INDUSTRIAL DATA PROCESSING APPLICATIONS REPORT

Applications	Production Control, Inventory, Sales Analysis
Type of Industry	Engine Component Production
Name of User	Wilmot Breeden Birmingham, England

Equipment Used	I.C.T. 1902 Computer

Synopsis

The Wilmot Breeden Group is comprised of four factories in Birmingham, London and Manchester, England; Glasgow, Scotland; and associated companies in France, Italy, Switzerland, Australia and the U.S. Breeden produces components for automobiles, trucks, domestic appliances, aircraft and chemical and process engineering plants. The Birmingham factory (which employs 6,000 persons) uses an International Computers and Tabulators 1902 computer to help control production, to produce a monthly "build" (a set of routines needed by the assembly production department to formulate each month's work schedule), and to produce information for management.

Wilmot Breeden originally used a punched card installation until it became obvious that that data processing method was inadequate. The equipment was not as flexible as was desired and there were problems of system design. In due course a change was made to a first generation computer. After some time, the company decided to undertake a reappraisal of data processing.

The director of purchasing, the chief accountant, the chief production controller and the organization and methods officer (who later became the data processing officer) formed a committee to probe the advantages of more extensive computerization. They concluded that a company-wide information system was desirable and that an integrated dataprocessing system should be the long-term objective. They took into consideration the fact that it would be necessary to transfer the first generation computer's programs to a new machine, making major changes for the sake of efficiency. Production control, accounting and administrative routines were given priority in the early stage of the data processing service which would ultimately become all embracing. Breeden took special care over education and training, before going into their bigger computer installation. They devised their own scheme for all levels of management and weekend courses were arranged for directors and functional heads at I.C.T.'s training center. After appropriate staff members completed courses, the new data processing department undertook the basic systems study. The staff includes six people on programing and five on systems work. The dp committee had a five to ten year time scale in mind.

Training at other levels involved seminars at the works and special sessions--for everyone down to shop foremen and section leaders in offices--to gain interest and participation in the company's plans.

The first production control tasks transferred were the daily stock requirements routine and the production of cost information on components and assemblies, required for control purposes and to assist the annual inventory. In time, the installation was operated for 60 hours a week at a variety of major tasks including the most significant, production control.

ROUTINES

The first routine for production control is the "monthly build" program, a set of programs which provide at the beginning of each month, data required by the assembly production departments on the month's work schedule. In the development of these schedules, account is taken of the demand from customers, orders in arrears, the actual stock factors and the safety stock factors. This information is tabulated for management, production and the production foremen.

Orders are received from customers which, along with outstanding orders and availability information for two months, are punched into 80-column cards to be merged with physical stock balances and safety stock factors in the computer.

The design of the magnetic tape master files has played an important part in the production control system, which at this stage is primarily catered to by the assembly file. Within this assembly file, a considerable amount of data is stored against each part number; requirements for each sales division are shown together with arrears, stock balances and standard costs--only a few of the items covered by the 90 data fields.

REPORTS

Each day, stock movements are processed, thus making available daily, weekly and monthly information by quantity and value of finished stock at the company's Elmdon warehouse. This data is used in the monthly build program, for monitoring the demand situation, and as an aid to production supervision.

SCHEDULE AND DELIVERY CHART

W.B. PART No.	CUST. CODE	WEEK 0	M	T	W	Th	F	WEEK 1 TOTAL	M	T	W	Th	F	WEEK 2 TOTAL	M	T	W	Th	F	WEEK 3 TOTAL	M	T	W	Th	F	WEEK 4 TOTAL	WEEK 5	WEEK 6	TENT. 1 MONTH	TENT. 2 MONTH	ARREARS
CUST. PART No.	DESCRIPTION		MAY 1	2	3	4	5		8	9	10	11	12		15	16	17	18	19		22	23	24	25	26						
BUMPERS.																															
0/2475	3A20E	56						44						44						44						44			176	176	NIL
	310																														
IG 9841 Pkg. piece																															
0/2987	3A20E	15						10						10						10						10			40	40	NIL
	310																														
IG 9786 Ft Bumper																															
0/2991	3A20E	15						10						10						10						10			40	40	NIL
	310																														
IG 9788 Spring Bar																															
0/2992	3A20E	15						10						10						10						10			40	40	NIL
	310																														

THE SCHEDULE AND DELIVERY CHART IS THE MAIN INPUT TO THE FOREMAN'S PROGRAM AND IS RUN ABOUT EVERY FOUR WEEKS.

36-001E

TRANSFER NOTE

COPY No. 4
D.P. DEPT.

FROM	TICK	SECTION
BUMPER DIV.		
DIECASTING DIV.		A282
MECHANISM DIV.		
FORDHOUSE LANE		
FARRINGDON WKS.		
ANY OTHER		

TO: SERVICE

CARD CODE—PAD MOVT. DESN.—2

INSPECTION STAMP

DESPATCHING DEPT. A/C CODE TO BE PUNCHED: 9 (COL. 31)

RECEIVING DEPT. A/C CODE TO BE PUNCHED (COL. 40): EXPORT 5; SERVICE 6; OTHERS INCL. ELMDON DESPATCH 7

Nº 219285

TRACK No.	No. OF PACKAGES	TYPE OF PACKING	DATE	FXD. QTY. ORDER No. (COLS. 49-56)
	10	BOXES	12.7.67	

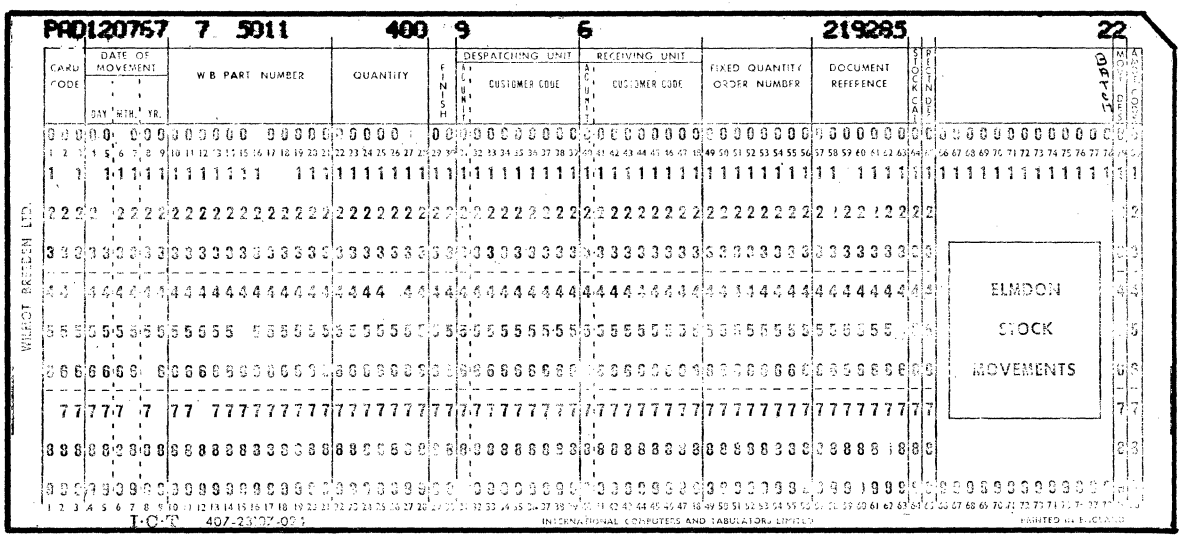
COLS 57-63

COMPONENT No.	W.B. PART No. (COLS. 10-21)	DESCRIPTION	QUANTITY (COLS. 22-28)	FINISH WHERE NON-STANDARD (COLS. 29-30)
	7.5011	HINGES	400	

RAW	R	
BLACK ENAMEL	N	
GRANODISED	G	
CKD (UNASS)	D	
LESS KEYS	L	
C/W 1 KEY	B	
LESS DEVICE	H	
LESS ESCUTCHEON	J	
	V	

CHECK OR POOL No. | NAME | RECEIVED BY | CHECKED BY

THE TRANSFER NOTE IS MADE OUT ON THE SHOP FLOOR, THE FOURTH COPY OF THE SIX PART SET BEING SENT DAILY TO DATA PROCESSING TO PRODUCE THE PUNCHED CARD INPUT TO THE COMPUTER.



APPROXIMATELY 1,000 CARDS PER DAY ARE GENERATED BY THE TRANSFER NOTE.

7.30 AM 19/04/67 — DAILY STOCK LIST — TABULATION NO 310 — PAGE NO 4

WB	PART NO	DESCRIPTION	F	FM	TR	YESTERDAY RECVD	YESTERDAY DESPD	CURRENT	ELMDON STOCK BALANCES OBSOLETE	BONDED	FXD QTY	TOTAL	COVER IN DAYS	STOCK ASSYS R-O-L	RQ
0/	4962	SPRING ASSY	0	01				0	0	0	0	0			
0/	4963	SPRING ASSY	0	01				62	0	0	0	62	4		
0/	4966	BRKT ASSY	0	01				69	0	0	0	69	3		
0/	4967	BRKT ASSY	0	01				70	0	0	0	70	4		
0/	4974	SPRING ASSY	0	01				166	0	0	0	166	13		
0/	4975	SPRING ASSY	0	01				145	0	0	0	145	11		
0/	4980	BUMPER	0	01			80	601	0	0	0	601	9		
0/	4981	BUMPER	0	01		86	40	51	0	0	0	51	1		
0/	4984	OVERIDER	0	01				30	0	0	0	30	2		
0/	4985	OVERIDER	0	01				240	0	0	0	240	18		
0/	4986	HALF BAR	0	01				182	0	0	0	182	14		
0/	4987	HALF BAR	0	01				140	0	0	0	140	11		
0/	4990	BUMPER	0	01				21	0	0	0	21	1		
0/	4991	BUMPER	0	01				15	0	0	0	15	1		
0/	4994	SPRING ASSY	0	01				161	0	0	0	161	12		
0/	4995	SPRING ASSY	0	01				153	0	0	0	153	12		
	5001	BUMPER	0	01			166	159	0	0	0	159			

THE DAILY STOCK LIST IS PRODUCED FROM DETAILS ON THE TRANSFER NOTE AND FROM RECEIPTS AND DISPATCHES TO THE WAREHOUSE.

Another aspect of the assembly program routines is the ability to apply inflationary or deflationary factors to the requirements for each assembly. This means that the first stage -- order entry -- is broken into two parts, one of which produces an initial tabulation enabling management to consider the general situation of demand and supply and to determine the factor to be applied. This tabulation can be classified by customer part number, product group, factory or sales division. The data is fed into the system by means of punched cards, and the final tabulations, the main part of which is the foreman's program, are then produced.

FOUR WEEKLY BUILD PROGRAMME FOR ASSEMBLY SHOP

DATE 29-07-67 — SHEET NO. 1 — PERIOD/YEAR 08-67
TRACK — FACTORY 0 — FOREMAN 01

SERIAL NO	PROD. GROUP	TOTAL TIME HRS	MINS	D.N.M. D/B	STAT. CAT.	W.B. PART NO	A FIVE WEEK PROGRAMME	B PREVIOUS WEEK 4	A-B NEW BUILD PROGRAMME	AMENDMENTS	B WEEK 4 TOTAL
1	040	52	29	W00	0	0/ 2095	3705				
2	040	4	15	W00	1	0/ 2095	300				
3	040	0	00	W00	1	0/ 2095C	200				
4	050	0	00	M00	1	0/ 2249	198				
5	050	0	00	W04	0	0/ 2401	634				
6	091	0	00	M00	0	0/ 2475	182				
7	020	52	60	W02	D0	0/ 2690	999				
8	020	0	00	W10	0	0/ 2987	33				
9	020	0	00	W00	1	0/ 2987	125				
10	091	0	00	M00	0	0/ 2991	69				
11	091	0	00	M00	0	0/ 2992	67				
12	020	37	15	W13	D0	0/ 3045	488				
			00	W00	0	0/ 3187	1875				

THE FOREMAN'S ASSEMBLY PROGRAM IS CALCULATED ONCE A MONTH (APPROXIMATELY) FROM THE SCHEDULE AND DELIVERY CHARTS AND IS THE MASTER ASSEMBLY BUILD PROGRAM ISSUED TO THE SHOP FLOOR.

G

WORK MOVEMENTS

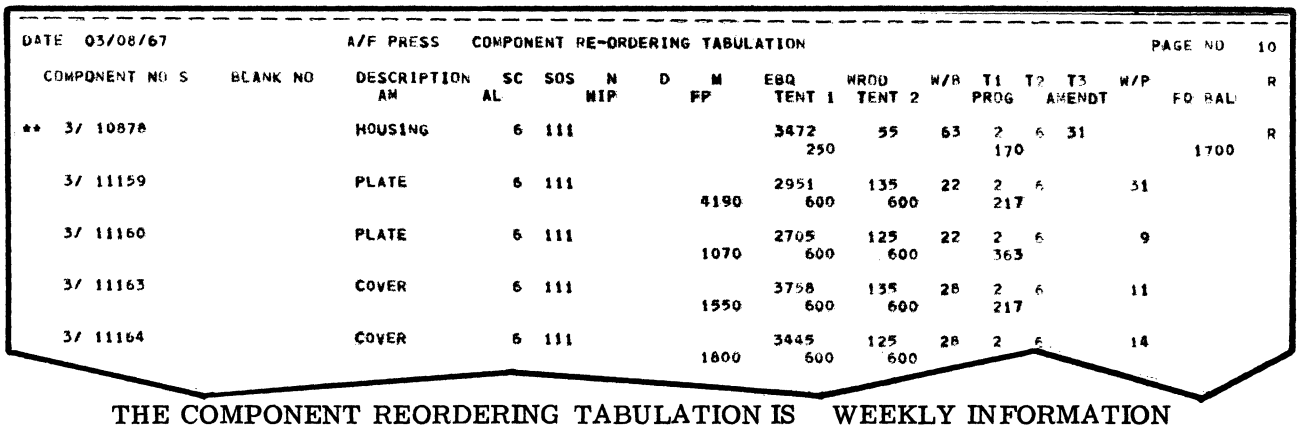
CARD CODE PAP — WEEK No.

PART NUMBER COLS. 4-15	QUANTITY COLS. 16-21	BATCH No. COLS. 22-27	AM. Col. 28	AL. Col. 29	WIP. Col. 30	FP. Col. 31	REMARKS
0/12345	500			-	+		
/34567	600				-	+	

THE WORK MOVEMENT SHEET IS CREATED IN THE PRODUCTION CONTROL OFFICES AND IS USED TO CONTROL THE FLOW OF COMPONENTS THROUGH THE FOUR LEVELS OF WORK IN PROGRESS.

Next, component breakdown routines translate the information on assembly requirements obtained in the monthly build program into component and subassembly form, and also determine raw material requirements.

This part of the processing is made possible by running the "requirement" information on the assembly file with the parts list data. Information on component parts is actually on two files -- the breakdown master file showing parts against each assembly, and the component file, on which the items are in part number order. Tabulations are produced for production, buying and production control.



DATE 03/08/67 A/F PRESS COMPONENT RE-ORDERING TABULATION PAGE NO 10

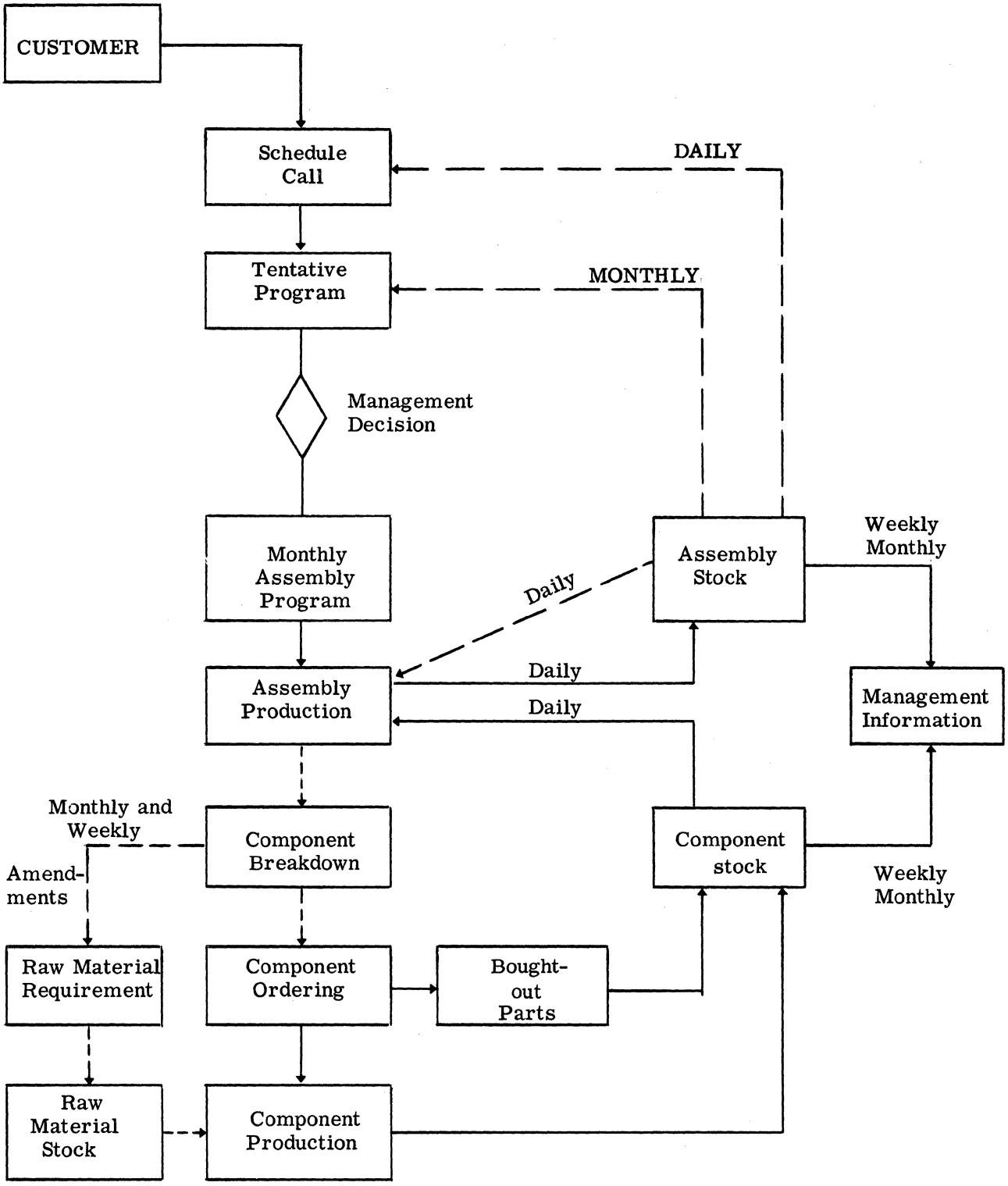
	COMPONENT NO S	BLANK NO	DESCRIPTION	SC AL	SOS	N WIP	D	M FP	EBQ TENT 1	WROD TENT 2	W/R	T1 PROG	T2	T3 AMENDT	W/P	FO BAL	R
**	3/ 10878		HOUSING	6	111				3472	55	63	2	6	31			R
									250			170				1700	
	3/ 11159		PLATE	6	111				2951	135	22	2	6		51		
								4190	600	600		217					
	3/ 11160		PLATE	6	111				2705	125	22	2	6		9		
								1070	600	600		363					
	3/ 11163		COVER	6	111				3758	135	28	2	6		11		
								1550	600	600		217					
	3/ 11164		COVER	6	111				3445	125	28	2	6		14		
								1800	600	600							

THE COMPONENT REORDERING TABULATION IS WEEKLY INFORMATION PRODUCED FROM THE WORK MOVEMENT SHEETS. IT INCLUDES DETAILS OF STOCK AND REORDER QUANTITIES. THE HEADINGS EBQ, WIP, WROD AND FR STAND FOR ECONOMIC BATCH QUANTITY, WORK IN PROGRESS STOCK, WEEKLY RATE OF DEMAND AND FINISHED PART STOCK. THE "R" IN THE RIGHT COLUMN INDICATES A REORDER CONDITION.

A component reordering system provides the production control and buying department with the new component requirements for the various Car Division factories. This information, provided each week, includes the automatic recalculation of the current rate of demand for each item and provides data on each component (or group of components) at several stock levels -- items awaiting loading, those awaiting material, and finished components. This is made possible by adding data on work-in-progress to the component file, used in the breakdown routines. Again 80-column cards are used, however, in the future other forms of data input will be employed.

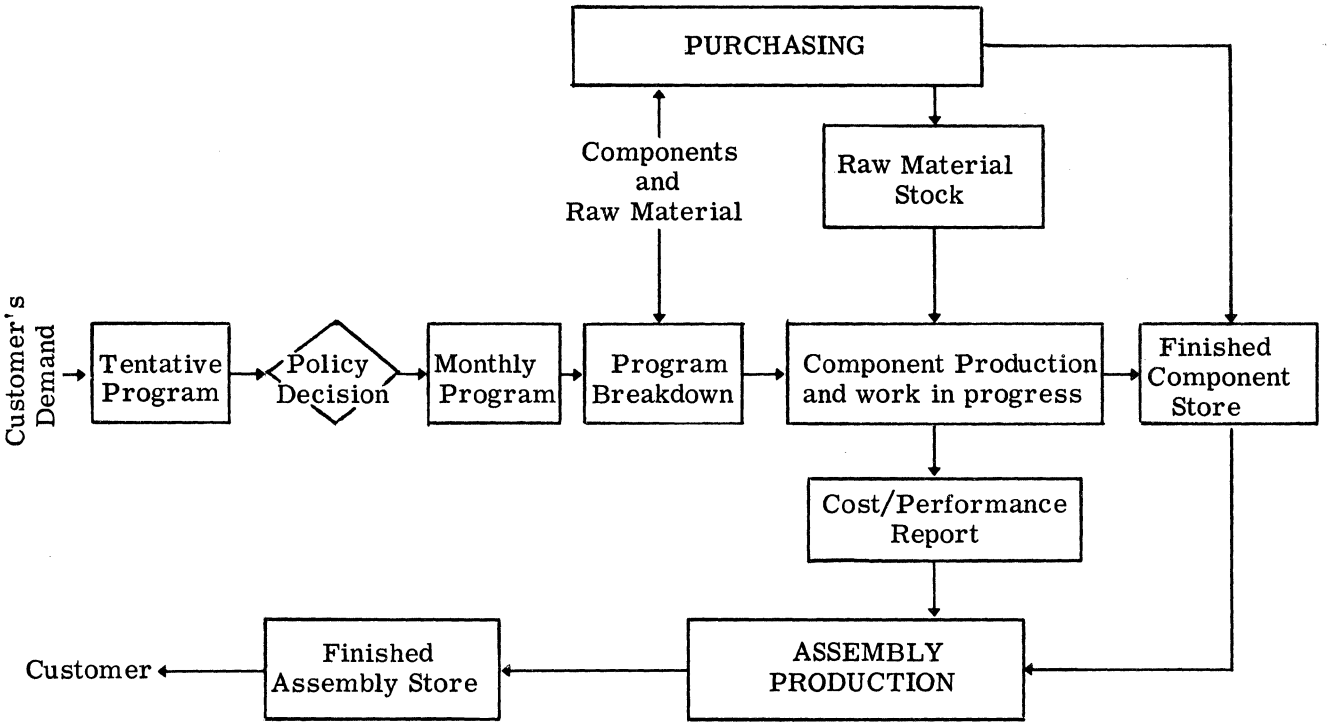
Finally, each week the computer files on assemblies, subassemblies and components are amended, new items are added and obsolete ones are removed. Buying, production control, engineering and cost departments all receive updated information on the parts list. Changes to the monthly build program are also produced at this stage.

There are many important applications for the computer outside the scope of production control. One is the provision of weekly and monthly purchase analysis routines, the end-product of which is an analysis of purchase invoices under expense codes and by department. Apart from the requirements of the Car Division, this information is supplied to Wilmot Breeden(Truflo) Ltd., a company making equipment for chemical installations. Other examples are sales analysis reports and the production of monthly financial information on the receipt of finished parts into several warehouses.



THIS DIAGRAM SHOWS THE INFORMATION FLOW OF THE PRODUCTION CONTROL SYSTEM WHICH, IN ADDITION TO PROVIDING PRODUCTION SCHEDULING INFORMATION FOR ASSEMBLY BUILD, COMPONENT PRODUCTION AND BOUGHT-OUT MATERIALS, PROVIDES SENIOR MANAGEMENT WITH CONTROL DATA ON STOCKS AND PRODUCTION ACHIEVEMENT. STOCK CONTROL TECHNIQUES ARE USED IN SUPPORT OF BOTH THE ASSEMBLY AND COMPONENT ORDERING SYSTEMS.

A weekly and monthly system which is designed to provide a labor cost and performance report is operating at Breeden. The system produces details of direct and indirect labor and indirect materials, showing comparisons between target and actual performance. Another routine yields a computer file on component and assembly costs and includes facilities for easy amendment. This latter procedure eliminates the need for a single annual revision and provides up-to-date information for the production control scheme.



THIS ILLUSTRATES THE GENERAL INFORMATION SCHEME RELATED TO THE MANUFACTURING CYCLE. THE MAJORITY OF DATA PROCESSING ACTIVITIES INCLUDED IN THIS OUTLINE ARE COMPONENTS OF THE PRODUCTION CONTROL SYSTEM. THIS INCLUDES THE PRODUCTION OF A MONTHLY ASSEMBLY PROGRAM AND EVENTUAL TRANSLATION INTO A COMPONENT RE-ORDER SYSTEM ON A WEEKLY BASIS. IN ADDITION, COST INFORMATION IS PROVIDED. THE MOST IMPORTANT ASPECT IS A WEEKLY OPERATING STATEMENT GIVING DATA ON DIRECT AND INDIRECT LABOR, INDIRECT MATERIAL COSTS AND PERFORMANCE RATIOS.

CONCLUSIONS

These and other applications for the ICT installation are augmented by new ideas emerging from investigations. Areas of interest include the control of raw material stock, study of purchasing routines, inventory procedures and further sales analyses as well as extensions of the production control scheme.

The computer installation enables masses of production data to be monitored quickly for the detection of key divergences and trends, yet it also provides a high degree of precision to forecasting, planning and scheduling for production. Printout includes work schedules and progress reports. As a consequence, equipment is better used and inventory on hand is held to a workable minimum. Orders can be filled quickly and more easily, thus passing computerization benefits on to the customers. Men, machines and materials are organized to ensure a smooth production flow. Changing policy and varying demand are now no longer hazardous to essential production.