DOC. DIVISION: HARDWARE	HD REFERENCE: 9702	SECTION:	PAGE NUMBER: 1
TITLE: SENSOR DESCRIPTIONS		SUPERSEDES ISSUE DATED: XX/XX/XX		EFFECTIVE DATE OF THIS ISSUE: YY/YY/YY
SUBJECT: DIGITAL INPUTS		WRITTEN BY: [illegible]	APPROVED BY: [illegible]	AUTHORIZATION BY: [illegible]

Point No.	Description	Code			Contact Data		Notes
		Dec.	Bin.	BCD	Form	Rating	

IBIS-DOCUMENTATION PLAN

EXHIBIT 9.5

EDISON STEEL COMPANY	DOC. DIVISION: HARDWARE	HD REFERENCE: 9703	SECTION: -	PAGE NUMBER: 1
		SUPERSEDES ISSUE DATED: XX/XX/XX	EFFECTIVE DATE OF THIS ISSUE: YY/YY/YY	
TITLE: SENSOR DESCRIPTIONS				
SUBJECT: ANALOG OUTPUTS		WRITTEN BY: (illegible)	APPROVED BY: ABC	AUTHORIZATION BY: XYZ

Point No.	Description	Resolution	Range			Load Impedance	Notes
			0%	100%	ma/mv		

IBIS - DOCUMENTATION PLAN

EXHIBIT 9.6

EDISON STEEL COMPANY	DOC. DIVISION: HARDWARE	HP REFERENCE: 9704	SECTION: -	PAGE NUMBER: 1
TITLE: SENSOR DESCRIPTIONS		SUPERSEDES ISSUE DATED: xx/xx/xx	EFFECTIVE DATE OF THIS ISSUE: YY/YY/YY	
SUBJECT: ANALOG INPUTS		WRITTEN BY: CWP	APPROVED BY: ABC	AUTHORIZATION BY: JDJ

Point Number	Measured Variable			Sensor						Notes
	Description	Range	Units	Mfr. & Type	Output			Common Mode	AC Ripple	
					Range	Units	Z			

APPENDICES

A. STANDARD FLOWCHARTING SYMBOLS

B. SYMBOLS FOR APPLICATION SUMMARY DIAGRAMS

C. SYMBOLS FOR HARDWARE-FACILITY LAYOUTS

D. DOCUMENTATION PAGE AND COVER LAYOUT STANDARD

APPENDIX A - STANDARD FLOWCHARTING SYMBOLS

This recommended standard for the use of symbols on flowcharts is for use in information systems, scientific systems, communications systems and process control systems. The standard is based upon the "ASA Flowchart Symbols for Information Processing", X3.5 - 1966. However, additional details have been added to further amplify and define usage. Modifications are:

- Additional symbols to cover automatic inputs and reference outputs for process control applications.
- Qualification on usage of input/output symbols to specific flowchart detail levels.

Each modification to the ASA standard is clearly marked (*).

*A basic symbol is established for each function and can always be used to represent that function. Specialized symbols for I/O are also available. In this convention, the I/O symbols are recommended for use as follows:

- Use the basic symbol for all levels of Program Flowcharts.
- Use the specialized symbols for summary level documents and System Flowcharts.

This standard contains the following sections:

- Presentation techniques - ASA and GE modifications thereto.
- Flowchart symbols - ASA and process control additions.
- Summary of Standard Flowchart Symbols.

PRESENTATION TECHNIQUES

Presentation techniques used in this standard incorporate ASA specifications as well as modifications which recognize a concensus in programming practice details.

- The orientation of symbols on a flowchart will be followed as illustrated below.
- The size of a symbol may vary but the dimensional ratio of a symbol will be maintained. *However, if an automatic flowcharting system is to be used, each symbol will be standardized within that system.

*. Flowcharts will normally be drawn with the GE Flow Diagram Template, TEM 001.

. Flow direction of logic is represented by lines drawn between symbols. Normal direction is from left to right and top to bottom. When the flow direction is not from left to right or top to bottom, arrowheads will be placed on reverse direction flowlines.

. When flowlines are broken due to page limitations, connector symbols will be used.

*. Connector symbols may be used on-page to simplify crossing lines and reverse flow.

*. There will be only one entry to a flowchart symbol. Multiple entries to a symbol will be made through flowlines merging prior to the symbol.

*. The basic I/O symbol will be used on all Program Flowcharts - general and detailed levels. Specialized symbols will be used on System Flowcharts.

*. On Detailed Program Flowcharts, numbers, English words and abbreviations will be used to describe all operations, comparisons, decisions, etc. Exceptions will be the use of $\rightarrow$, $+$, $-$, $\times$, $=$, $\neq$, $<$, $>$, $\leq$, $\geq$, in mathematical subroutines only, common mathematical expressions. Terminology will be according to the IFIP/ICC Vocabulary of Information Processing.

*. Detailed Program Flowcharts will be cross referenced to the coding in a manner consistent with the programming language used (i.e., symbolic names, tabled names, etc.). This annotation shall be placed at the upper left and outside of the symbol.

FLOWCHART SYMBOLS

Flowchart symbols represent manual and computer functions of an information processing and control system. These functions are:

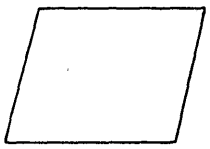
Input/Output (I/O)
Processing
Flow direction of information
Annotation or notes

A basic symbol is established for each function and can always be used to represent that function. Specialized symbols are established which may be used in place of a basic symbol to give additional information.

Basic Symbols

The input/output symbol shown below represents the general input/output (I/O) function; that is, entering information for processing or recording the processed information.

*Individual I/O media symbols are also available, but are used primarily in System Charting.

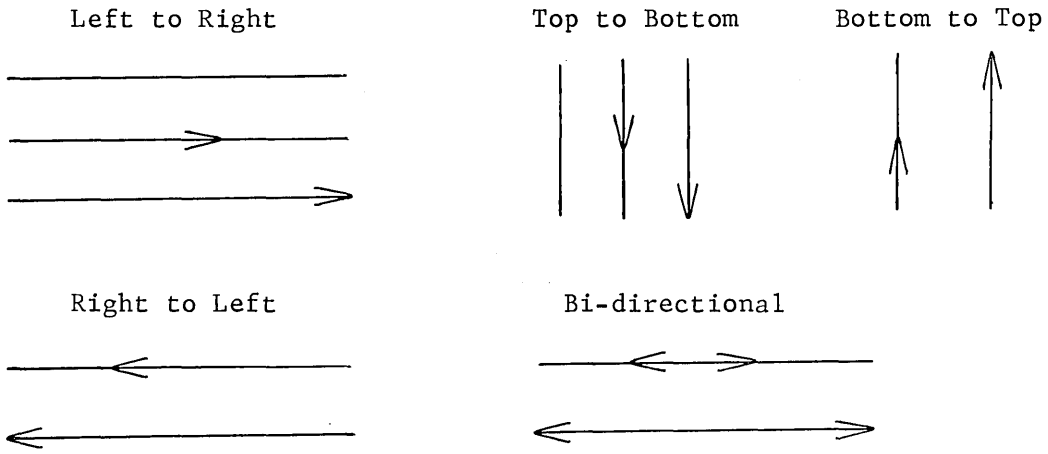


Dimensional Ratio
Width:Height = 1:2/3
ASA Standard

The symbol shown below represents the processing function; that is, the process of executing a defined operation or group of operations resulting in a change in value, form, or location of information, or in the determination of which of several flow directions are to be followed.

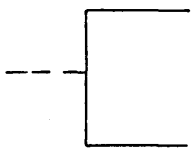
Dimensional Ratio
Width:Height = 1:2/3
ASA Standard

The flow direction symbols shown below indicate the sequence of information flow and executable operations. Flow direction is represented by lines drawn between symbols. Normal direction of flow is from left to right or top to bottom. Arrowheads will be placed on reverse direction flowlines. When increased clarity is desired, arrowheads can be placed on normal direction flowlines. When flowlines are broken due to page limitation, connector symbols will be used to indicate the break. When flow is bi-directional, it can be shown by either single or double lines, but arrowheads shall be used to indicate both normal direction flow and reverse direction flow.



ASA Standard

The annotation symbol allows the addition of description comments or explanatory notes as clarification. The broken line may be drawn either on the left as shown or on the right. It is connected to the flowline at a point where the annotation is meaningful by extending the broken line in whatever fashion is appropriate.



Dimensional Ratio
Width:Height = 1:2/3
ASA Standard

Special Symbols

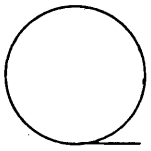
Input/Output. Specialized I/O symbols may represent the I/O function and, in addition, denote the medium on which the information is recorded or the manner of handling the information or both. If no specialized symbol exists, the basic I/O symbol is used.

*Specialized I/O symbols are used on System Flowcharts and other summary levels charts such as the Application Summary Diagram.

Punched Card. The symbol shown below represents an I/O function in which the medium is punched cards.

Dimensional Ratio
Width:Height = 1:1/2
ASA Standard

Magnetic Tape. The symbol shown below represents an I/O function in which the medium is magnetic tape.

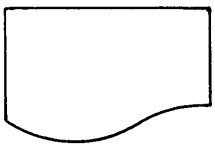


Dimensional Ratio
Width:Height = 1:1
ASA Standard

Punched Tape. The symbol shown below represents an I/O function in which the medium is punched tape.

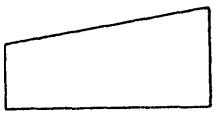
Dimensional Ratio
Width:Height = 1:1/2
ASA Standard

Document. The symbol shown below represents an I/O function in which the medium is a document (does not include console printers).



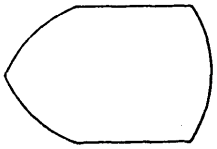
Dimensional Ratio
Width:Height = 1:2/3
ASA Standard

Manual Input. The symbol below indicates information is entered manually at the time of processing, by means of on-line keyboards, switch settings, pushbuttons, etc.



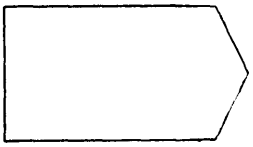
Dimensional Ratio
Width:Height = 1:1/2
ASA Standard

Display. The display symbol represents an I/O function in which the information is displayed for human use at the time of processing (on-line indicators, video devices, digital displays, binary displays, audible alarm, console printers, etc.).



Dimensional Ratio
Width:Height = 1:2/3
ASA Standard

Automatic Input. The symbol below indicates information is entered automatically at the time of processing from process sensors, alarm signals, etc.

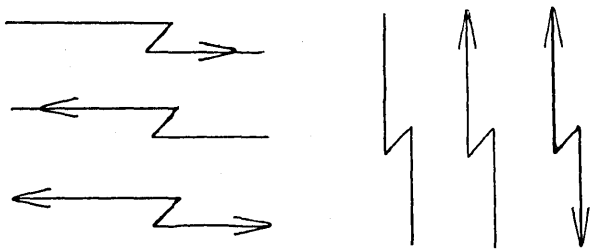


Dimensional Ratio
Width:Height = 1:2/3
*Not an ASA Standard

Reference Output. This symbol indicates that information is send to control some type of equipment such as positioning drive, valve, controller set point, etc.

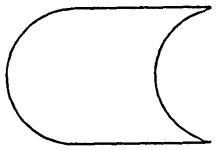
Dimensional Ratio
Width:Height = 1:2/3
*Not an ASA Standard

Communication Link. The symbol shown below represents an I/O function in which information is transmitted automatically from one location to another. The symbol is always drawn with superimposed arrowhead to denote the direction of data flow.



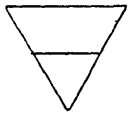
ASA Standard

On-Line Storage. This symbol indicates auxiliary mass storage of information that can be accessed on-line (magnetic drums, discs, tape strips, etc.).



Dimensional Ratio
Width:Height = 1:2/3
ASA Standard

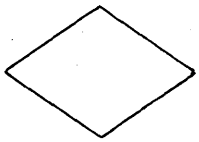
Off-Line Storage. This symbol indicates any off-line (not under control of the central processor) storage of information, regardless of the medium on which the information is recorded.



Dimensional Ratio
Width:Height = 1:1
ASA Standard

Specialized Processing. Specialized processing symbols may represent the processing function and, in addition, identify the specific type of operation to be performed on the information. If no specialized symbol exists, the basic processing symbol is used.

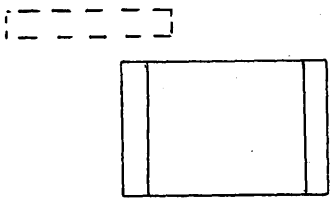
Decision. The symbol shown below represents a decision-type operation that determines which of a number of alternate paths is to be followed. Two exits are used with "yes" and "no" questions; three exits may be used with "hi", "lo", "equal" queries.



Dimensional Ratio
Width:Height = 1:2/3
ASA Standard

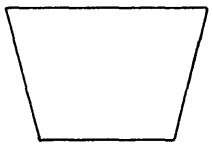
Predefined Process. The symbol below represents a named process consisting of one or more operations or program steps that are specified elsewhere; that is, a subroutine or logical unit.

*Use of this box always means that the subroutine is detailed elsewhere according to the number reference at the upper left corner.



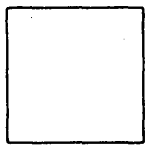
Dimensional Ratio
Width:Height = 1:2/3
ASA Standard

Manual Operation. The symbol shown below represents any off-line operation geared to the speed of a human being.



Dimensional Ratio
Width:Height = 1:2/3
ASA Standard

Auxiliary Operation. The symbol below represents an off-line operation performed on equipment not under direct control of the central processing unit.



Dimensional Ratio
Width:Height = 1:1
ASA Standard

Additional Symbols

Connector. The connector symbol represents a junction in a line of flow. A set of two connectors is used to represent a continued flow direction when the flow is broken by the physical limitations of a flowchart page.

Dimensional Ratio
Width:Height = 1:1
ASA Standard

Terminal. The symbol represents a terminal point in the execution of a program where information can enter or leave the system; that is, start, stop, halt, delay, or interrupt.

Dimensional Ratio
Width:Height = 1:3/8
ASA Standard

SUMMARY OF STANDARD FLOWCHART SYMBOLS

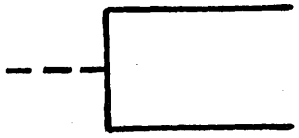
Basic Symbols:

Input/Output

Processing

Flow Direction

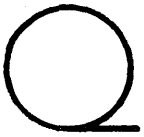
Annotation



Specialized Input/Output Symbols:

Punched Card

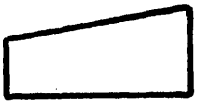
Magnetic Tape



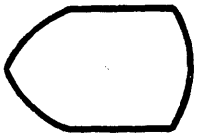
Punched Tape

Document

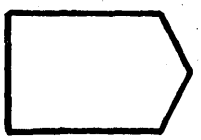
Manual Input



Display



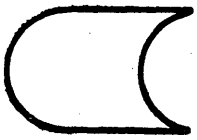
*Automatic Input



*Reference Output

Communication Link

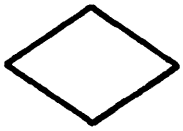
On-Line Storage



Off-Line Storage

Specialized Processing Symbols:

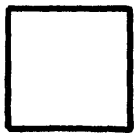
Decision



Predefined Process

Manual Operation

Auxiliary Operation



Additional Symbols:

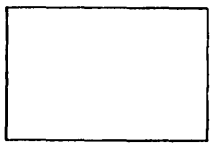
Connector

Terminal

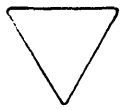
*NOT ASA STANDARD

APPENDIX B - SYMBOLS FOR APPLICATION SUMMARY DIAGRAMS

FACILITIES:

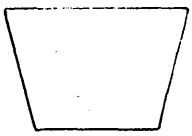


ANY PRODUCTION FACILITY - COLD MILL, MELT SHOP; ALSO MOLD SHOP WAREHOUSE, ETC.

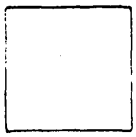


ANY IN-PROCESS OR UNASSIGNED INVENTORY STORAGE LOCATION.

MANUAL PROCEDURES:

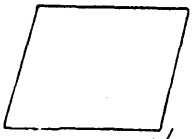


ANY MANUAL OPERATION - EDIT ORDER INFO, RECORD PRODUCTION, ETC.



ANY OF SEVERAL ACTIONS SUCH AS "CARD SORT," "COLLATE," "KEYPUNCH", ETC.

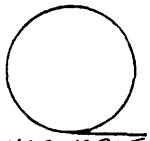
SYSTEM INPUT/OUTPUT:



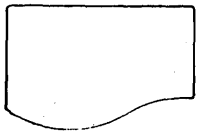
GENERAL I/O - (WHERE MEDIA NOT SPECIFIED)

CARD I/O

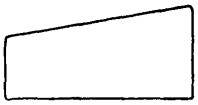
PUNCHED TAPE I/O



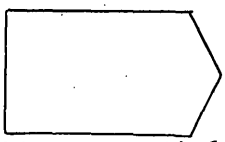
MAG TAPE I/O



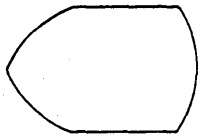
ANY OUTPUT HARDCOPY - CHARACTER OR LINE PRINTED



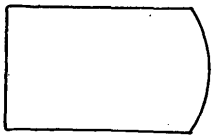
ANY MANUAL DIGITIAL INPUT



AUTOMATIC INPUT - WEIGHT SENSORS, ETC.



VISUAL DISPLAY - DIGITAL OR BINARY

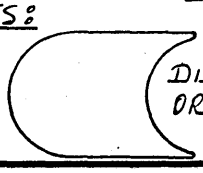


REFERENCE OUTPUT - CONTROL SIGNALS, CONTACTS, TAG PRINTER, ETC.

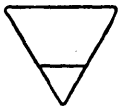
COMPUTER SYSTEM:

ALL COMPUTER ACTIVITIES

SYSTEM FILES:



ON-LINE DISC, DRUM OR MASS STORE



OFF-LINE STORE

APPENDIX C- SYMBOLS FOR HARDWARE-FACILITY LAYOUTS

DESCRIPTION:

THE SYMBOLS BELOW ARE FOR USE IN ILLUSTRATING SENSORS AND DATA INPUTS AND OUTPUTS ON FACILITY LAYOUTS (HARDWARE DIVISION.) THEY ARE SMALLER SYMBOLS THAN THEIR FLOWCHART EQUIVALENTS. THEY ARE A FINER BREAKDOWN OF FLOWCHART SYMBOLS TO SHOW MANUAL AND AUTOMATIC INPUTS AND OUTPUTS AT A PHYSICAL PRODUCTION FACILITY OR ACTIVITY.

← INPUTS

FLOWCHART SYMBOL	LAYOUT SYMBOL & ABBREV.	MEANING
SENSORS:		
*	11 / MD	(SENSOR NO. 11 - SEE CHART) METAL DETECTOR - (CONTACT, NON-CONT, LOAD)
	T	TEMPERATURE
	W	WEIGHT
	L	LOAD (FORCE)
	P	PRESSURE
	V	SPEED
	A	AMPERAGE
	LP	LOOP
	F	FLOW
	L	LENGTH
	H	THICKNESS
	W	WIDTH
	C	CONCENTRATION
	VLT	VOLTAGE
	POS	POSITION
DATA DEVICES:		
*	10 / DIG	(TERMINAL NO. 10) DIGITAL - MANUAL
*	CR	CARD READER
*	PT	PAPER TAPE
*	TAG	TAG READER

OUTPUTS →

FLOWCHART SYMBOL	LAYOUT SYMBOL & ABBREV.	MEANING
SENSORS:		
*	27 / G	(SENSOR NO. 27 - SEE CHART) CONTROL SIGNAL - GENERAL
	O/F	ON / OFF CONTROL SIG.
	T	TEMPERATURE "
	P	PRESSURE "
	L	LOAD (FORCE) "
	V	SPEED "
	A	AMPERAGE "
	LP	LOOP "
	F	FLOW "
	S	SHEAR / SAW "
	T	THICKNESS "
	W	WIDTH "
	VLT	VOLTAGE "
	POS	POSITION "
DATA DEVICES:		
*	14 / DIG	(TERMINAL 14) DIGITAL - OR LIGHT
*	CP	CARD PUNCH
*	PR	PRINTER / TYPER
*	PT	PAPER TAPE PUNCH
*	TAG	TAG PUNCH / EMBOSSER

* FLOWCHART SYMBOLS - APPENDIX A.

APPENDIX D - PUBLICATION MARGINS

GENERAL

To permit international interchange of printed material, marginal standards have been established which will permit the transfer of computer text material from 8 1/2" x 11" to 8.27" x 11.69" or vice versa without retyping. The following margins will allow such an interchange:

STANDARD MARGINS

On 8 1/2 x 11 inch paper stock, format standards for printed text or illustrations shall not include margins less than:

1-inch top margin
1-inch bottom margin*
1-inch outside edge
1 1/2-inch binding edge

*not including logos or other ornamental devices

The preceding permits the text area on a printed 8 1/2 x 11 inch page to occupy a space of 6 x 9 inches.

VARIATIONS

in 11-inch fold-outs, only the nine-inch height is critical. The one-inch margin must be maintained.

In the preparation of coding sheets and other outside documents, a 2:3 width to length ratio should be maintained to permit proper camera reduction to fit either IOS or U.S. quarto standard sheets.