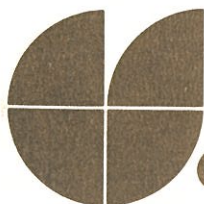
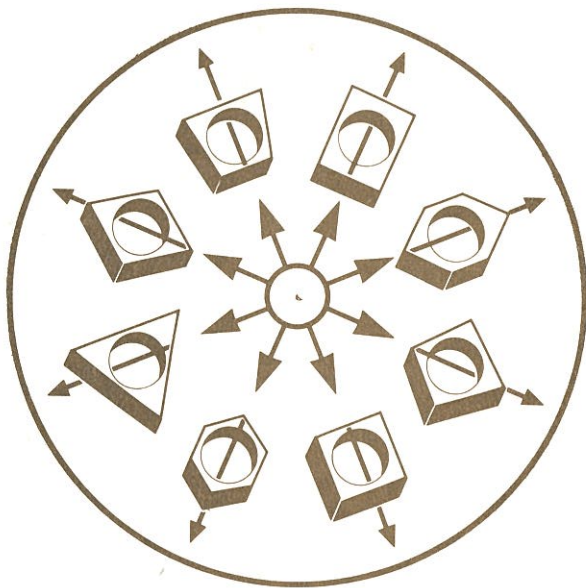


MMPS

Manufacturing Material Planning System



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MANUFACTURING MATERIAL PLANNING SYSTEM
OVERVIEW

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DESIGN PHILOSOPHY

MMPS OVERVIEW

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A DESIGN PHILOSOPHY

THE GENERIC SOLUTION TO APPLICATION SOFTWARE

Application software products exist in order to support the operational needs of business and industry. Every application system is a set of programs designed to support these functional needs through the use of specific data processing procedures. It is important to note, however, that the specific data processing solution to an application product can vary in a multitude of ways depending on the particular approach taken by the designer. The two primary dimensions of this variation are:

1. The functional capability of the application software product, and
2. the complexity of the system as a data processing entity.

These two dimensions nearly always relate in direct proportion. The more completely the system attempts to satisfy the functional needs of the application, the more complex the data processing procedures become. This increased data processing complexity naturally increases the cost of constructing and maintaining such a system. Furthermore, it is quite probable that this cost increase would be passed on in the form of a higher purchase price. In addition to the higher cost associated with the development of a more complex system, the system tends to become more rigid in its structure. This rigidity makes the system less able to accommodate the variations that naturally occur in the detailed definition of the same application within different companies. It also makes the system less flexible towards modification, as the needs of a company evolve.

The creators of "complete" application systems have tried to resolve the rigidity problem by introducing even more data processing complexity into application software products. In order to provide the ultimate solution for a broad variety of prospective users, the system must be designed to be configured in a multitude of ways, thus resulting in even higher development costs.

The multi-configuration product rarely provides the ultimate solution to the specific and unique functional needs of an individual company. At best, only one configuration is a close approximation of the actual solution of the user's problem. Therefore, the remainder of the multiple configurations are of no use and a portion of the purchase price that has been paid for the complete product is effectively thrown away. Furthermore, this close approximation is not the ultimate solution required by the user. The product must be further modified, expanded, etc., in order to completely satisfy all functional requirements. The cost of this enhancement is also influenced by the data processing complexity of the multi-configuration product. The end result is often a complex system that has cost an unnecessary amount, and will cost more than necessary to modify and support.

The Generic Solution approach to application software development presents a much different solution to the compromise between functional completeness and data processing complexity. Rather than providing multiple versions of a complete solution to a problem and suffering unavoidable data processing complexities, the Generic Solution approach provides only that portion of a

solution that is truly common between companies. Additionally, it provides the solution in a simple, flexible fashion, employing the latest data processing technology.

The portions of an application solution that may be considered common between companies are:

1. The Data File Requirements - although field formats and length may vary, the basic content and relationships will remain the same.
2. Transactional and Report Data - formats may again vary from one company to another, but the transaction types and report contents will remain consistently common.
3. General Processing Logic - specific processing logic may vary between companies in order to support individual requirements; the major processing logic, however, must be consistent because the data base, transaction types and content, and output requirements are common.

In addressing these common areas using the Generic Solution approach, recent developments in the field of data processing are employed. These developments significantly reduce the overall complexity of the system, and provide greater flexibility for specifically answering the needs of the user. Among these developments are:

1. Standard ANS COBOL - as an application programming language, it is the most accepted in the data processing industry and provides the greatest degree of hardware independence.
2. Structured Programming Techniques - provide data processing disciplines to insure well documented, consistent, and logical code, insuring ease of program maintenance and modification.
3. Data Base Management System - reduces file manipulation logic (complexities), and provides unique data relationship capabilities, resulting in additional hardware independence.

The overall idea is to create application systems that enhance rather than hinder system evolution from both the functional and environmental points of view, to free the application system from hardware/software restrictions associated with a specific vendor, and to allow for flexibility in future corporate growth patterns. Therefore, the Generic Solution approach may very well represent the only true solution to application systems in today's data processing environment.

GENERAL INFORMATION AND SYSTEM CONCEPTS

This overview presents introductory information about the Manufacturing Material Planning System (MMPS) - general concepts of design, structure, and operation.

1.1 A Generic Solution to MRP Support Requirements

The application of the Generic Solution concept to the Material Requirements Planning area has resulted in Cincom System's Manufacturing Material Planning System, MMPS. MMPS is a data processing system designed to be a universal foundation for many varieties of company-unique MRP support systems. This foundation design includes the three support functions required for MRP: Bill of Material Definition and Maintenance, Inventory Status Maintenance, and Master Schedule Definition and Maintenance; as well as the MRP Analysis function itself.

As in the case of MMPS as a whole, each of these individual support mechanisms is intended to be a universal base for many company-unique variations of the respective functional area. This means that each of these support mechanisms provides the master data definitions, transaction types, processing logics, and display or reporting facilities that represent a generally standard definition of the required support capabilities.

It is unlikely that the basic MMPS implementation of any one of these facilities exactly matches an individual company's requirements. As mentioned in the Design Philosophy discussion, however, it is equally unlikely that any specific bill of material maintenance, inventory control, or other support mechanism would meet more than one company's true requirements. As you read the following descriptions of MMPS and its components, therefore, please remember that we are defining a base system that is intended to be modified and possibly extended to meet your unique requirements. MMPS is a generic MRP support mechanism whose data base content, transaction types and formats, display and reporting capabilities, and processing logic can all be efficiently modified and extended to provide the true solution to your unique support requirements.

1.2 Major Functions of MMPS

The primary functions of MRP support mechanisms fall into three basic categories:

1. Bill of Material Maintenance
2. Material Plan Maintenance
3. MRP Analysis

MMPS, as a data processing system, provides these functional capabilities in three major modules, with assistance from several others to provide functions like transaction control, generalized data extract, and various system control services.

The first of the three major modules is the Master Data Base maintenance component. It provides part master data and bill of material maintenance and includes these functions:

- . part master data maintenance
- . bill of material definition and maintenance
- . where-used relationship maintenance
- . low-level code maintenance
- . engineering change control by date
- . pending engineering change review

The second major module is the Material Control Transaction Processing component. Nearly all of the inventory status and material plan maintenance is performed within this component. Transactions for balance-on-hand maintenance, committed and planned on-order condition maintenance, master schedule order maintenance and also individual requirements maintenance (independent and dependent demand) are all processed by this module:

- . physical count support
- . balance on hand maintenance
- . master schedule maintenance
- . master and detail on-order maintenance
- . detail requirements maintenance
- . stock status review

In the third major component, the MRP Review Process, the inventory status, master schedule, and details of material plans are reviewed and analyzed. This module performs an activity driven, net change replanning analysis of the data maintained by the Material Control Transaction Processing module. Where necessary, new orders are planned, existing planned orders are modified, exception conditions are identified, and reschedule messages are generated:

- . bucketless, pegged requirements
- . manufacturing day as planning increment
- . unlimited planning horizon
- . net change review
- . multiple planning fences
- . flexible lot-sizing policies
- . nervousness dampers
- . automatic allocation
- . automatic order aging
- . exception retention and re-presentation

Table 1 offers a basic definition of the primary functional requirements of a material control system, the general definition of MRP facilities that fill those needs, and the procedures of controls in MMPS that provide those MRP facilities.

Table 1. MANUFACTURING INFORMATION FUNCTIONS PERFORMED BY MMPS

INDIVIDUAL MANUFACTURING OPERATION REQUIREMENTS	PROCESSING AND INFORMATION REQUIRED TO RESOLVE THE NEED	RESPECTIVE PROCEDURES/ CONTROLS INHERENT IN MMPS
The ability to closely control and monitor all input data affecting the manufacturing process.	A method for determining what data has been submitted, when, by whom and what its effect has been.	<ul style="list-style-type: none"> a. Batch Control Log b. Master DB Maintenance Log c. Material Control Log d. Transaction Reject Review e. Transaction History Log
The ability to define the components and raw materials required for producing an end item; ability to determine what products a given part goes into.	A structural relationship among raw materials, component parts, and end items.	<ul style="list-style-type: none"> a. Part Master Display b. BOM Master c. BOM Displays <ul style="list-style-type: none"> -Single Level Explosion -Indented Explosion -Single Level Implosion -Indented Implosion
The ability to plan the necessary future manufacturing and purchase orders at all levels in order to meet end item production objectives.	A method for entering a Master Production Schedule, calculating the associated material requirement dates and quantities, and scheduling orders for each required item with notices of 'exception' situations and advised action.	<ul style="list-style-type: none"> a. Master Schedule Display b. Material Plan c. Material Plan Exceptions d. Order Review Activity Log
The ability to set priorities and react to the complex, constantly changing activities and capabilities of the manufacturing operation.	A method for manipulating, tracking, and displaying requirements, on-hand balances, and on-order conditions that together define the material plan for end items, components, and raw materials.	<ul style="list-style-type: none"> a. Material Plan b. Material Plan Exceptions c. Order Status Display d. Stock Status Display

1.3 COMPONENTS OF MMPS

MMPS consists of seven components:

1. The MMPS Data Base - stores the part and bill of material information that defines products, and the inventory status, on-order conditions, and requirement conditions that define the material plan.
2. Transaction Control Processing - provides the internal routing, processing, and tracking of all incoming user transactions.
3. Data Base Maintenance Processing - provides maintenance and display capabilities for all 'static' data involved in product and part definition. (Bill of Material)
4. Material Control Processing - provides inventory control, order maintenance, and requirements maintenance capabilities.
5. Master Schedule Processing - provides the ability to enter, display, and modify Master Schedule information to drive MRP.
6. MRP Review Processing - performs analysis of the material plan status as defined by inventory, on-order, and requirement conditions, as they relate to the master schedule; attempts to re-balance the material plan, thereby accounting for material activity and passage of time since the last balancing of the plan; presents user with detailed and summarized information along with relevant suggested action messages.
7. Utility Support Processing - provides the Data Processing Department with a series of programs to assist in system installation, system control, and system extensions.

These components will be discussed in more detail in the following paragraphs.

Figure 1 presents a conceptual illustration of the basic components of MMPS.

MANUFACTURING MATERIAL PLANNING SYSTEM

MMPS

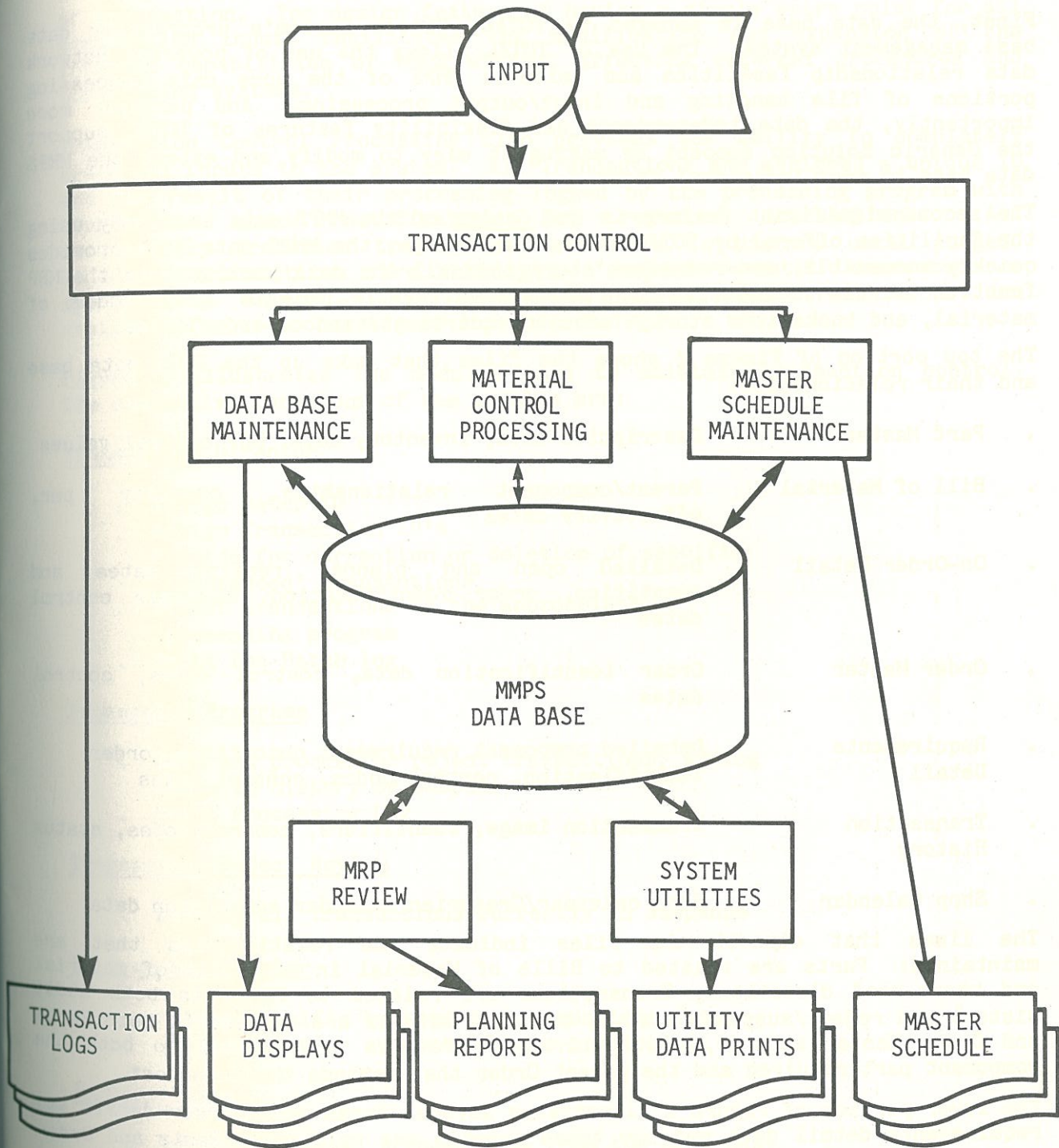


FIGURE 1 Basic Components of MMPS

1.3.1 The MMPS Data Base

The MMPS data base is the critical cornerstone in the design of MMPS. Two important aspects of this data base heavily influence the nature of MMPS as both a data processing system and a MRP support mechanism.

First, the data base is managed by TOTAL, Cincom System's proprietary data base management system. The use of TOTAL allows the use of powerful network data relationship facilities and relieves MMPS of the pure data processing portions of file handling and input/output processing. And perhaps more importantly, the data independence and flexibility features of TOTAL support the Generic Solution concept by making it easy to modify and extend the MMPS data base to meet individual needs.

The second significant feature is the design of the MMPS data base. By using the facilities offered by TOTAL to full advantage, the MMPS data base provides quickly accessible, non-redundant storage of all the data pertinent to the MRP function at the detail level: most significantly, single level bills of material, and bucketless storage of all requirements and on-order data.

The top portion of Figure 2 shows the files that make up the MMPS data base and their relationships:

- . Part Master Descriptive data, inventory data, MRP control values
- . Bill of Material Parent/component relationships, quantity per, effectivity dates
- . On-Order Detail Detailed open and planned receipt dates and quantities, order identification, multiple control dates
- . Order Master Order identification data, control codes, control dates
- . Requirements Detail Detailed component requirement quantities, order identification, control codes, control dates
- . Transaction History Transaction image, identifiers, control codes, status
- . Shop Calendar Shop calendar/Gregorian calendar conversion data

The lines that connect the files indicate the relationships that are maintained: Parts are related to Bills of Material in both bill of material and where-used directions, Transactions are related to Parts in both audit history and reject/suspense status, On-order Details are related to both Parts and Order Master records, and Requirements Details are related to both the component part required and the parent Order that demands the component.

The lower portion of Figure 2 illustrates several forms of on-order detail and requirements detail data and how these details are related to Parts and Order Masters. The On-Order Details linked to Part A represent three planned receipts of A, as multiple delivery lots of Order 28. Order 30, on the other hand, is a multi-item order. Lots of B, C, and D will all be delivered on 429. Item E is a manufactured Part and has an on-order condition defined as manufacturing order 32. Linked to order 32 in the Requirements Detail file are component requirements records for D, F, G, and H. These requirement conditions are also linked to the respective parts.

1.3.2 Transaction Control Processing

This component is the entry point for all MMPS user transactions. It directs each user input to the specific subsystem which handles that type of transaction. The design feature of having a single entry point for all transaction inputs facilitates the modification and expansion of the internal capabilities of MMPS without affecting external procedures and interfacing systems.

Transaction Control Processing also provides the ability to completely track all inputs to the system. All Transactions are assigned a unique ID and the result of their processing logged by the processing program with appropriate error notification for rejected transactions. All successfully processed transactions are held in history until purged. Rejected transactions are held in 'suspense' until corrected or specifically deleted. All processed and rejected transactions are available for re-processing if and when desired.

Figure 3 illustrates the modules used to maintain transaction control. The respective functions of the modules are:

Transaction Director

- . Assign Batch ID
- . Assign Transaction ID's
- . Provide for correction or deletion of specific 'suspended' transactions
- . Direct transactions to the appropriate processing program
- . Print the Batch log

Processing Programs

- . Edit and process or reject transactions, adding them to history or suspense
- . Print Processing Log

Transaction Reject Review

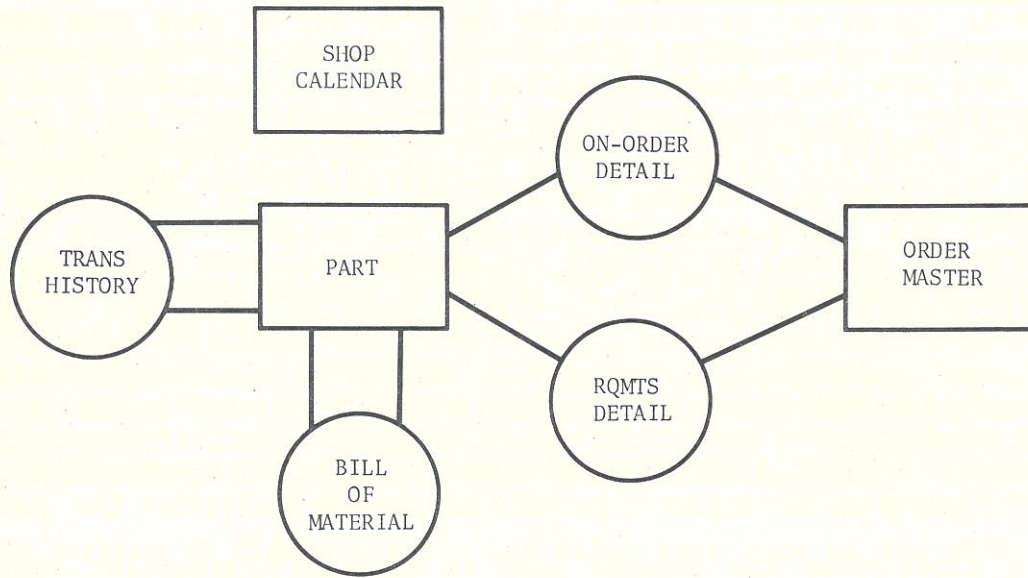
- . Display all transactions currently in suspense

Re-Process Selector

- . Select specific batches or transactions from history and/or suspense for re-processing.

History Purge

- . Remove processed transactions from the data base and place in long-term history.



MMPS DATA BASE STRUCTURE

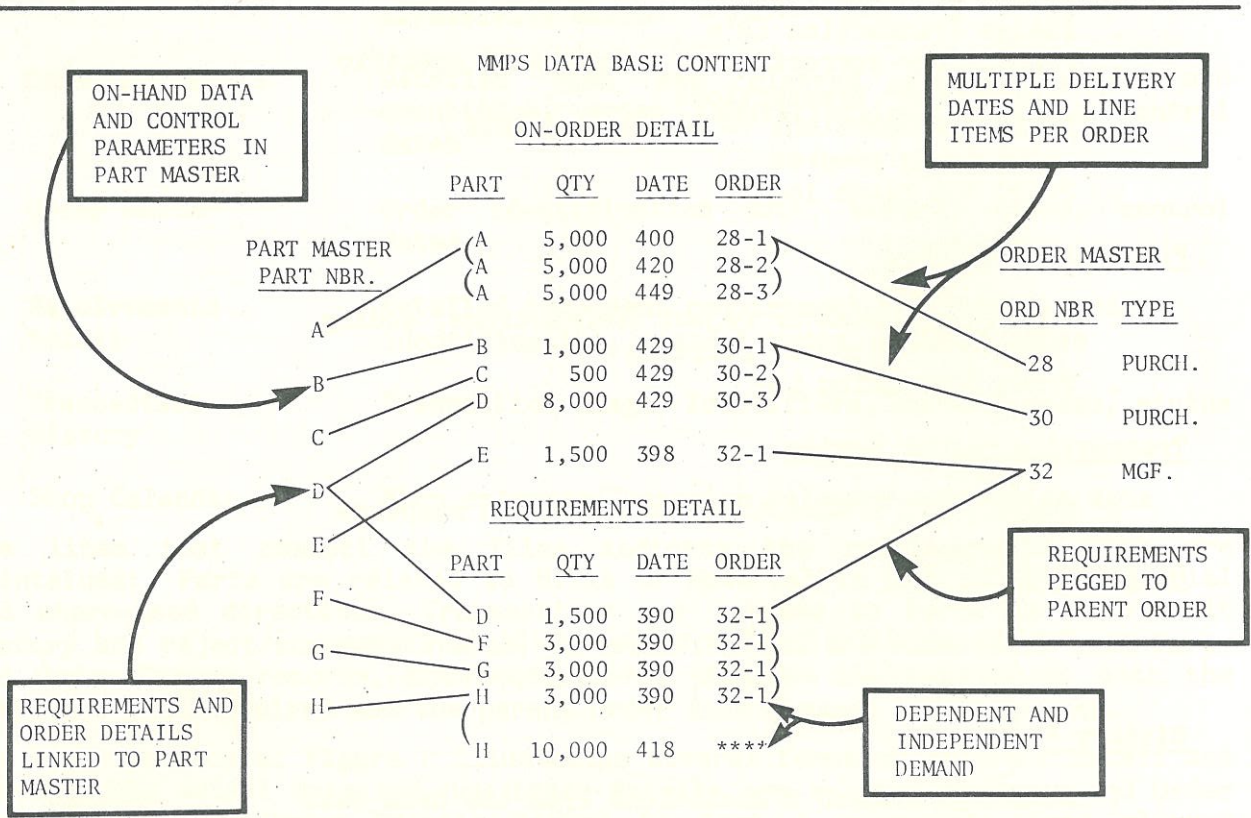


FIGURE 2

TRANSACTION CONTROL

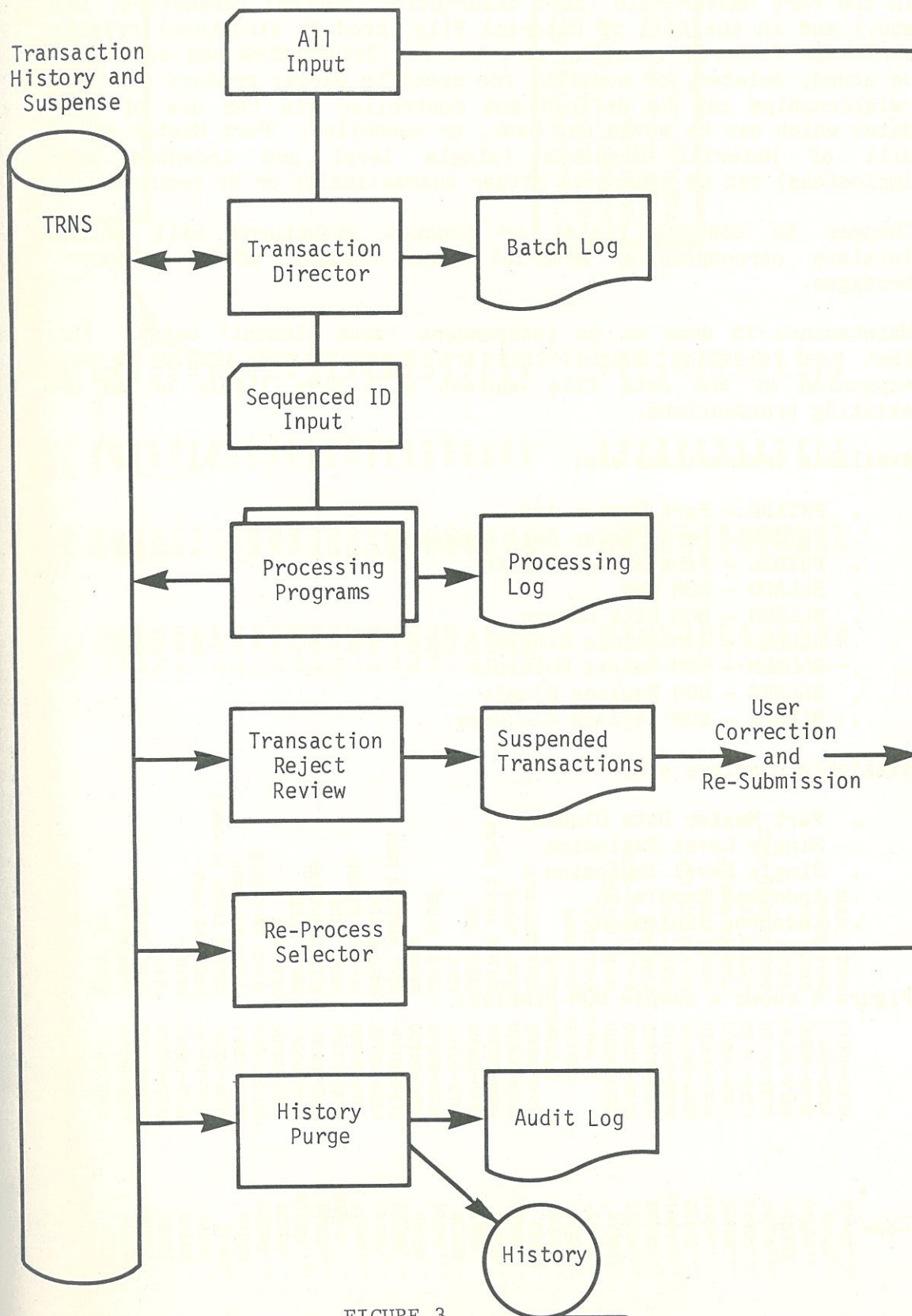


FIGURE 3

1.3.3 Data Base Maintenance Processing

This component provides maintenance and display capabilities for 'static' data contained in the MMPS Data Base. Static data is typically embodied in the Part Master File (part description, control parameters, lead time, etc.) and in the Bill of Material File (product structural relationships, shrinkage factors, quantity per, etc.). Descriptive and control data can be added, deleted, or modified for specific parts; product structure (BOM) relationships can be defined and controlled via the use of effectivity dates which can be moved up, back, or cancelled. Part Master displays and Bill of Material displays (single level and indented explosions/implosions) can be generated either automatically or by request.

Changes to control fields or product structures will automatically initiate corresponding material plan changes and/or planner action messages.

Maintenance is done on an independent 'data element' basis. This means that user updating capabilities are flexible and simple to use, while expansion of the data file content will have little or no effect on existing transactions.

Available transactions are:

- . PRTADD - Part Master Add
- . PRTCHG - Part Master Data Change
- . PRTDEL - Part Master Delete
- . BLLADD - BOM Add
- . BLLCHG - BOM Data Change
- . BLLDLS - BOM Delete Single
- . BLLDLM - BOM Delete Multiple
- . BLLRPS - BOM Replace Single
- . BLLRPA - BOM Replace All Uses

Available Displays are:

- . Part Master Data Display
- . Single Level Explosion
- . Single Level Implosion
- . Indented Explosion
- . Indented Implosion
- . Master BOM Display

Figure 4 shows a sample BOM display.

ENGINEERING
CHANGE CONTROL
BY EFFECTIVE
DATE (AUTOMATICALLY
REFLECTED IN MATERIAL
PLAN.

EXPLOSIONS/IMPLOSIONS
IN SAME FORMAT
AUTOMATIC LOW-LEVEL-CODE
MAINTENANCE
MODULAR 'CHASE' ROUTINE
FOR ADDITIONAL REPORTS.

PARENT PART	PARENT DESCRIPTION	SEQ NBR	COMPONENT PART	COMPONENT DESCRIPTION	QTY PER	SHRK FCTR	BEGN DATE	END DATE	EF CD
WAGN-20000	DELUXE RED WAGON								
		00010	WRED-00001	WAGON RED	1.000	.000	***	***	
		00010	STMP-00300	STAMPED RED	1.000	.000	***	***	
		00010	SLSH-00010	SHEET STEEL	6.000	.060	***	***	
		00020	PNTS-00025	PAINT	0.125	.100	119	***	
		00020	PNTS-00025	PAINT	0.200	.100	***	***	
		00030	DECL-00500	LOGOTYPE DECAL	2.000	.050	***	***	
		00020	ASSM-00002	DELUXE FRONT ASSEMBLY	1.000	.000	***	***	
		00010	WHL5-08000	WHEEL ASSEMBLY	2.000	.000	***	***	
		00010	TIRE-00800	BLACK WALL TIRE	1.000	.050	***	***	
		00020	RIMS-00400	TIRE RIM	1.000	.000	***	***	
		00010	LSSH-00010	SHEET STEEL	1.650	.050	***	129	
		00030	HBCP-00700	SILVER HUB CAP	1.000	.000	***	***	
		00010	SLSH-00010	SHEET STEEL	0.850	.020	***	***	
		00030	HBCP-00800	PLASTIC HUBCAP	1.000	.000	***	***	
		00040	HBCP-00800	PLASTIC HUBCAP	2.000	.100	***	***	
		00050	CTPN-00100	COTTER PIN	1.000	.002	***	***	
		00020	BLBR-00200	BALL BEARING UNIT	1.000	.000	***	***	
		00010	HNDL-00100	HANDLE	1.000	.002	***	***	
		00010	SLSH-00010	SHEET STEEL	1.000	.000	***	***	
		00030	AXLE-00100	AXLE	1.000	.000	***	***	
		00010	SLRD-00800	STEEL ROD	1.666	.050	***	***	
		00040	FRME-00002	DELUXE FRONT FRAME	1.000	.000	***	***	
		00010	SLSH-00010	SHEET STEEL	1.450	.080	***	***	
		00030	ASSM-00003	REAR ASSEMBLY	1.000	.000	***	***	
		00005		* OPTIONAL EXTRA					
		00006		* TRAILER ATTACHMENT					
		00007		* 3 MODELS AVAILABLE					
		00010	WHL5-08000	WHEEL ASSEMBLY	2.000	.000	***	***	
		00010	TIRE-00800	BLACK WALL TIRE	1.000	.050	***	***	
		00020	RIMS-00400	TIRE RIM	1.000	.000	***	***	
		00010	SLSH-00010	SHEET STEEL	1.650	.050	***	129	
		00030	HBCP-00700	SILVER HUB CAP	1.000	.020	***	***	
		00010	SLSH-00010	SHEET STEEL	0.850	.000	***	***	
		00030	HBCP-00800	PLASTIC HUBCAP	1.000	.100	***	***	
		00040	CIPN-00100	COTTER PIN	2.000	.002	***	***	
		00050	BLBR-00200	BALL BEARING UNIT	1.000	.000	***	***	
		00020	AXLE-00100	AXLE	1.000	.000	***	***	
		00010	SLRD-00800	STEEL ROD	1.666	.005	***	***	
		00030	FRME-00003	REAR FRAME	1.000	.000	***	***	
		00010	SLSH-00010	SHEET STEEL	1.700	.040	***	***	

FIGURE 4 Sample BOM Display

COMPONENTS (AND COMMENTS)
CONTROLLED BY INDEPENDENT
SEQUENCE NUMBER.

1.3.4 Material Control Processing

This component maintains the 'non-static' data contained in the MMPS Data Base. This includes Inventory Control, Order Maintenance, and Detail Requirements Maintenance (both dependent and independent demand). Essentially, this component is used to input material activity and changes to the material plan; all activity and/or changes will automatically cause an MRP Review of affected items.

Inventory Control

Transactions which are processed through Inventory Control are those which are used to maintain a current count of the balance on-hand of all parts under the control of MMPS. Issues, receipts, counts, returns, and adjustments are the types of transactions which maintain this current on-hand inventory balance.

Issues, receipts, and returns also update the appropriate requirement and on-order records as well as the on-hand balance.

Order Maintenance

Transactions processed through order maintenance are in the form of adds, cancels, changes, opens, and closes of both manufacture and purchase orders.

When a manufacture order is added, the parent Bill of Material is exploded to create detail component requirements in proper relation to the planned receipt date and quantity of the order. If and when the order is modified or cancelled, the component requirements are automatically modified or cancelled correspondingly. Maintenance can be applied to planned purchase orders to relate specific delivery dates, line items, etc., to open P.O. numbers.

Detail Requirements Maintenance (Dependent Demand)

Requirement Maintenance transactions can be used to add, delete, substitute, or modify the detail component requirements for specific orders. This maintenance can be done to create non-standard orders whose material requirements vary from the standard Bill of Materials.

Independent Demand Requirements Maintenance

These transactions allow you to add, delete, and modify definitions of independent demand (requirements not associated with a higher level order). This can be used to introduce into the MMPS system requirements for end items as an assist in establishing a Master Production Schedule, and can also be used to introduce service part demand for lower level items.

Master Schedule Processing

This component uses the Independent Demand Requirements Maintenance and/or Order Maintenance Transactions to Generate a Master Schedule Display for user analysis. The user can then perform time-phased order point methods either manually or using MRP logic on these items in order to create Master Schedule Orders and/or modify existing Master Schedule Orders as input to drive MRP.

MANUFACTURING MATERIAL PLANNING SYSTEM
MASTER PLAN

MPS-R090
PLANNER ID CS

REPORTS DISTRIBUTED
TO PLANNER
RESPONSIBLE

USER CONTROLS ORDER
MATURING PROCESS
VIA TIME FENCES

USER DEFINES
LOT-SIZE POLICY

BUCKETLESS
REQUIREMENTS
DETAIL PEGGED
TO PARENT ORDER

MANUFACTURING DAY AS
PLANNING 'INCREMENT';
USER DEFINES PLANNING
'PERIODS' FOR DETAIL
SUMMARY.

ORDER RESCHEDULE
ADVISE MESSAGES

PART NBR	DESCRIPTION	TYPE	REVW	LAST	INV	BOM	CONV	LEAD	RLSE	FIRM	INV	ORD	ORDER	ORDER	STOCK	SAFETY	STOCK	SHRK
MC	100	00170-100	EACH	1.000	08	10	18	MR	FQ	10	1,000	1,800	100	294	.000			
HBCP-00700	SILVER HUB CAP	M																

***** PLAN DETAIL *****

ORDER #	PARENT	REQUIREMENTS	QTY-REQD	QTY-ISSD	STAT	EXCP	* DAY *	ORDER #	TYPE	CTRL	QTY-OORD	QTY-REVD	STAT	EXCP	PLANNED
000145-001	WHLS-08000	294	0	AL	RQ1	* 099 *									1,506
000146-001	WHLS-08000	1560	0	RQ	RQ2	* 105 *		000156-001	MO		1000	0	RR	002	-54
000147-001	WHLS-08000	720	0	RQ		* 115 *									946
000148-001	WHLS-08000	680	0	RQ		* 121 *		000157-001	MO		1000	0	PL		226
000149-001	WHLS-08000	1240	0	RQ		* 127 *		000158-001	MO		1000	0	PL		546
000150-001	WHLS-08000	1000	0	RQ		* 133 *		000159-001	MO		1000	0	PL		306
000151-001	WHLS-08000	960	0	RQ		* 139 *		000160-001	MO		1000	0	PL		306

***** TIME PHASED PLAN *****

PERIOD	END CAL	END SHOP	1	2	3	4	5	6	7	8	9	10	11
CURRENT	07/25	101	08/01	08/08	08/15	08/22	08/29	09/06	09/12	09/19	09/26	10/03	10/10
			107	113	119	125	131	137	142	146	152	158	
PROJ ON HAND	1,800		1,506	-54	946	226	546	306	306	346	346	346	346
OPEN ORDERS													
PLND ORNERS				1,000	946	1,000	1,000	1,000	1,000	346	346	346	346
PLND AVAIL	1,800		1,506	946	946	1,226	1,546	1,306	1,306	346	346	346	346
REQUIREMENTS	294		1,560	720	720	680	1,240	1,000	960	346	346	346	346
ENDING BAL	1,506		-54	946	226	546	306	306	346	346	346	346	346

BEYOND
/

FIGURE 5. Material Plan Information

1.3.6 MRP Review Processing

Material Requirements Planning (MRP) is a method of generating future material requirements to meet a given Master Production Schedule, and of planning appropriate manufacturing and purchasing activities necessary to support that schedule. 'Net Change' MRP is the process of re-analyzing those plans for items which have changes or activity at the time the activity occurs.

The MRP Review Processing component of MMPS periodically reviews the on-hand balance, requirements detail, and order detail information for items which have had 'activity' since the last review. This is done to monitor the material plan to determine whether or not, based upon user-defined parameters, the planned availability appropriately supports the requirements. When an 'imbalance' exists, the system either changes the plan or notifies the planner that certain actions should be taken. This system action depends upon where the 'imbalance' occurs in relation to user-defined 'time fences'.

Additionally, all orders are periodically reviewed to take into account the passage of time and to make limited automatic status changes according to 'time fences'.

Table 2 shows the major MRP control parameters, statuses, and exception/advice messages.

The MRP Review component provides the planner with a concise, yet detailed, set of planning and control reports with which to do his job. They are designed such that the planner has short, concise 'Priority Action' reports which lead him quickly to those items needing action while providing him with 'Detailed Reference' reports with which to make decisions on that action.

Figure 5 shows a sample R090 Master Plan report page.

<p>Priority Action Reports:</p> <p>R095 - Material Plan Exceptions R120 - Order Activity Log</p> <p>Detailed Reference Reports:</p> <p>R090 - Master Plan R140 - Order Status Review</p>
--

1.3.7 Utility Support Processing

The Utility Support Processing component provides programs to: initialize files for system start-up, display all or parts of the Data Base, generate a shop calendar, manipulate data, and control the day-to-day operation of the system. Additionally, various key and data extract programs are provided to aid the user in developing additional reporting capabilities pertinent to his unique environment.

MRP CONTROL PARAMETERS AND STATUSES

TIME FENCES	LEAD TIME READY-FOR-RELEASE FENCE FIRM-PLANNED FENCE
INVENTORY POLICY	MRP CONTROLLED (OR) NON-MRP CONTROLLED
ORDER (LOT-SIZING) POLICIES	DISCRETE (LOT-FOR-LOT) (OR) FIXED PERIOD (OR) FIXED QUANTITY
SAFETY STOCK	AUTOMATICALLY REPLENISHED BEYOND FIRM-PLANNED TIME FENCE
NERVOUSNESS DAMPERS	EARLY FACTOR LATE FACTOR
ORDER STATUS	PLANNED FIRM PLANNED READY-FOR-RELEASE OPEN CLOSED
REQUIREMENT STATUS	"ALLOCATED" WHEN PARENT ORDER BECOMES READY-FOR-RELEASE

MRP EXCEPTION/ADVICE MESSAGES

ORDER MESSAGES	RESCHEDULE IN RESCHEDULE OUT INCREASE QUANTITY DECREASE QUANTITY READY-FOR-RELEASE OVERDUE-FOR-RELEASE OVERDUE-FOR-RECEIPT
REQUIREMENT MESSAGES	NOT COVERED BY PLAN NOT COVERED BY STOCK ("ALLOCATED" REQUIREMENT) OVERDUE FOR ISSUE

TABLE 2

MMPS OUTPUT OVERVIEW

The reporting philosophy of MMPS is that the user should be notified of exception conditions and required action with as little 'paper shuffling' as possible, but at the same time, have quick access to all necessary detail and summary data in order to make decisions and take action. The output 'types' below are designed to support this philosophy.

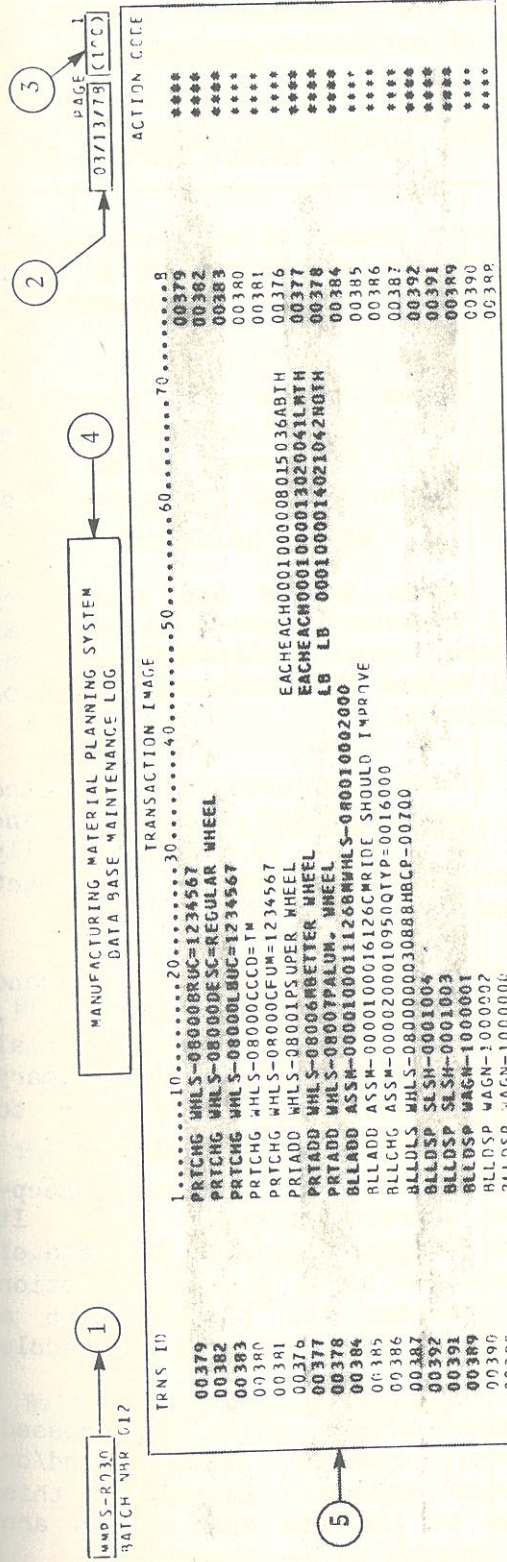
Types of MMPS Outputs

The standard output reports included in the MMPS system fall into four general categories:

1. Transaction Logs. Transaction log reports display results of transaction processing. Information contained in this type of output includes Batch Number, Transaction ID, Transaction Data, and resulting action code(s). This type of report serves as a transaction audit trail for the user.
2. Activity Logs. Activity log reports display automatic system action and/or advised user action. This type of report shows when specific action has been taken by the system or needs to be taken by the user (e.g. a planned order has been made ready-for-release by the system and should be opened by the planner).
3. Reviews. Review reports re-present errors, exceptions, or pending changes which were displayed at processing time by a Transaction Log or an Activity Log. This type of report reminds the user that he needs to make a decision and take action.
4. Displays. Display reports present current Data Base contents in detail and/or summary form. This type of report can be automatic or 'on-request' and provides the user with the reference information he needs to make a decision and take action.

General Format of MMPS Output Reports

The basic format of all of the output reports produced by MMPS is the same. The sample report shown in Figure 6, the General MMPS Report Format, represents a typical MMPS report. This sample report identifies the basic components of an MMPS report, and shows the location of these elements on the print-out.



```

1.....10.....20.....30.....40.....50.....60.....70.....80.....90.....
PRYCHG WHLS-08000RUC=1234567
PRYCHG WHLS-08000DE SC=REGULAR WHEEL
PRYCHG WHLS-08000LBUG=1234567
PRYCHG WHLS-08000CCCD=TM
PRYCHG WHLS-08000CFUM=1234567
PRIADD WHLS-08001PSUPER WHEEL
PRIADD WHLS-08006BETTER WHEEL
PRIADD WHLS-08007ALUM. WHEEL
BLRADD ASSM-0800100011268WHLS-080010002000
BLRADD ASSM-0000100016126CRRIDE SHOULD IMPROVE
ALLCHG ASSM-0000200010950QTPP=0016000
BLLDLS WHLS-08000000030888H8GP-00100
BLLDSP SLSM-0001004
BLLDSP SLSM-0001003
BLLDSP WAGN-1000001
BLLDSP WAGN-1000002
BLLDSP WAGN-1000000
3LLDSP WAGN-1000000

```

```

*****
TOTALS *****
*****

```

1. Report Identifier
2. Calendar Date of Creation
3. Shop Date of Creation
4. Report Title
5. Detailed Data
6. Summarized Data (Transaction Processing Programs Only)

FIGURE 6. General MMPS Report Format

MMPS Report List

The following list presents the reports provided by the basic MMPS operational flow. No mention is made of frequency, detail content, or distribution because MMPS has been designed for considerable flexibility in conforming the report usage to the needs of particular environments.

REPORT	GENERAL CONTENT AND USAGE
R010 - Batch Control Log	This report shows images of all transactions entering the system and serves as an audit and error correction report for transaction control.
R030 - Data Base Maintenance Log	This report shows images and processing results of all Part Master and BOM maintenance transactions; it serves as an audit and error correction report for transaction control.
R060 - Material Control Maintenance Log	This report shows images and processing results of all inventory control and material plan maintenance transactions; it serves as an audit and error correction report for Transaction Control.
R040 - Bill of Material Display	This report format is used for requested single level and indented explosions and implisions, as well as automatically produced 'Master' BOM prints as by-product of BOM Maintenance.
R090 - Master Plan	This report shows MRP control fields, on-hand balance, requirements and on-order detail, and a time-phased summary of the material plan for a given part. It is the primary reference report used by the planner to track and modify a part's material plan.
R095 - Material Plan Exceptions Display	This report shows the newly generated exceptions to the current material plan. It shows the part number, order-ID, and date of exception conditions along with an exception message; it provides the planner with a 'priority' list of orders needing reschedule action.
R120 - Order Status Activity Log	This report shows orders which have crossed a time fence, changed status, and/or required planner action. Primarily, this report is used to indicate what orders are ready for, or overdue to be released.

MMPS Report List (continued)

REPORT	GENERAL CONTENT AND USAGE
R140 - Order Status Review	This is the primary reference report for order status. For manufacture orders, it shows the several planned control dates and on-order quantity as well as the current status of the order and its associated component requirements (quantity issued, exception messages, etc.). For purchase orders, it shows the planned delivery date(s) and quantity(ies) as well as the current status (overdue, reschedule, etc.).
R220 - Material Plan Exception Review	This report has the same format as R095. This version, however, is run periodically to assure that all exceptions are 're'-presented until resolved.
R320 - Transaction Reject/Suspense Review	This report shows the image, ID, batch, processing date, and reject reason of all transactions currently in suspense. It is used to insure that rejected transactions are 're'-presented until corrected.
R420 - Master Schedule Display	This report shows independent demand and master schedule order details as well as a time-phased summary. It is used as an aid in developing and modifying the Master Production Schedule.
R520 - Pending BOM Maintenance	This report is produced periodically to review BOM changes which have been entered for future dates. It can be used to control final approval of engineering changes.
R521 - Deleted BOM Records	This report is an audit report showing BOM records which have become obsolete and are being removed from the data base.
R620 - Transaction History Purge Log	This is an audit report showing all transactions which have been removed from data base history to long-term history (e.g., tape).
R720 - Stock Status Display	This report shows control fields, on-hand balance, total required quantity, and total on-order quantity for a given part. This report would normally be provided only for items which are being manually planned (e.g., order point items).

MMPS Report List (continued)

REPORT	GENERAL CONTENT AND USAGE
R905 - System Control Display	This report shows the current value of control fields contained in the system control record as well as current contents of the activity chain.
R910 - Shop Calendar	This report shows, in monthly calendar form, the shop dates related to the actual calendar. It can be distributed monthly as desk reference.
R920 - Selected Transaction Log	This report shows all transactions selected from suspense for reprocessing.
OORDDS - Order Data Display Utility	This report lists all data fields for all or selected order detail records.
RQMTDS - Requirement Data Display Utility	This report lists all data fields for all or selected requirement detail records.
PARTDS - Part Data Display Utility	This report lists all data fields for all or selected part master records.

SUMMARY OF DATA BASE ELEMENTS

The following is a list of the data elements applicable in the basic MMPS data base and, as such, contains only those elements which are necessary to the standard functions provided. This list should in no way be considered restrictive as it is intended that the data base will be extended by most users in order to provide the descriptive and control data necessary to their particular environment.

SUMMARY OF ELEMENTS CONTAINED IN DATA BASE FILE RECORDS

<u>Element Name</u>	<u>Explanation</u>
Appear Date	Date transaction was processed.
Batch Number	Batch Number in which transaction was processed.
Begin Effective Date	Time point at which a component Part on a BOM will become active (add to BOM).
Bill of Material Unit of Measure	Unit of Measure. Defines how quantity is maintained in Bill of Material (e.g., GRAM, FOOT, etc.). Might also be used as a Key to Table or Routine.
Carrying-Cost-Code	Key to Table or Routine.
Comment	Bill of Material Comment data.
Component Part Number	Identifies the component part in a parent/component relationship.
Conversion Factor Unit of Measure	Used to convert inventory units of measure to bill of material units of measure.
Cost for Burden	Unit cost for overhead.
Cost for Labor	Unit cost for Labor.
Cost for Material	Unit cost for materials.
Cost for Order	Fixed cost to place an order.
Cost (Total)	Total unit cost.
Control Code	Non-blank entry, specifying that the order is out of MRP control.

SUMMARY OF ELEMENTS CONTAINED IN DATA BASE FILE RECORDS

<u>Element Name</u>	<u>Explanation</u>
Date Closed	Date on which the order was closed.
Date Required	Date on which a component will be needed.
Day of Week	Date of week (e.g., 1-7, 1=Sunday)
Effectivity Code	Effectivity code (e.g., 'D' = delete after End Date).
End Effectivity Date	Time point at which a component part on a BOM will become inactive (delete from BOM).
Exception Code	Key to table or routine to flag situations for User Action or information only.
Firm Planned Time Fence	The number of shop days prior to planned receipt date at which an order becomes "Firm Planned".
Inventory Policy Code	'MR' means MRP controlled; other values mean out of MRP control.
Inventory Unit-of-Measure	Unit-of-measure; defines how the quantity is maintained in inventory (e.g., GRAM, FOOT, EACH, etc.).
Key Date	Shop Calendar date.
Last Batch Date	Date last batch number was generated.
Last Batch Number	Last batch number generated by the Transaction Director, MP010.
Last Count	Last physical inventory count.
Last Count Date	Date of last physical inventory count.
Last Issue Date	Date of the most recent issue.
Last MRP Review Calendar Date	Date of last MRP review run.
Last Order Number	Last order number automatically generated by MRP process.
Last Review Date	Date of last MRP review for the specified part.

SUMMARY OF ELEMENTS CONTAINED IN DATA BASE FILE RECORDS

<u>Element Name</u>	<u>Explanation</u>
Last Transaction Date	Date last transaction was processed.
Last Transaction Identification	Identification of last transaction processed.
Last Transaction Sequence Number	Sequence number of the last transaction processed.
Lead Time	Total time required to complete manufacturing/purchasing process for a specified part.
Level Number Activity Chain Anchor	Indicates level number of the Activity Chain Anchor.
Level Number	Indicates the Activity Chain Level Number.
Low Level Code	The lowest level at which this item appears in any BOM (e.g., Finished Goods = 0).
Maximum Levels	Maximum number of BOM levels.
MRP Early/Late Tolerance Factor	Nervousness Dampener. Indicates the number of Shop Days which orders may be early or late without causing exception conditions.
MRP Review Code	Indicates reason for review; BM = Bill of Material; MC = Material Control.
Number of Sub-Orders	Indicates number of sub-orders for a specified order number.
Order Identification	The order-ID consists of an order number and a sub-order number.
Order Number	Identifies a specific order.
Order Period	Number of time periods included for 'FP' (fixed period) order policy code.
Order Policy Code	Lot sizing algorithm to be used when planning orders. Valid codes are: FP (fixed period), FQ (fixed quantity), and DS (discrete). (Default = DS).
Order Quantity	Predetermined quantity for FQ (fixed quantity) order policy.

SUMMARY OF ELEMENTS CONTAINED IN DATA BASE FILE RECORDS

<u>Element Name</u>	<u>Explanation</u>
Order Policy Quantity Modifier 1	User defined (min order size)
Order Policy Quantity Modifier 2	User defined (max order size)
Order Status	Order Status Codes.
Order Type	Order types are: 'M' (Manufacturing Order); 'P' (Purchase Order).
Part Description	Describes the specified part, for display purposes.
Part Number	Identifies a specific part; key to PART file.
Part Type	Identifies origin of the part; 'M' (manufactured) 'P' (purchased).
Plan Firm Date	Date on which order will become "firm planned".
Planned Receive Date	Planned date for receiving order into stock.
Planned Release Date	Date on which order will be "ready for release".
Planner Identification	Identifies person responsible for the material plan for this part.
Parent Part Number	Identifies parent part in a parent/component relationship.
Quantity Allocated	Total quantity of component part required to support "Ready For Release" orders.
Quantity Issued	Quantity issued to a specified requirement.
Quantity On-Hand	Current inventory for a specified part.
Quantity On-Order	Quantity of a specified part to be added to inventory by the order on the planned receive date.
Quantity Per	Required quantity of a component within a BOM (in BOM units of measure).

SUMMARY OF ELEMENTS CONTAINED IN DATA BASE FILE RECORDS

<u>Element Name</u>	<u>Explanation</u>
Quantity Received	Quantity received against an order.
Quantity Required	Quantity required on the requirement date.
Rejection Code	System Action Codes.
Ready-For-Release Time Fence	The number of shop days prior to planned receipt date at an order becomes "Ready For Release".
Requirement Code	Indicates that requirement is required (RQ) or allocated (AL).
Safety Stock	Indicates part quantity to be on-hand at all times, if possible.
System Control Record Key	Key to System Control Record PART File: LOW-VALUES.
System Control Record Description	Key to System Control Record PART File: MRP System Control Record.
Sequence Number	Specifies the BOM position of component or comment.
Shrinkage Factor	Percentage of loss of material (e.g., breakage, theft, etc.).
Sub-Order Number	Identifies a specific order.
Test Shop Date	A Shop Date, used for system testing, which overrides the date in the 'SCAL' file.
Transaction Data	The image of a card; columns of a transaction.
Transaction Identification	Identification assigned to a specific transaction Director (MP010).

