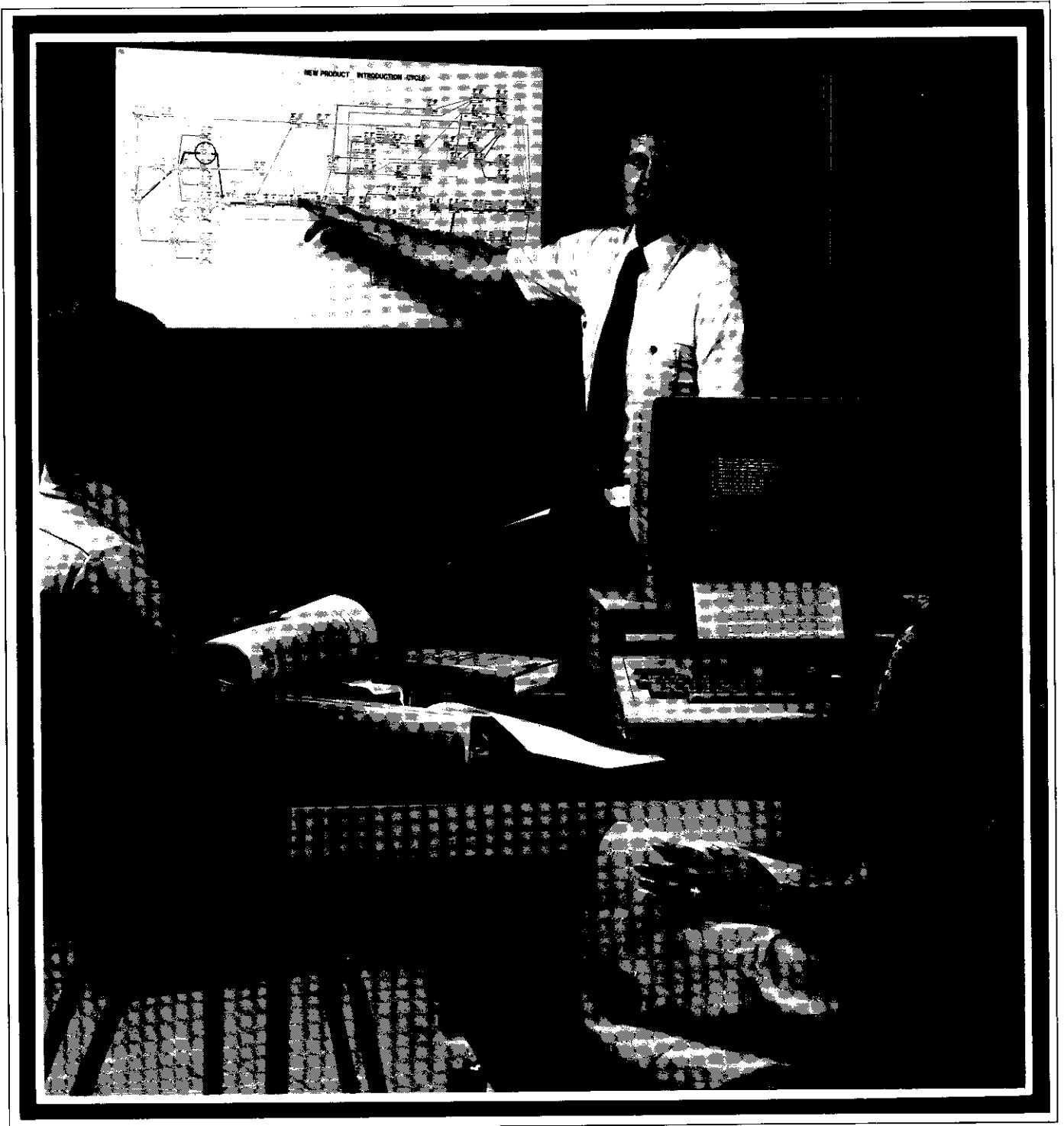


A Hewlett-Packard Software Summary
for the System 45B Desktop Computer

System 45B Business Management



System 45B's business management software for better decisions and tighter control

In the competitive world of business, three things pay off—preparation, innovation and hard work. The amount of hard work necessary to successfully complete a task is often a direct result of your preparation and innovation. To help you gain greater control over these aspects of your job, Hewlett-Packard offers you System 45B and a comprehensive collection of business management software.

No matter what your concern, whether it be forecasting, project management, payroll, or inventory control, HP's System 45B is the solution to your needs. Its versatility and speed give you the ability to perform a wide variety of functions. With this fully integrated desktop computing system, you can sort information, convert it to different graphic and tabular forms, store it for future use, perform all types of arithmetic computations, edit text, and lots more.

HP Puts It All Together For You

System 45B with its integrated system architecture means ease-of-use for you. In a single compact unit, small enough to sit on your desk, you get a valuable computation tool with up to 448K bytes of read/write memory. This system integrates type-writer-like keyboard, central processor, mass storage, graphic CRT, and internal thermal printer.

Also with System 45B, you not only get the results you want, but you get them when you want. System 45B is at your command. This means you can eliminate the turnaround times so characteristic of batch or the charges for timeshare systems.

Don't be fooled by its size. System 45B was designed to conveniently handle both your big problems as well as the small ones. Should your job require fast access to a large amount of stored information, System 45B can handle it. A special ROM which provides Unified Mass Memory Commands to the system enables you to store records on tape or disk without making program changes as you switch from one to the other.

Another ease-of-use feature of this command structure is the file-by-name directory. This allows you to store data by descriptive 6-character titles. For example, you can use "payrol" for payroll files. Then the system automatically takes care of placing files on the storage medium.

A Comprehensive Software Collection

But hardware is only part of System 45B's total solution package. HP also offers an extensive range of business management software. Each pack has been specially designed to benefit most from System 45B's friendly user-interactive features and graphics capability wherever applicable. For instance, when using the forecasting pack for management decisions, you can easily work with your data, trying various alternatives until you get the optimum solution. Then, when you want a hard copy record of your plot, simply type DUMP GRAPHICS and the CRT display is transferred dot for dot to System 45B's internal thermal printer.

Use System 45B Without Becoming A Computer Expert

Because we know you don't have time to become a computer expert to get the results you need, this software was designed to be extremely easy to use. User prompts on the CRT guide you through the program so even less-experienced computer users can perform complicated analyses right away.

In addition, all software for the System 45B is written in HP enhanced BASIC. This language, with its conversation-like commands, makes programming straightforward. Its statements and additional Unified Graphics, Mass Memory, and I/O Commands enable you to quickly and simply perform complex programming operations.

Software Details

To learn more about how the System 45B can help you with your business management problems—look through the detailed software summaries that follow:

- Project Management,
- Forecasting,
- Linear Programming,
- Inventory Control,
- List Management,
- Payroll.

Then, add up the benefits these programs have to offer you. We think you'll agree that with HP's desktop computing system, you can rapidly acquire more information, broaden your scope of planning, and expand your control over many management functions.

Keep projects on time with PERT, CPM, MPM.

Project Management

Project Planning and Control

One of the most important phases of any project is the planning. You may want to build a bridge, construct a ship or organize a workshop production run. Whatever the project, its success depends on the organization of many interrelated activities. What materials are required and when should they be delivered? When should each stage of the project start and finish, and what manpower is required? A great deal of information must be gathered, sorted and analyzed. Alternatives must be investigated.

Network analysis (CPM, PERT, MPM) is the method used most often today to tackle project management. In addition to helping you formulate the basic plan, network analysis enables you to follow the project closely, anticipate problem areas and evaluate alternate plans. In other words, network analysis helps you control and achieve the economic and timing objectives of a project.

Computer-Aided Network Analysis

For projects involving numerous steps, network analysis is a complex and time-consuming job — a job ideally suited to the Hewlett-Packard System 45B Desktop Computer. This easy-to-use system has the power and speed to handle extremely complex networks. Not only can you formulate a plan quickly, you can update and modify it as changes occur during the project. System 45B's compact size lets you put it where it's needed...on the project planner's desk.

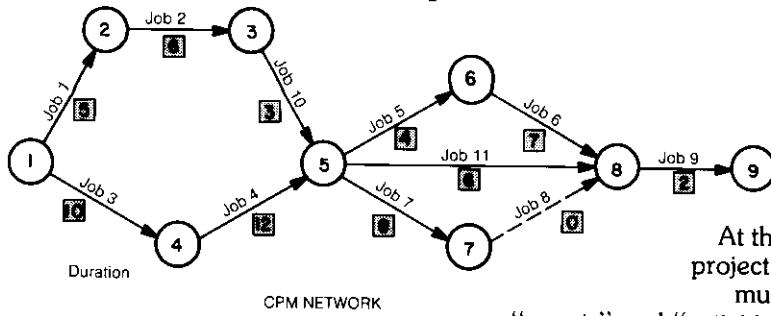
Hewlett-Packard has developed a Project Management software pack for use on System 45B. The program incorporates the following three methods.

- P.E.R.T. Program Evaluation and Review Technique
- C.P.M. Critical Path Method
- M.P.M. Metra Potential Method

Program Features

- 1800 activities for CPM and PERT, or 1400 activities for MPM
- Arbitrary job numbering — jobs can be inserted or deleted throughout the network at any time
- 128 start points
- 128 end points and/or milestones
- Time units of any duration
- Results in time units or calendar dates
- 2048 freely definable non-working days (holidays, etc.)
- 30-character descriptor for activities
- 6-character responsibility code
- 15 different sort keys to access sorted lists
- Multiple-stage sorts
- 7 different selection parameters to output partial lists
- Probability calculation if three time estimates are used
- Unattended processing
- Highlights critical activities

A Sample Network



At the start of the project, the planner must identify all "events" and "activities" and draw the basic network. All the printout examples shown are based on the simple CPM network shown above. Due to space limitations, all printouts have been reduced.

A Choice of Tabular and Graphical Reports

You have several choices for the presentation of the results of network calculations. Not only can vital project information be present as a tabular report which provides exact dates and times but a GANTT chart output is available which gives a clear comprehensive picture of the critical results. Either format can be represented as time units or specific calendar dates — whichever you prefer. All this flexibility is available with the convenience of the ability to sort the information you need in 15 different ways. You can sort and re-sort and then request only the data you need. Why search through pages of information when the program can give you just what you want at the push of a button?

Versatile Data Input and Update Routines

Page 1

Project: DEMO EXAMPLE: CPM NETWORK

Table of start jobs

Job-no	Respon	Description	From	To	Date
1	JOHN	PRODUCE MOULD	1	2	780101

Project: DEMO EXAMPLE: CPM NETWORK

Job-no	Respon	Description	From	To	Duration
1	JOHN	PRODUCE MOULD	1	2	5.0
2	JOHN	CAST PART A	2	3	6.0
3	JIMMY	PURCHASE PART B	1	4	10.0
4	TED	QUALITY CHECK PART B	4	5	12.0
5	BOB	ASSEMBLE PARTS A AND B	5	6	4.0
6	JOHN	MACHINE PARTS A AND B	6	8	7.0
7	JOHN	PRODUCE JIG FOR FINAL ASSEMBLY	5	7	8.0
8		DUMMY ACTIVITY	7	8	0.0
9	BOB	FINAL ASSEMBLY	8	9	2.0
10	TED	QUALITY CHECK PART A	3	5	3.0
11	JIMMY	PURCHASE SCREWS AND NUTS	5	8	6.0

Project: DEMO EXAMPLE: CPM NETWORK

Holiday table

780101	780107	780108	780114	780115	780121	780122	780128	780129
780204	780205	780211	780212	780218	780219	780225	780226	780304
780305	780311	780312	780318	780319	780325	780326	780401	780402
780408	780409	780415	780416	780422	780423	780429	780430	780506
780507	780513	780514	780520	780521	780527	780528	780603	780604
780610	780611	780617	780618	780624	780625	780701	780702	780708
780709	780715	780716	780722	780723	780729	780730	780805	780806
780812	780813	780819	780820	780826	780827	780902	780903	780909
780910	780916	780917	780923	780924	780930	781001	781007	781008
781014	781015	781021	781022	781028	781029	781104	781105	781111
781112	781118	781119	781125	781126	781202	781203	781209	781210
781216	781217	781223	781224	781230	781231			

DEMO EXAMPLE: JETI
PAGE NO.: 1

9	BOB	FINAL ASSEMBL
11	JIMMY	PURCHASE SCRE
7	JOHN	PRODUCE JIG F
6	JOHN	MACHINE PARTS
5	BOB	ASSEMBLE PART
10	TED	QUALITY CHECK
4	TED	QUALITY CHECK
2	JOHN	CAST PART A
1	JOHN	PRODUCE MOULD
3	JIMMY	PURCHASE PART

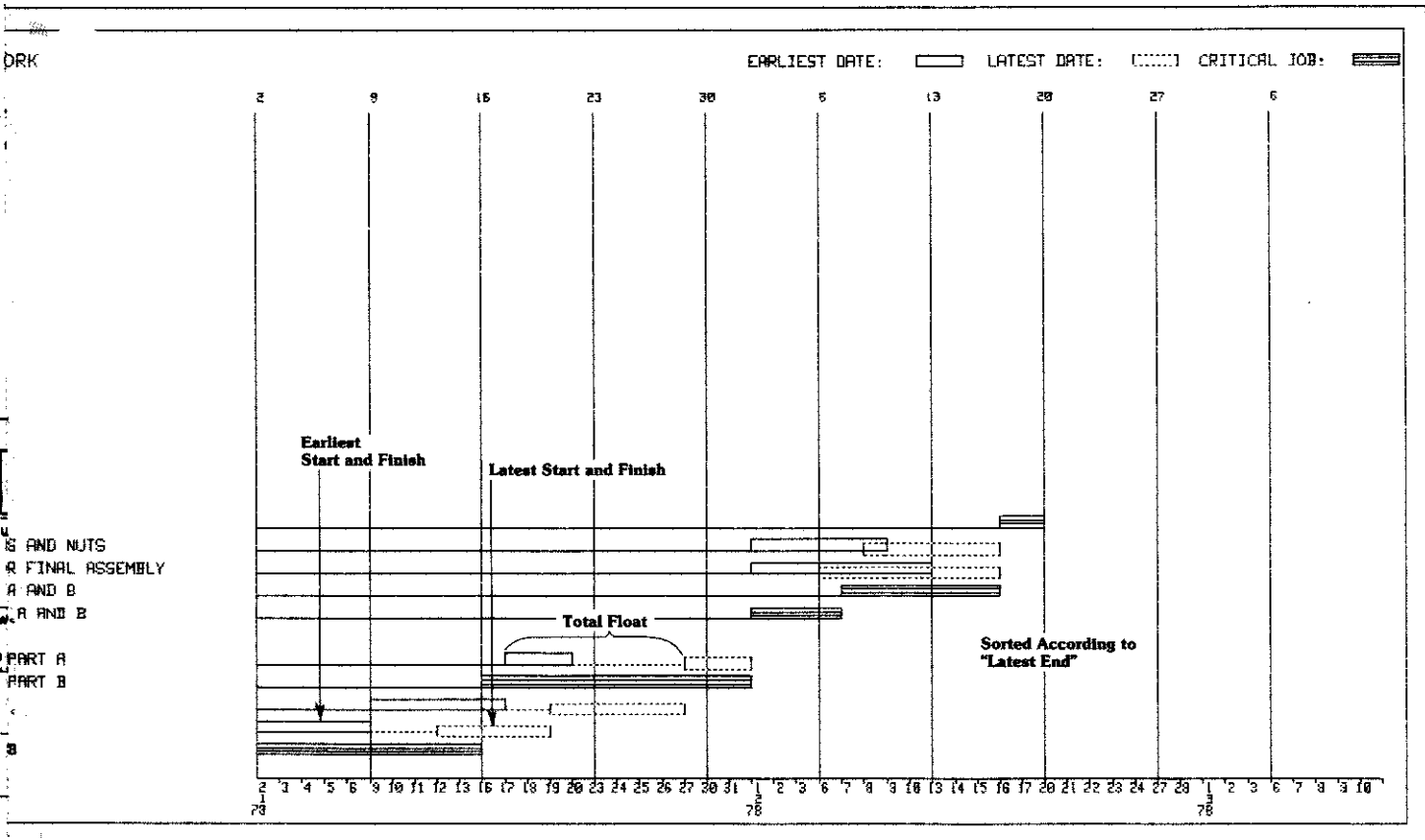
INPUT/UPDATE Module: An easy-to-use conversational format has been used for the entry and updating of project data. Data verification is printed prior to calculation.

Project: DEMO EXAMPLE: CPM NETWORK

The program provides several options to allow unattended operation. Once the data is entered and verified, you simply select the data you need and are free to handle your other management problems while the program handles the details of giving you the final results of the network calculations.

Job-no	Respon	Description	Free-Float	Tot.-Float	E-Beg	From E-End	To L-Beg	Duration L-End	Crit
8		DUMMY ACTIVITY	3.0	3.0	780213	780213	780216	780216	
5	BOB	ASSEMBLE PARTS A AND B	0.0	0.0	780201	780207	780201	780207	*
9	BOB	FINAL ASSEMBLY	0.0	0.0	780216	780220	780216	780220	*
3	JIMMY	PURCHASE PART B	0.0	0.0	780102	780116	780102	780116	*
11	JIMMY	PURCHASE SCREWS AND NUTS	5.0	5.0	780201	780209	780208	780216	
1	JOHN	PRODUCE MOULD	0.0	0.0	780102	780109	780112	780119	
2	JOHN	CAST PART A	0.0	0.0	780109	780117	780119	780127	
6	JOHN	MACHINE PARTS A AND B	0.0	0.0	780207	780216	780207	780216	*
7	JOHN	PRODUCE JIG FOR FINAL ASSEMBLY	0.0	3.0	780201	780213	780206	780216	
4	TED	QUALITY CHECK PART B	0.0	0.0	780116	780201	780116	780201	*
10	TED	QUALITY CHECK PART A	0.0	0.0	780117	780120	780127	780201	

JOBLIST Module: Management reports are easily accesible in either time units or calendar days. If three time estimates are used you have the option of determining optimistic, pessimistic, and probability estimates of project completion.



GANTT Module: The benefits of graphics are provided by the GANTT chart output which presents all the key results of network analysis in a convenient format. Highlighting of critical activities calls the managers attention to the areas vital to meeting the project deadlines.

Program Organization

The program is divided into five operational modules, each of which is accessed by one of the Special Function keys on the System 45B keyboard. The overlay shown above fits over the Special Function keys. After you load the program into the System 45B and put the overlay in place, you simply follow the dialogue on the screen and enter data and parameters when requested.

The individual modules of the Project Management program are listed below.

- **INPUT/UPDATE:** Allows entry of method, job data, connections, holidays, start and end dates, and data updates. Lists are provided to verify project data.
- **CALC:** Performs network calculations and calculates probabilities if required. Calculations are based on one or three time estimates for the network.
- **SORT:** Provides sorts of project data according to 15 available sort sequences.
- **JOBLIST:** Produces reports of the calculation results in either time units or calendar dates.
- **GANTT:** Produces calculation results in GANTT chart format (time units or calendar dates).

Project Management (CPM, PERT, MPM)							
S							
	Input/Update	Calc.	Sort	Joblist	Gantt	End	
S							
						Yes	No

System 45B Special Function key overlay.

Software Development

The System 45B Project Management program was developed, in conjunction with Hewlett-Packard, by the Büro Für Elektronisches Rechnen under the leadership of Dr. Hans Pircher. The Büro, located in Austria, was founded by Dr. Pircher and employs 15 people specializing in software development. Computer-aided network analysis is one of the Büro's specialty fields, and the System 45B program is based on many years of practical experience in this application.

Benefits

System 45B presents a convenient, cost-effective method for solving tough network analysis problems. It offers flexibility, ease of operation, freedom to choose the method that suits you, accurate documentation, fast results and the ability to modify the project plan at any time — all the ingredients you need to plan your project, monitor its progress and identify problems before they occur.

Versatility

When you're not using the System 45B for network analysis, you can put it to work on a host of other applications. To find out more, contact your nearest Hewlett-Packard Sales and Service office.

Hardware Configuration

The Hewlett-Packard Project Management pack requires the following hardware:

System 9845B with 64K Byte r/w memory

Thermal Printer	Opt. 560
Graphics package	Opt. 311, 700
Mass Storage ROM	Opt. 313
Flexible Disk Drive	9885M

The program could be run using Option 600 (the second tape drive) in place of the flexible disk drive. However, this would reduce the maximum number of activities which can be processed to about 700 for CPM and PERT or about 550 activities for MPM networks. The GANTT chart can be produced on the internal printer, the HP 7245 printer plotter or a large drum plotter through the incremental interface.

Ordering Information

Order Hewlett-Packard part number 09845-11100 to receive the Project Management software pack including the following three items.

- Program tape cartridge
- Special Function key overlay
- User's instruction manual

Recognize trends and seasonal fluctuations to get a clearer picture of the future.

Decision Making and the System 45B

Objectively evaluating historical results and then accurately predicting future values are the bases for many important commercial and scientific decisions.

To aid you in the decision-making process, Hewlett-Packard has developed the Forecasting application software package. This pack contains statistical routines that analyze and smooth initial raw data under a variety of assumptions to determine trends, seasonality and random variations. In addition, five alternative forecasting methods are available for applications such as sales forecasting, cash planning, setting expense and budgets, manpower projections and production/inventory planning and control.

This software package operates with HP's System 45B Computer and, together, they provide you with:

- an interactive cathode ray tube (CRT) display that allows you to continually evaluate the data and results of the several successive steps typically required to produce accurate, valid forecasts,
- an internal thermal line printer that can quickly and conveniently reproduce the figures and graphic results displayed on the CRT,
- Special Function keys that let you easily access the many options in the Forecasting programs by pressing a single key.

Forecasting

The Forecasting software pack includes programs that characterize, smooth and forecast time series data. The following sections describe the typical sequence of forecasting operations from data entry through analysis and forecasting to final CRT display or hard-copy output.

Versatile Data Entry

Up to 250 equally-spaced data points can be entered from the keyboard or read from the tape cartridge or other compatible mass storage devices such as a flexible disk drive. These entries are sufficient to accommodate up to 20 years of monthly data or five years of weekly data.

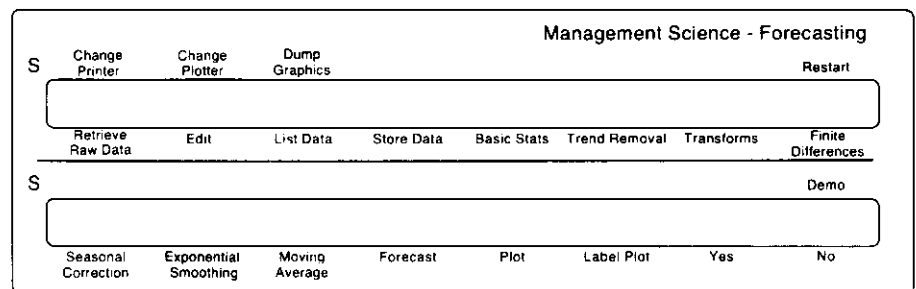


Figure 1. Reproduction of the Forecasting overlay which fits over the System 45B's Special Function keys.

Array of Statistics

After entering the data, you can analyze, evaluate and modify this information through several statistical routines. For example, simply press the FINITE DIFFERENCES key to determine linear, quadratic and exponential trends.

The TREND REMOVAL key allows easy removal of a linear or quadratic trend using coefficients you supply or those generated by the program.

SEASONAL CORRECTION provides easy evaluation and removal of seasonal trends in the data. Variations in retail sales, for example, can show up as Christmas buying peaks or winter lulls in vacation-related purchases. The program will determine the correction factors, or you can enter your own correction factors.

Two "smoothing" techniques let you reduce random variations in the data. These techniques are (1) centered or equally-weighted MOVING AVERAGE and (2) single, double or triple EXPONENTIAL SMOOTHING. As an example, the housing permit data shown in Figure 3 has been deseasonalized and smoothed prior to forecasting. The "smoothed" data has been overlaid on a plot of the original raw data. (Figure 3 illustrates the related data.)

Forecasting Options

The five forecasting methods available are:

- linear to a specified point,
- linear growth,
- exponential growth,
- linear regression,
- exponential smoothing.

In all cases you can include a seasonal pattern in the forecast by using the SEASONAL CORRECTION routine to provide correction factors. Figure 2 illustrates the use of the double exponential smoothing forecasting model with corrections for seasonality.

Visually evaluating raw data, results of successive statistical routines and forecasts provide you with a unique advantage for accurate forecasting — a capability available only with an interactive CRT system such as that in the System 45B.

HOUSING PERMITS IN LARIMER COUNTY COLORADO

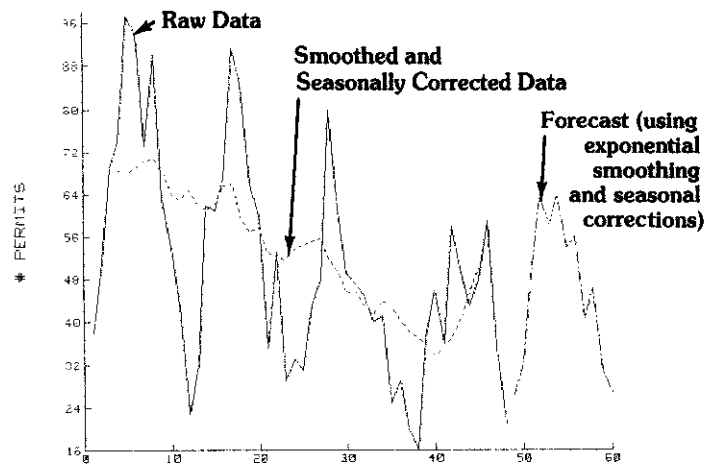


Figure 2. Several plots showing raw data, deseasonalized, smoothed data and a 12-month forecast.

```

PROJECT TITLE: HOUSING PERMITS IN LARIMER COUNTY COLORADO
RAW
DATA
-----
OBS.# # PERMITS      OBS.# # PERMITS      OBS.# # PERMITS
-----
1      38          17     91          33     40
2      49          18     85          34     41
3      69          19     66          35     25
4      74          20     60          36     29
5      97          21     35          37     28
6      94          22     53          38     16
7      73          23     29          39     37
8      98          24     33          40     46
9      64          25     31          41     36
10     54          26     43          42     58
11     43          27     48          43     49
12     23          28     88          44     43
13     32          29     41          45     48
14     62          30     44          46     59
15     61          31     47          47     35
16     67          32     45          48     21

SEASONAL CORRECTION FACTORS
-----
PHASE  CORRECTION FACTOR  SEASONAL INDEX (<= 100/(C.F.))
-----
1      1.77966431452     56.3604543966
2      1.4518278067      68.8768920541
3      1.370958714907     102.5913089936
4      1.745261896679     133.461119496
5      1.816427387124     122.484367069
6      1.75137042223      143.899145123
7      1.889482237473     112.42494669
8      1.06165123457      116.056237127
9      1.13742226395     83.5673446692
10     1.0520008011      95.0521738157
11     1.59213893632     62.7666162453
12     1.03126211122     54.6880419776

EXPONENTIAL SMOOTHING
-----
SPECIFICATIONS FOR SMOOTHING # 1 :
MODEL : LINEAR ( * 2 )
SMOOTHING : DOUBLE
SMOOTHING COEFFICIENT, ALPHA = .15
AVERAGE AGE OF THE SMOOTHED DATA = 5.6656666667
NUMBER OF GENERATIONS : 48
INITIAL VALUES :
A(0) = 67.3492439516
B(0) = -6.9814939787
ESTIMATED COEFFICIENTS AT OBS# 48
A HAT = 46.7951879128
B HAT = 1.206363647976

FORECASTING
-----
THE FORECASTING MODEL FROM EXPONENTIAL SMOOTHING :
X(T) = 46.7951879128 + 1.206363647976 * T

TIME      FORECAST (WITH SEASONALITY)
-----
49        26.4996883435
50        32.5161945412
51        48.932596417
52        65.5850421225
53        56.588843187
54        63.9276815754
55        54.234946887
56        56.2347173252
57        48.628614923
58        46.4413742951
59        38.7962640925
60        26.906227629
    
```

Figure 3. Output showing data used in plotting Figure 2.

Interactive CRT Graphic Display

With the CRT display and graphics hardware option, data and forecasts can be plotted using four line types.

The system allows for an unlimited number of plot overlays. This means you can, for example, compare raw data with smoothed data or forecasts using alternate methods.

The graphic display can then be reproduced dot-for-dot on the internal thermal line printer when you press the DUMP GRAPHICS key. Graphic display can also be reproduced on the optional 9872A Plotter which has four-color capability.

Convenient Defaults

A variety of defaults are incorporated into the programs, providing a time-saving feature. For example the plotting routine automatically determines tick spacing and maximum-minimum values so you don't have to spend time determining values for each plot.

These defaults not only simplify using the programs but also furnish flexibility. You have the option of using your own values if you wish.

Ordering Information and Hardware Configuration

To order the Forecasting and Graphics package, specify Part No. 09845-10610. This pack includes:

- Instruction manual
- Forecasting cartridge
- Forecasting overlay

The following first four items are recommended in the equipment configuration. The last two are optional:

- HP 9845B Desktop Computer with 56,426 bytes of read/write memory
- Graphics Hardware Package, Opt. 700
- Graphics ROM, Opt. 311
- Thermal Line Printer, Opt. 560
- Second Tape Transport — optional. Opt. 600
- HP 9872A Graphics Plotter — optional



Optimize the allocation of your resources... automatically.

Desktop Computer Solution for Linear Programming

Linear programming is used extensively in such industries as manufacturing, transportation, agriculture and chemical for applications in production scheduling, profit optimization blending, assignment problems, and nutrition. It is a mathematical method of optimizing a linear function of a number of variables. The variables, representing resources, are subject to constraints, expressed as linear inequalities.

Now Hewlett-Packard provides a Linear Programming package for use with System 45B. It gives the user a simple and convenient method of optimizing linear programming models.

A General Purpose Software Package

The System 45B Linear Programming package has been designed for use in many different industries. Since the format of the input and output has not been tailored or structured for any particular application, it can be used for many diverse applications requiring LP capability.

The complete System 45B Linear Programming Package consists of the following parts, all housed in a convenient binder:

- a prerecorded cartridge containing the programs for LP,
- an instruction manual describing the programs and giving detailed operating instructions as well as examples of software operation,
- a Special Function keys template which overlays the desktop computer to define keys for easy user access.

NUMBER OF CONSTRAINTS		NUMBER OF VARIABLES			
Total	Greater than	56K Memory	187K Memory	318K Memory	449K Memory
25	12	119	602	1088	1573
50	25	12	292	571	850
75	37		145	341	536
100	50		47	199	349
125	62			96	219
150	75			11	116

Figure 1. This table indicates the size of problems which can be handled with the different memory configurations.

Size of Problems

The size of problems that can be handled differs depending upon the number of variables, the number of constraints, and the number of "greater than" constraints. The table in Figure 1 will give you an idea of the size of problems which can be handled by the program. The instruction manual contains the formula to be used in determining which problems can be solved.

Solving an LP Problem

The first step in solving an LP problem is to set up your input in the format used by the System 45B LP program. A worksheet, included in the manual, assists you in formatting the input.

From the worksheet you enter:

- Problem name
- Maximize or minimize
- Number of constraints
- Number of variables
- Names of the constraints
- Names of the variables
- Objective function coefficients for the variable
- Upper bounds on the variables
- Lower bounds on the variables
- Variable coefficients for each constraint
- Constraint values

Figure 2 shows a sample worksheet for a typical problem of trying to determine the lowest cost for a food mix.

PROBLEM NAME: FEED

No. Constraints 17 Max. of Min. Min
 No. Variables 13
 No. <= 7 No. = 1 No. > 9

Variable Name	Corn	Fishm	Alf	Rbran	M&B	Soya	Grnut	Taploc	Calpho	Lime	Mol	Oil	WhP	Constraint	Value
Objective Function	23	60	21.5	19.5	51	45	37	15	22.42	1.5	7.14	70	21		
Upper Bound	40	6	9	-1	1	20	10	15	5	5	5	1	-1		
Lower Bound	0	0	7	0	0	0	0	0	0	0	0	0	0		
Initial Value															
PrtmUP	8.5	60	15	13	45	43	45	2	0	0	3	0	16	<=	2050
FatUP	3.8	7.5	1.5	5	4	3.5	6	0	0	0	0	0	4	<=	500
FibrUP	12.5	1	3.3	12	2.5	6	11	0	0	0	0	0	0	<=	650
AshUP	1.5	20	9	16	35	5.5	5.5	0	0	0	11	0	5.5	<=	650
CalUP	.01	5	1.2	.6	11	.2	.17	0	13	38	.1	0	.1	<=	110
PhosUP	.25	3	.2	1.8	5.5	.6	.55	0	4	0	.05	0	.9	<=	70
EnrgUP	1500	1350	400	800	810	1100	1200	1300	0	0	400	8000	810	<=	12000
Weight	1	1	1	1	1	1	1	1	1	1	1	1	1	=	100
PrtmLO	8.5	60	15	13	45	43	45	2	0	0	3	0	16	>=	140
FatLO	3.8	7.5	1.5	5	4	3.5	6	0	0	0	0	0	4	>=	250
FibrLO	12.5	1	3.3	12	2.5	6	11	0	0	0	0	0	0	>=	400
AshLO	1.5	20	9	16	35	5.5	5.5	0	0	0	11	0	5.5	>=	300
CalLO	.01	5	1.2	.6	11	.2	.17	0	13	38	.1	0	.1	>=	80
PhosLO	.25	3	.2	1.8	5.5	.6	.55	0	4	0	.05	0	.9	>=	55
Meth	.2	1.8	0	.24	.5	.74	.46	0	0	0	0	0	.25	>=	30
Gly	.2	5.3	0	.5	2.2	2.7	1.3	0	0	0	0	0	.7	>=	80
EnrgLO	1500	1350	400	800	810	1100	1200	1300	0	0	400	8000	810	>=	12000

Figure 2. A sample worksheet for a typical, small LP problem of mixing feed and trying to determine the lowest cost. These worksheets are provided in the instruction manual.

Check Input on the CRT Display

The print section of the program allows the user to view the data on the CRT or print it on one of the optional printers. The printout (see Figure 3) can be used as a check on the data entered or just to provide a hard-copy record of the problem. If any errors have been made during entry of the problem, the modify routine provides a simple way to make corrections. The routine also allows the user to create essentially new problems by just adding or deleting constraints from a previously created problem.

CONSTRAINT PrtmUP
 8.500 Corn
 13.000 Rbran
 45.000 M&B
 16.000 WhP
 <= 2050.000

CONSTRAINT FatUP
 3.800 Corn
 5.000 Rbran
 6.000 Grnut
 <= 500.000

CONSTRAINT FibrUP
 12.500 Corn
 12.000 Rbran
 11.000 Grnut
 <= 650.000

CONSTRAINT AshUP
 1.500 Corn
 16.000 Rbran
 5.500 Grnut
 <= 650.000

CONSTRAINT CalUP
 .010 Corn
 .600 Rbran
 .170 Grnut
 <= 110.000

CONSTRAINT PrtmLO
 8.500 Corn
 13.000 Rbran
 45.000 M&B
 16.000 WhP
 >= 140.000

CONSTRAINT FatLO
 3.800 Corn
 5.000 Rbran
 6.000 Grnut
 >= 250.000

CONSTRAINT FibrLO
 12.500 Corn
 12.000 Rbran
 11.000 Grnut
 >= 400.000

CONSTRAINT AshLO
 1.500 Corn
 16.000 Rbran
 5.500 Grnut
 >= 300.000

CONSTRAINT CalLO
 .010 Corn
 .600 Rbran
 .170 Grnut
 >= 80.000

CONSTRAINT PhosLO
 .250 Corn
 3.000 Fishm
 .200 Alf
 1.800 Rbran
 5.500 M&B
 .600 Soya
 .550 Grnut
 >= 55.000

CONSTRAINT Meth
 .200 Corn
 1.800 Fishm
 .240 Alf
 .500 Rbran
 .740 Soya
 .460 Grnut
 >= 30.000

CONSTRAINT Gly
 .200 Corn
 5.300 Fishm
 .500 Alf
 2.200 Rbran
 2.700 M&B
 1.300 Soya
 >= 80.000

CONSTRAINT EnrgLO
 1500.000 Corn
 1350.000 Fishm
 400.000 Alf
 800.000 Rbran
 810.000 M&B
 1100.000 Soya
 1200.000 Grnut
 1300.000 Taploc
 0.000 Calpho
 900.000 Lime
 8000.000 Mol
 810.000 Oil
 >= 12000.000

Problem Automatically Stored

After a problem is entered, it is automatically stored on the tape cartridge under the problem name given at the start of the data entry.

The user then has the opportunity to enter another problem, to print, modify, or solve the problem just entered, or to solve any previously entered problem.

OBJECTIVE FUNCTION MINIMIZE

23.000 Corn
 60.000 Fishm
 21.500 Alf
 19.500 Rbran
 51.000 M&B
 45.000 Soya
 37.000 Grnut
 15.000 Taploc
 22.420 Calpho
 1.500 Lime
 7.140 Mol
 70.000 Oil

VARIABLE LIMITS

0.00	<=	Corn	<=	40.00
0.00	<=	Fishm	<=	6.00
7.00	<=	Alf	<=	7.00
0.00	<=	M&B	<=	1.00
0.00	<=	Soya	<=	20.00
0.00	<=	Grnut	<=	10.00
0.00	<=	Taploc	<=	15.00
0.00	<=	Calpho	<=	5.00
0.00	<=	Lime	<=	5.00
5.00	<=	Mol	<=	5.00
0.00	<=	Oil	<=	1.00

Figure 3. Printout of the data for the sample feed-mix problem.

Solutions

The solve routine performs the optimization, using a modified simplex method, prints the solution and, if desired, a sensitivity analysis. The tableau, which is used to provide a beginning solution in optimizing the problem, will show not only the variables which have been entered, but also the slack, surplus and artificial variables. The system automatically computes these variables in order to convert the inequalities to equalities. Printing the tableau is an option which you may specify either before or after optimization. (See Figures 4 and 5).

After the optimization, the system will automatically print out the basis and solution variables, including the dual variables, and indicate both the value of the objective function and the number of iterations required as shown in Figure 6. If you wish to see a final tableau, the system will print one out at this point.

Finally, this LP system will provide a sensitivity analysis to determine the range for variables to stay in or out of the basis and the critical level of the constraint values. This part of the program is an important tool for analyzing the results of LP and looking at various alternatives. The sensitivity analysis for the sample problem is shown in Figure 7.

FEED

```
*****
YOUR VARIABLES 1 THROUGH 13
SURPLUS VARIABLES 14 THROUGH 22
SLACK VARIABLES 23 THROUGH 29
ARTIFICIAL VARIABLES 30 THROUGH 39
```

```
Print Initial Tableau?
Yes
```

```
TABLEAU AFTER 0 ITERATIONS
8.50 60.00 15.00 13.00 45.00 43.00 45.00 2.00
0.00 0.00 3.00 0.00 16.00 0.00 0.00 0.00
0.00 0.00 0.00 0.00 0.00 0.00 1.00 0.00
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
0.00 0.00 0.00 0.00 0.00 0.00 0.00 1945.00
```

Figure 4. Initial tableau for the sample problem before solution. Note that surplus, slack and artificial variables are automatically calculated and entered into the tableau.

```
Print Final Tableau?
Yes
```

```
TABLEAU AFTER 21 ITERATIONS
0.00 33.50 0.00 0.00 19.12 0.00 24.75 26.76
0.00 0.00 23.42 65.65 0.00 0.00 0.00 0.00
0.00 0.00 -1.50 41.34 0.00 .01 1.00 0.00
2.36 0.00 .57 0.00 0.00 -21.60 0.00 0.00
0.00 0.00 0.00 1.56 -41.34 0.00 -.01 460.00

0.00 -4.32 0.00 -1.38 8.28 0.00 .69 -4.32
0.00 0.00 -2.74 -31.89 0.00 0.00 0.00 0.00
0.00 0.00 -.07 4.13 0.00 -1.00 0.00 1.00
-.68 0.00 .03 0.00 0.00 -1.96 0.00 0.00
0.00 0.00 0.00 .07 -4.13 0.00 .00 203.64
```

Figure 5. Final tableau for the sample problem showing the number of iterations before a solution is reached.



Hardware Configuration

To use the System 45B Linear Programming package, the following hardware is required:

- 9845B Desktop Computer
- Internal thermal line printer (Opt. 560)
- Second internal tape drive (Opt. 600)

The size of linear programming problem which can be handled can be increased without any changes to the program by having a larger internal memory option.

Ordering Information

To order the Linear Programming Package, specify Part No. 09845-10600. For further information on this program package or on the equipment, call or write your nearest Hewlett-Packard Sales Office. Ask to talk with your desktop computer representative.

ANSWERS:

BASIS AFTER ITERATION 23

VARIABLE	VALUE
SLK 1	468.554
SLK 2	293.644
Soya	18.478
SLK 4	174.426
SUR 13	38.000
SLK 6	15.000
SLK 7	10000.000
SUR 10	46.356
Rlf	8.818
SUR 12	175.574
SUR 9	1399.446
WhP	21.464
Lime	1.627
Delpho	.198
SUR 16	136.485
Corn	38.432
SUR 11	258.888
Fishm U	6.888
Toploc U	15.888
MoI U	5.888
Oil U	1.888

DUAL VARIABLES

COLUMN	CONSTRAINT #	VALUE
14	1	0.000
15	2	0.000
16	3	0.000
17	4	0.000
18	5	0.000
19	6	.712
20	7	18.929
21	8	0.000
22	9	.027
23	10	8.000
24	11	0.000
25	12	3.663
26	13	0.000
27	14	.581
28	15	0.000
29	16	0.000
30	17	-23.568

OBJECTIVE FUNCTION VALUE = 2588.88

Figure 6. Printout of the basis and solution variables, including dual variables, the value of the objective function, and the number of iterations required for optimization.

SENSITIVITY ANALYSIS

RIGHT-HAND-SIDE RANGING

CONSTRAINT NO.	LL	B(I)	UL
1	545.554	1945.000	UNBOUNDED
2	442.144	489.500	UNBOUNDED
3	376.988	626.988	UNBOUNDED
4	411.426	587.000	UNBOUNDED
5	71.600	181.600	UNBOUNDED
6	53.600	68.600	78.344
7	127199.083	127208.000	127284.484
8	-43.485	93.000	UNBOUNDED
9	-5212.847	85.888	866.448
10	-221.854	239.500	UNBOUNDED
11	173.256	376.988	UNBOUNDED
12	204.874	237.000	243.946
13	-182.825	71.600	UNBOUNDED
14	23.600	53.600	593.968
15	15.000	38.000	UNBOUNDED
16	-9928.000	88.000	UNBOUNDED
17	117185.788	117288.000	117285.379

BASIS VARIABLE COEFFICIENT RANGING

VARIABLE	LL	C(J)	UL
Soya	35.853	45.000	54.129
Rlf	8.640	21.500	28.786
WhP	12.585	21.000	25.587
Lime	UNBOUNDED	1.500	21.447
Delpho	16.146	22.428	35.233
Corn	18.984	23.000	36.788

NON-BASIS VARIABLE COEFFICIENT RANGING

VARIABLE	LL	C(J)	UL
Fishm	31.887	68.888	UNBOUNDED
Rbran	7.833	19.500	UNBOUNDED
M&B	42.824	51.000	UNBOUNDED
Grnut	24.814	37.000	UNBOUNDED
Toploc	UNBOUNDED	15.888	UNBOUNDED
MoI	UNBOUNDED	7.148	UNBOUNDED
Oil	UNBOUNDED	78.888	UNBOUNDED

Figure 7. This sensitivity analysis allows you to evaluate the effect of various constraints on the basis and indicates the range of variables to stay in or out of that basis.

Inventory control Today... less effort, more control.

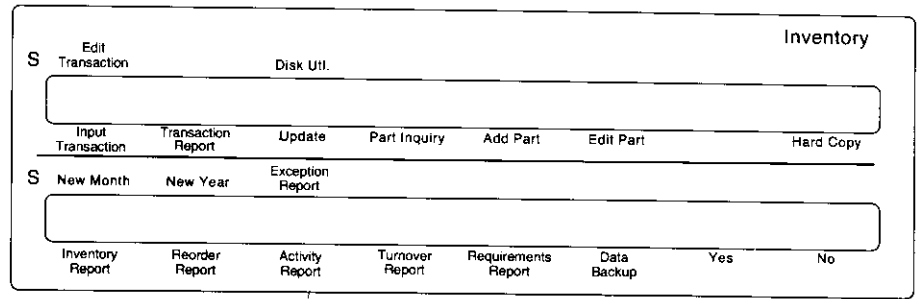
Inventory Control

Posting transactions to a KARDEX, the standard method of inventory control, has always involved entering each issue or receipt on a card or sheet and then making the necessary adjustment to the previous balance. This system is often prone to manual errors and does not produce the kind of timely management information for today's inventory control needs. Now, with Hewlett-Packard's System 45B Desktop Computer and the Inventory Control Pack, you can not only control your day-to-day inventory transactions quickly and easily, but you can get valuable management reports on such information as total dollar balance on hand, when to reorder, and low usage of parts.

Easy to Use

Operation ease is a key feature of the System 45B Inventory Control Pack. To operate the system, the user merely presses the appropriate Special Function key on the upper right-hand section of the computer keyboard. These keys are clearly labeled with report and program names for quick identification. For example, the user may wish to begin daily use of the system by updating inventory records with the activity that occurred during the previous day. Pressing the INPUT TRANSACTION key will allow the user to begin entering transactions. If a mistake is made during entry, pressing the CLEAR key will allow you to reenter the information, or you may edit the entry using the edit keys. The entry will not be accepted by the system until the operator is ready and has pressed the CONTINUE key.

Once all entries have been made, the user may want a printout of the transactions. The TRANSACTION REPORT key is for this purpose. All other Inventory reports are as easily available as this, simply by pressing the appropriate Special Function key.



```

ENTER PART NUMBER (ENTER 0 TO END)
?
1236-231A
ENTER DESCRIPTION
?
HEW-ADJUSTER
ENTER UNIT PRICE
?
1.23
ENTER UNIT OF MEASURE
?
EACH
ENTER MINIMUM QUANTITY
?
100
ENTER QUANTITY ON HAND
?
235
ENTER QUANTITY ON ORDER
?
350
ENTER ORDER LEAD TIME (DAYS)
?
35
ENTER LAST ORDER DATE (MM/DD/YY)
?
7/15/77
TURNOVER ON 1236-231A
?
NO
    
```

Figure 1.

INVENTORY REPORT
OCTOBER 11, 1978

PAGE 1

PART NUMBER	DESCRIPTION	UNIT PRICE	QUANTITY ON HAND	VALUE ON HAND	QUANTITY ON ORDER	UNIT OF MEASURE
1245A	LUG-STARTER	1.10	7523	8275.30	500	EACH
2415-6372	TURNKEY-VARIABLE	1.34	387	518.58	0	EACH
4152H	SCREEN-IMAGE	42.15	30	1264.50	0	EACH
42X-15Y	SHEET METAL ASSEMB	2.25	5	11.25	25	EACH
4551-54A	LENS CAP	.75	300	225.00	600	EACH
5298L	OVERHEAD VIEWER	165.25	12	1983.00	10	EACH
7215-1421	PAPER-PRINT	11.25	75	843.75	75	GROSS
A1241B	FLASH-DISPLAY	75.24	8	601.92	40	EACH
B4251Y	PROJECTOR	125.25	0	0.00	50	EACH
D41-XA	A-BULBS	42.50	25	1062.50	0	DOZEN
L4152-XY	MATRIX-ASSEMBLY	15.40	20	308.00	20	EACH
TOTAL VALUE ON HAND				15093.80		

Figure 2.

REORDER REPORT
OCTOBER 11, 1978

PAGE 1

PART NUMBER	UNIT PRICE	MINIMUM QUANTITY	QUANTITY ON HAND	QUANTITY ON ORDER	LAST ORDER DATE	LEAD SLACK TIME
B4251Y	125.25	5	0	50	10/ 5/78	45 10

Figure 3.

EXCEPTION REPORT
OCTOBER 12, 1978

PAGE 1

PART NUMBER	UNIT PRICE	QUANTITY ON HAND	VALUE ON HAND	LAST ISSUE DATE	YTD ISSUE	YTD REC
1245A	1.10	7973	8770.30	10/11/78	50	500
2415-6372	1.34	352	471.68	10/10/78	35	0
4152M	42.15	30	1264.50		0	0
42X-15Y	2.25	30	67.50		0	25
5298L	165.25	7	1156.75	10/ 7/78	5	0
7215-1421	11.25	75	843.75		0	0
A1241B	75.24	8	601.92		0	0
B4251Y	125.25	0	0.00		0	0
D41-XA	42.50	25	1062.50		0	0
L4152-XY	15.40	20	308.00		0	0

Figure 4.

REQUIREMENT REPORT
OCTOBER 11, 1978

PART NUMBER	QUANTITY REQUIRED	ON HAND	ON ORDER	LAST ORDER DATE	AVAILABLE	SLACK	LEAD TIME
1245A	50	7523	500	10/ 7/78	8023	7973	7
4551-54A	200	300	600	10/10/78	900	700	10
5298L	10	12	10	10/ 1/78	22	12	20
L4152-XY	50	20	20	10/10/78	40	-10	5

Figure 5.

CUSTOMER ORDER REPORT
OCTOBER 11, 1978

PAGE 1

CUSTOMER NUMBER	PART NUMBER	QTY ISSUED	SELLING PRICE	GROSS SALE	UNIT COST	TOTAL VALUE	GROSS PROFIT	% PFT
145	5298L	5	165.25	826.25	165.25	826.25	0.00	0.0
234	2415-6372	35	3.45	120.75	1.34	46.90	73.85	157.5
411	1245A	50	2.50	125.00	1.10	55.00	70.00	127.3
740	4551-54A	300	1.50	450.00	.75	225.00	225.00	100.0
TOTAL ORDER				1522.00		1153.15	368.85	

Figure 6.

VENDOR ORDER REPORT
OCTOBER 11, 1978

PAGE 1

VENDOR NUMBER	PART NUMBER	QUANTITY ORDERED	UNIT COST	GROSS PURCHASE
121	5298L	2	150.00	300.00
566	A1241B	40	41.34	1653.60
741	L4152-XY	50	5.15	257.50
TOTAL PURCHASE				2211.10

Figure 7.

ACTIVITY REPORT
OCTOBER 12, 1978

PAGE 1

PART NUMBER	UNIT PRICE	MTD ISSUE	ISSUE DATE	MTD REC	RECEIPT DATE	YTD ISSUE	YTD REC
1245A	1.10	50	10/ 5/78	500	10/11/78	50	500
2415-6372	1.34	35	10/11/78	0		35	0
4152M	42.15	0		0		0	0
42X-15Y	2.25	0		25	10/10/78	0	25
4551-54A	.75	300	10/11/78	0		300	0
5298L	165.25	5	10/12/78	0		5	0
7215-1421	11.25	0		0		0	0
A1241B	75.24	0		0		0	0
B4251Y	125.25	0		0		0	0
D41-XA	42.50	0		0		0	0
L4152-XY	15.40	0		0		0	0

Figure 8.

With System 45B you also have the flexibility to either view and print, or just view, the data on file. In many programs in the Inventory Pack, no printout is generated unless specifically requested by pressing the HARD COPY Special Function key. This feature keeps seldom-used data available in the computer for ready access, not cluttering your desk or files.

Additional Features

- Full-page CRT display of information
- Quick and easy keyboard entry of inventory transactions
- Easy operation by office personnel — no computer professionals required
- Valuable management reports — describing inventory status, when to reorder, slow moving parts, and more
- Immediate inquiry — less than 2 seconds — about any item in inventory (up to 2500 part numbers)
- Report flexibility — CRT display of information and/or printed copy of reports and data files
- Audit trail — to trace parts activity
- System expandability — to keep pace with growth
- Operating convenience — system operates on standard voltage — no special air conditioning required.

Special Function Keys

At upper left is the Special Function key template that overlays the Special Function keys on the computer keyboard. These keys provide maximum flexibility and ease of operation for report generation. A single keystroke tells your System 45B to generate the desired report or allows the user to edit programs.

Easy Data Entry

Easy operation is one of the main features of the inventory package. The following example of adding parts to the inventory illustrates this clearly.

This program allows the user to add parts to the inventory file. When the part number is entered, an immediate check is made to verify that the part is not already on the inventory file. This means that mistakes in entering data are caught immediately for rapid correction.

To illustrate the conversational step-by-step approach of all the programs, here are the complete operating instructions for use of the Add Parts key. See Figure 1.

PROCESSED TRANSACTIONS
OCTOBER 11, 1978

PAGE 1

PART NUMBER	TRANG CODE	QUANTITY	UNIT PRICE	DATE	CUSTOMER/ VENDOR NUMBER	SELLING/ PURCHASE UNIT PRICE
1245A	1	500	1.10	10/11/78		
42X 15Y	1	25	2.25	10/10/78		
TOTAL RECEIPTS		2				
1245A	2	50		10/ 5/78	411	2.50
2415-6372	2	35		10/11/78	234	3.45
4551-54A	2	300		10/11/78	740	1.50
5278L	2	5		10/12/78	145	165.25
TOTAL ISSUES		4				
5278L	3	2		10/11/78	121	150.00
A1241B	3	40		10/10/78	566	41.34
L4152-XY	3	50		10/10/78	741	5.15
TOTAL ORDERS		3				

Figure 9.

Special reports for Inventory Control

A single keystroke provides many special reports associated with inventory control.

Inventory Report

Touch the Special Function key labeled Inventory Report to see the status of each part. This report shows the unit price, quantity on hand, value on hand, quantity on order, and unit of measure of each item.

The total inventory value will allow you to monitor your inventory investment trends and calculate aggregate inventory investment turnover. See Figure 2.

Activity Report

To see the information on the month-to-date and year-to-date issues and receipts, touch the ACTIVITY REPORT key. Through an analysis of usage from this report and the information on the lead time for delivery of parts, guidelines for the minimum quantity on hand can be established. See Figure 8.

Exception Report

For a listing of slow-moving parts, touch the EXCEPTION REPORT key. This report is based on a number you specify to the system to be the maximum year-to-date issues. Only those parts that are equal to or below that number will be listed. For each item, the report shows the unit price, quantity on hand, value on hand, last issue data, and YTD issues and receipts. This report is very valuable in analyzing how much money you have tied up in slow-moving inventory. See Figure 4.

Requirement Report

To see the impact of removing a group of items from inventory touch the key labeled REQUIREMENT REPORT. The system asks for the part number and the quantity. Up to fifty parts can be entered. The report shows the parts required, the quantity on hand, the quantity on order, the last order date, the slack, and the lead time. It gives you the information you need to spot potential shortages that could hold up a complete shipment. See Figure 5.

Customer Order Report

Whenever issues from inventory are processed, a customer order report is automatically generated. With this report you will be able to analyze the value of the total sales processed, as well as the gross profit obtained on each sale. See Figure 6.

Vendor Order Report

The Vendor Order Report is also printed automatically when inventory transactions are processed. This report reflects receipts from vendors and will allow you to analyze the receipts to determine the total dollar value received. In addition, detail by vendor and part number is also displayed to give you a clear look at the individual transactions. See Figure 7.

Reorder Report

For a listing of items that may have to be ordered, touch the REORDER REPORT key. This report lists only those items where the quantity on hand is less than the minimum. For each of these items, the report

shows the quantity on order, the last order date, the lead time for delivery, and the slack (quantity on hand, plus quantity on order, less the minimum quantity). See Figure 3.

Processed Transactions Report

This report, which furnishes an excellent audit trail for inventory transactions, is printed automatically during the update or posting of the inventory file. A report similar to this is available prior to the updating of the inventory file to allow editing transactions. See Figure 9.

Hardware Configuration

To operate the System 45B Inventory Control Pack, the following equipment is required:

- HP 9845B Desktop Computer with the Mass Storage ROM 98413A and a printer, e.g. the internal printer (Option 560) or any system compatible external impact printer.
- HP 9885M/S Flexible Disk Drive.

To obtain typewriter-quality reports, you may wish to add the optional 9871A Character Impact Printer.

Ordering Information

To order this software package, specify the Inventory Control Pack, Part Number 09845-10860.

A simple and flexible desktop solution to managing lists

List Management



Mailing lists, library cataloging, personnel files and many other listing needs can now be managed easily and quickly with HP's new List Management software pack. This program, together with HP's powerful System 45B Desktop Computer, offers you a flexible and efficient method for reducing time-consuming list manipulations such as mailing label preparation, sorting, sublistings, merge/purge operations and other list maintenance activities.

Versatile Routines For Easy List Manipulation

At each step of the list management procedure — from data preparation and entry to printout — the versatility of this software is impressive. The data manipulation capabilities allow you to enter names in any sequence (even out of sequence), locate duplicate entries, or quickly add/change/delete any name.

A new data field can be added to the list at any time in case you overlooked it in the original set-up.

The flexibility of the program becomes readily apparent when you wish to sort a list in several different ways. The entire list or portions thereof can be sorted according to name, zip code, occupation, catalog number, author, title or any other variable you choose. You can even sort out those names with missing data.

Kenneth Allsworth
Route 3
Loveland Colo.

Vernon White
1030 W. 7th
Ft. Collins CO.
80521

80521
Vernon White
1030 W. 7th
Ft. Collins CO.

Samual Baker
231 W. 9th
Loveland Colo.

Kathy Osborn
1127 W. 45th
Boulder CO.
80535

80535
Kathy Osborn
1127 W. 45th
Boulder CO.

Wayne Laudrick
812 W. 4th
New Raymer Colo.

Kenneth Allsworth
Route 3
Loveland CO.
80537

80537
Kenneth Allsworth
Route 3
Loveland CO.

Kathy Osborn
1127 W. 45th
Boulder Colo.

Samual Baker
231 W. 9th
Loveland CO.
80537

80537
Samual Baker
231 W. 9th
Loveland CO.

Wesley Schaeffer
2420 W. 22nd
Loveland Colo.

Wesley Schaeffer
2420 W. 22nd
Loveland CO.
80537

80537
Wesley Schaeffer
2420 W. 22nd
Loveland CO.

Vernon White
1030 W. 7th
Ft. Collins Colo.

Wayne Laudrick
812 W. 4th
New Raymer CO.
80542

80542
Wayne Laudrick
812 W. 4th
New Raymer CO.

Figure 1. The original mailing list...

restructured by adding Zip Codes, changing the state abbreviation and re-ordering by Zip Code sequence.

Then, the print-out format is changed.

Add to this the capability of searching for a name on the list without knowing the correct spelling of that name and you have **real flexibility!**

List Set-Up Flexibility

To set-up the system for a specific list, you merely designate the number of data items for each name and give a meaningful title to each item such as **FIRST NAME, LAST NAME, ADDRESS, ZIP CODE**, etc. There is no limit to the number of items per name. The number of names is limited only by the size and type of mass storage device used.

A list is entered into the system through the System 45's typewriter-like keyboard. Each name can be edited on the CRT screen as it is entered. List ordering or sequence can be based on any item within the name.

Restructuring Your List

New lists can be created from old ones already on the computer. The program features a **RESTRUCTURE**

ALGOL for Beginners	Sams, Roy	QA76.5.S33.1977
Hawaii	Roberts, William & Evelyn	G153.R197
PHOTOGRAPHY!!!	Alcott, J. M.	TR350
Social and Political Unrest in 1966	Heiser, James A.	HN58.H21

(A)

Alcott, J. M.	PHOTOGRAPHY!!!	TR350
Heiser, James A.	Social and Political Unrest in 1966	HN58.H21
Roberts, William & Evelyn	Hawaii	G153.R197
Sams, Roy	ALGOL for Beginners	QA76.5.S33.1977

(B)

G153.R197	Hawaii	Roberts, William & Evelyn
HN58.H21	Social and Political Unrest in 1966	Heiser, James A.
QA76.5.S33.1977	ALGOL for Beginners	Sams, Roy
TR350	PHOTOGRAPHY!!!	Alcott, J. M.

(C)

Figure 3. Library cataloging arranged according to (A) title, (B) author and (C) Library of Congress number.

module that allows you to input the original list, make changes or additions and output a duplicate list incorporating all those changes. For example, to take advantage of lower bulk mailing rates, you may want to duplicate your existing list, add missing zip codes and re-arrange the new list according to zip code sequence. Or you may want to make a duplicate list,

add a new item and keep the original as a back-up.

With the **RESTRUCTURE** module you can add new data items to the names after the list has been prepared. For instance, you might need to add telephone numbers to your mailing list. This is easily done by setting up a new list with **TELEPHONE NO.** as one of the elements and then performing the **RESTRUCTURE** routine.

<input type="radio"/>	Kenneth Allsworth	<input type="radio"/>
	Route 3	
<input type="radio"/>	Loveland CO.	<input type="radio"/>
	80537	
<input type="radio"/>	Samual Baker	<input type="radio"/>
	231 W. 9th	
<input type="radio"/>	Loveland CO.	<input type="radio"/>
	80537	
<input type="radio"/>	Sybil Jones	<input type="radio"/>
	143 North Ave.	
<input type="radio"/>	Platteville NB.	<input type="radio"/>
	45343	
<input type="radio"/>	Wayne Laudrick	<input type="radio"/>
	812 W. 4th	
<input type="radio"/>	New Raymer CO.	<input type="radio"/>
	80542	

Arrange Report Layout And Printing Format Any Way You Want

Whether you need mailing labels, a columnarized listing, pre-printed forms or any other printing or reporting format, it is easy to set-up the layout you need. You can format the data in any order, omit or duplicate information and print out the entire list or any portion of it.

Label printing for internal or external mailings is easy with the **HP List Management** software, the **System 45B Desktop Computer** and an optional impact printer. You can select any label size and print them on continuous or pre-cut forms as many as four-up with only a minor program change. (See Figure 2).

Figure 2. Mailing labels like these can easily be created using the List Management pack, the System 45B and an optional HP impact printer.

Selecting Part Of the List

You can designate any portion of the data or any distribution of names to be printed by using the SELECTION CRITERIA Special Function Key. This Key, identified by a special key overlay supplied with the software pack (see Figure 4), allows you to choose as many as five different selection criteria and use them for printing. For example, you could print labels for only those persons on your list who live in Utah or only those whose zip codes are between 80203 and 80525. At any point you can override the selection criteria and print the entire list.

Occasionally, you may want to randomly sample your list. To do this, merely specify the sample interval or criteria — every third name, every other name, etc. Once the distribution is chosen, the computer will print only those names and ignore the rest.

Other Lists. With this software you can manage many kinds of small data lists other than mailing lists:

- Library Cataloging
- Personnel Records
- Vendor Data
- Equipment Information
- Customer Lists

For example, in Library Cataloging, you can alphabetize according to author, title, or Library or Congress Number. With such lists you can cross reference books according to subject matter, code numbers, publication dates or any other category. (See Figure 3).

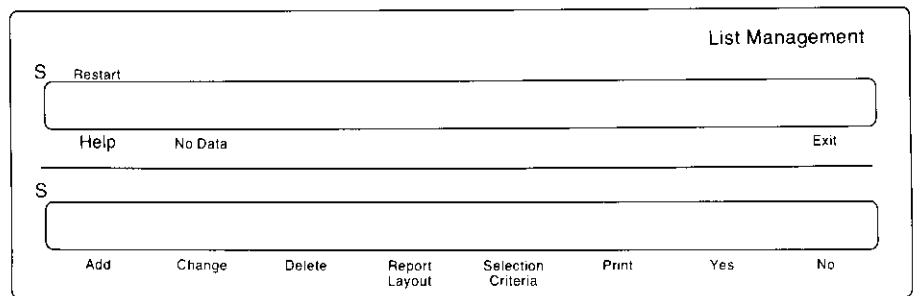


Figure 4. Special Function Key overlay supplied with the software pack.

Control Features

HELP — This Special Function Key acts as an operator's "mini-manual" by giving you additional instructions in the use of the software pack. If you don't understand a particular user prompt or if you want more information about a certain part of the program, just press the HELP key. A synopsis of the specific function will be displayed on the System 45B's CRT screen. With this feature, there is seldom any need to refer to the operator's manual.

DATA BACK-UP — You needn't worry about losing data with this feature. A module is included in the program that allows easy back-up of a list after modifications have been made.

NO DATA — When the program asks you for missing data and that data is not available or is unnecessary, this Special Function Key allows you to skip that entry and go on to the next.

EXIT — This function lets you stop the program at any point and then return to that same point at a later time.

KEYLINE — Normally, a collage of selected pieces of data items used to "catch" duplicate entries. Only minor software modifications (documented in the manual) are required to change the keyline to suit your needs.

Hardware Configuration

To start solving your list management problems, you'll need:

- the HP 9845B Desktop Computer with 56,426 bytes of read/write memory
- Option 600 - second tape drive for an additional 217K bytes of storage and memory
- Optional HP 9871A or HP 2631A Impact printer (with forms tractor) for label creation

As your list requirements grow, HP offers you additional read/write memory options:

- HP 9885M/S Flexible Disk Drive (500K bytes)
- HP 7900 Series Hard Disc Drives (20M bytes or 50M byte)

Ordering Information

To order the HP List Management software pack which includes:

- Instruction Manual (with listed program modifications for label printing and keyline changes)
 - Program Tape Cartridge
 - Special Function Key overlay
- specify HP Part No. 09845-10630

Payroll

Reduce payroll processing costs and get your payroll out on time, every time.

Payroll processing is an integral part of any business enterprise. In fact, an efficient payroll system is mandatory to help ensure good relations between an employer and his employees by providing timely, accurate pay checks and earnings data.

Besides the basic check-writing operation, a good payroll system should provide:

- useful management reports,
- 941-A quarterly F.I.C.A. reports,
- W-2's at year end.

Hewlett-Packard gives you these and much more with the System 45B and the Payroll application software package. With this desktop system in your office, anyone on your payroll staff can easily enter payroll data for each employee. The System 45B then calculates payroll information. Salaries, wages and commissions can all be handled during the same payroll run. This information can be viewed on the CRT; or by simply pressing one key, you can get a printout of the display. This feature keeps seldom-used data in the computer ready for access, not cluttering your desk. Reports and individual records on as many as 350 employees can be displayed and printed.

Special System Features For Easy Operation, Quick Results.

Once the flexible disks for Payroll have been loaded and the Special Function key overlay is in place, a clerk who is familiar with payroll can easily operate the system.

The Special Function keys (located on the upper-right hand section of the keyboard) are used for simplified report generation and record modification. The overlay for these keys has specific labels for each

S	Sick Hrs.	Vac. Hrs.	New Month
	Enter Hrs.	Proceed	Correct Hrs.
S	Restore Empl.	Done	Rate
	Add Empl.	Modify Empl.	Empl. Sum.

Figure 1. Payroll pack template Function keys on the System 4

ABC CO. ANYWHERE, USA
PAYROLL REGISTER

10/14/78

	REGULAR EARNINGS	OVERTIME EARNINGS	OTHER EARNINGS	TOTAL EARNINGS	FEDERAL INC TAX	FICA TAX
John J. Adams EMPL 1, DEPT NO. 4422 CUR HOURLY, RATE = 4.9500 YTD	148.50 8662.50	0.00 125.36	49.50 396.50	198.00 9184.36	15.56 594.72	8. 528.
Jack M. Boldon EMPL 2, DEPT NO. 42 CUR SALARY, RATE = 7.2117 YTD	288.47 11826.93	0.00 0.00	250.00 645.36	538.47 12472.29	137.63 2212.67	31. 729.
Peter J. Carlson EMPL 3, DEPT NO. 89 CUR HOURLY, RATE = 5.0100 YTD	200.40 8216.40	125.25 195.79	0.00 150.30	325.65 8562.49	67.37 1692.61	19. 495.
Jim Jones EMPL 4, DEPT NO. 22 CUR COMMISSION, RATE = 9.6155 YTD	288.47 15313.47	0.00 0.00	371.66 1491.66	660.13 16805.13	159.60 3039.80	35. 965.
Robert J. Wilson EMPL 5, DEPT NO. 2234 CUR SALARY, RATE = 5.7692 YTD	92.31 10242.31	0.00 0.00	163.46 438.96	255.77 10681.27	42 58	12. 622.
COMPANY TOTALS	1018.15 54261.61	125.25 321.15	834.62 3122.78	1978.02 57705.54	422.98 7598.55	106. 3340.

1 Control number 22222		2 Employer's State number 4993	
3 Employer's name, address, and ZIP code ABC CO. ANYWHERE, USA LOVELAND DIVISION P.O. BOX 5543 LOVELAND, COLORADO 80537			4 Sub-total Cor-rection
7 Employer's identification n			
10 Employee's social security number 543-30-3333	11 Federal income tax withheld 3039.80	12 Wages, tips, other compensation 16805.13	13 FICA tax 965.2
15 Employee's name (first, middle, last) Jim Jones		16 Pension plan coverage? Yes/No YES	17 *
19 Employee's address and ZIP code 2314 S. Elm St. Ft. Collins, Colorado 80531		20 State income tax withheld 457.30	21
		23 Local income tax withheld 358.26	24
Wage and Tax Statement			1978
			COPY B to be filk

Payroll

New Qtr.	New Yr.	Empl. Hrs.	Reset Ck #
Calculations	Checks	Ck. Reg.	Pay. Reg.
Fed.	Loc. Tax	Misc. Tax	New Backup
Tax Dist.	941/W-2	Backup	Yes
			No

ABC CO. ANYWHERE, USA
YEARLY TAX DISTRIBUTION REPORT
10/14/78

TAXING ENTITY	EMPL PAID	GROSS TAXABLE INCOME	INCOME TAX	FICA WAGES	FICA TAX
FEDERAL	5	57705.54	7598.55	57105.56	3340.67
STATE NO. 1	3	38461.78	1024.00		
STATE NO. 2	2	19243.76	429.74		
LOCAL NO. 1	2	21656.65	153.00		
LOCAL NO. 2	2	27486.40	363.38		
LOCAL NO. 3	1	8562.49	0.00		

which fits over and defines the Special 15B keyboard.

	STATE TAX	LOCAL TAX	TOTAL DEDUCT	NET PAY
71	4.74	0.00	0.00	168.99
60	306.54	0.00	2482.07	5272.43
55	23.41	0.00	98.62	247.26
63	260.16	153.00	98.62	9018.21
05	0.00	0.00	30.91	208.32
04	125.24	0.00	810.82	5438.78
39	32.05	13.20	108.88	310.81
25	457.30	358.26	3208.66	8775.85
29		5.12	0.00	195.74
15		5.12	45.67	9645.06
	60.20		238.41	
99	1453.74	18.32	6645.86	1131.12
67		516.38		38150.35

PAGE (ST/FED) 1 / 1 QTR ENDED: 9/30/78 STATE: WYOMING

EMPLOYEE'S SOC. SEC. NO.	NAME OF EMPLOYEE	TAXABLE FICA WAGES	TAXABLE TIPS REPORTED
522-80-3566	John J. Adams	148.50	
345-87-9351	Jack M. Boldon	538.47	
543-30-3333	Jim Jones	605.00	

3 TOTAL TAXABLE UNDER FICA 1291.97

TAXING ENTITY	EMPL PAID	TAXABLE FICA WAGES	TAXABLE TIPS REPORTED
WYOMING	3	1291.97	0.00
FEDERAL TOTALS	3	1291.97	0.00

For Official Use Only

Void	Make No Entry Here
number	
Withheld	14 Total FICA wages
5	16500.00
	18 FICA tips
State wages, tips, etc.	22 Name of State
16805.13	WYO.
Local wages, tips, etc.	25 Name of locality
168 13	CHEY.

with employee's FEDERAL tax return



Payroll Register

This report provides you with a permanent record of all employees' earnings and deductions. It also gives you valuable company totals on a current and year-to-date basis for all categories. These totals are useful in reconciliation of general ledger balances as well as providing data for various government reports.

Earnings Register

This report was designed to provide a further breakdown of the information in the Payroll Register (see above) of the "Other Earnings" and "Total Deduct." columns. The Other Earnings category includes sick pay, vacation pay and miscellaneous earnings. The Total Deduct. category includes deductions numbered 1 through 6. Current and year-to-date totals are provided for each employee as well as for the total company.

Tax Distribution Report

Reconciliation of federal, state and local taxes is made easier with this report. It provides gross taxable income used for calculating:

- federal income and F.I.C.A. taxes
- up to ten different state and ten different local taxes
- amounts of tax withheld for each state and local taxing entity.

This report is available on a current, quarter-to-date and year-to date basis.

941-A and W2 Forms

This data can be easily generated for federal tax and F.I.C.A. report requirements.

Employee Summary Report

This can be obtained for all employees, or you can specify a particular employee number and receive only the report for that employee. The report information is displayed instantly on the CRT and the printout is available just by pressing the HARDCOPY key.

Features of the report include:

- definition of type of employee — salaried, hourly, commissioned. (Hourly employees have a regular hourly rate, an overtime 1 rate and an overtime 2 rate.)
- six voluntary employee deductions based on a fixed amount
- a different number of exemptions for employee's state tax and federal tax
- up to ten different state taxes and ten different local taxes
- earnings and deductions maintained on a current, quarter-to-date and year-to-date basis.

Check Register

The check register provides a list of all checks issued for a pay period and gives you a record to aid in reconciliation of your company's bank account.

Ordering Information

To order the Payroll pack, which comes with an instruction manual (including program modification instructions for state tax calculations), a pre-programmed tape cartridge, and a Special Function keys overlay, specify Part. No. 09845-10850.

Hardware Configuration

To operate the Payroll pack, you will need the following equipment:

- HP 9845B Desktop Computer with 56,426 bytes of read/write memory and the Mass Storage ROM (HP 98431A)
- A 132 character impact printer, e.g. the 2631A or 9871A with the 98021A Forms Handler
- HP 9885M/S Flexible Disk Drive



3404 E. Harmony Road, Fort Collins, Colorado 80525

For assistance call: Washington (301) 948-6370, Chicago (312) 255-9800, Atlanta (404) 955-1500, Los Angeles (213) 877-1282.
Ask for an HP Desktop Computer representative.