digital INTEROFFICE MEMORANDUM

SUBJECT: PDP-16 REVIEW/PDP-16/M PRESENTATION

DATE: March 2, 1972

TO: Management Committee

FROM: Fred Gould

DEPARTMENT: PDP-16

ITEMS;

1. Financial Review of FY72 and forecast for balance of year.
2. Introduction of PDP-16 variant - PDP-16/M.
3. Impact of accounting errors on small Product Line.

Attachments:

Memo "IEEE Introduction of PDP-16/M"
PDP-16/M Price List (Preliminary)
PDP-16/M Marketing Plan

digital INTEROFFICE MEMORANDUM

SUBJECT: IEEE INTRODUCTION OF PDP-16/M (Marketing Twist for PDP-16)

DATE: February 15, 1972

TO: Operations Committee
Product Line Managers

FROM: Fred Gould

DEPARTMENT: PDP-16

We propose to introduce a PDP-16 at IEEE in a box designated PDP-16/M. It is a set of existing PDP-16 modules, the power supply and cabinet of 8/M, and a different approach of marketing the PDP-16.

The attached memo explains the reasoning behind this new approach.

The market this is aimed at is the small quantity dedicated computer user, with small active data requirements, and seldom reprogrammed.

It is proposed we price this basic configuration with its box, front panel and power supply at $1995.00.

The cost of the basic version is $650.00 with Electronics and Back Plane accounting for $470.00.

The full Type 1 discount would bring this machine down to under $1300.

By adding options with mark ups varying from 3.0 to 9.0 we greatly enhance the margin of the system.

Attached also, find a draft of the brochure and price list, and a copy of the PDP-16/M marketing plan.

PDP-16/M PRICE LIST PRELIMINARY

TYPE #	DESCRIPTION	PRICE
PDP-16/M AA	Functional computer, 256 word control ROM, 4 word data ROM, 1 word Read/Write Memory, 96 instructions decoded, fully implemented 16 bit I/O channel with output buffer register, enclosure and power supply (rack mountable), slides include: Back plane prewired to accept options noted in Figure 1.)	$1995

Unit consists of:

1	KAC-16)	General purpose Arithmatic Unit
1	KAR-16)	
1	KBS-16)	Bus Control
1	KTM-16)	
1	PCS16-BA	256 Word Control Memory
3	PCS16-C	Instruction Decoders
1	PCS16-D	Boolean Input Card
1	PCS16-A	Control Unit
1	MR16-A	4 x16 Constants Generator
1	MS16-A	Transfer Register
1	DB16A	General Purpose Interface
2	KFL16	3 Flags

OPTIONS

Type #	DESCRIPTION	PREREQUISITE	PRICE
KBM-16	Bus Monitor - Provides led readout of bus data and essential control functions.	PDP-16/M	$ 200
W983	Double height extender card.	PDP-16/M	$ 27
W982	Single height extender card.	PDP-16/M	$ 18
	Expansion cabinet without power supply required for mounting additional logic functions	PDP-16/M	$250
H9190	Mounting Panel for additional logic functions	Expansion cab	$250

TYPE #	DESCRIPTION	PREREQUISITE	PRICE
	Expansion cabinet with power supply		$600
	DATA		
DB16-A	General Purpose Interface - 16 bit I/O channel with output buffer register.	PDP-16/M	$100
DB16-B	Output Interface - 16 Bit output channel with buffer register.		$ 75
DB16-C	Input Interface - 16 bit input channel		$ 50
DC16-A	Serial Interface - contains receiver, transmitter, clock: bit configuration and baud rate are selectable by jumper.	DC16-B	$325
DC16-B	Serial Interface Adapter	DC16-A	$ 25
MR16-A	Constants Generator - 4 x 16 diode ROM Direct access		$100
MR16-D	Constants Generator - 24 x 16 core ROM Direct access		$150
MS16-A	Transfer Register - 16 bit data storage and manipulation register: allows byte operations		$100
MS16-B	Byte Register - similar to transfer register above but allows more complex bit manipulation.		$115
MS16-C	Scratch pad - 16 x 16 solid state read/write memory. Direct Access		$200
MS16-D	Scratch pad - 256 x 16 Solid state read/write memory. Random access.		$500
MS16-E	Scratch pad - 1K x 16 solid state read/write memory. Random access.		$1500
	CONTROL OPTIONS		
PCS16-BA	8 x 256 PROM (reprogrammable)	PCS Control & Decoders	$ 225*
PCS16-BB	8 x 256 Fusible link ROM. (avail. June 1972)	PCS Control & Decoders	$ 125*

TYPE#	DESCRIPTION	PREREQUISITE	PRICE
PCS-16BC	8 x 256 masked ROM (minimum quantity of 50 identically programmed pieces)	PCS Control & Decoders	$ 75*
PCS16-C	Instruction Decoder - provides 32 instructions when used in conjunction with other PCS options.	PCS ROM & Control	$ 50
PCS16-D	Boolean MUX - multiplexes 29 Boolean inputs to PCS control.	PCS ROM, Control & Decoders	$ 50
PCS16-A	PCS Control	PCS ROM & Decoders	$ 100

* NOTES

1. Control memory price includes loading of contents specified by customer generated paper tape. Masked ROM minimum quantity is 50 units.

2. PROM reload service is offered at $50 per unit.

   In all cases the customer is responsible for programming.

3. Field Service of the PDP-16/M is available. Contact factory. Field Service will not be offered on systems shipped less chassis and power supply.

PDP-16/M MARKETING PLAN

FY'73 Q1 - Q4

1.0 PRODUCT DEFINITION AND CONCEPTS

1.1 Product Overview

The PDP-16 (originally called Register Transfer Modules) was created in order to postpone the expected demise of M series. It has done much more than that. It has filled the gap which existed in the salesman's product bag between logic modules and general purpose minis.

While the PDP-16 has been marginally successful to date, some problems have been noted.

1. Since the product, in its present form, is relatively complex, it is difficult to train salesmen.
2. Since the product is currently offered as a set of options uniquely configured for each situation, the salesman does not have the feeling of security of a predefined box that he can see and feel.

3. Although the PDP-16 has been well received by computernicks, it is still somewhat of a mystery to neophytes.

All of these hang-ups can be traced to a single source, namely, inadequate product identification. By offering the PDP-16/M as a computer that looks, feels and acts like a computer, rather than a special system, it is expected that the remaining obstacles to product line success will be eliminated.

The PDP-16/M is a viable product in itself, and will account for a significant percentage of product line bookings, but it has other, and perhaps more significant, reasons for being. It will serve as an easily understood introduction, for salesmen and prospects, to the PDP-16 concept, namely, a family of powerful, inexpensive, functional 16 bit computers. It will act as a door opener in dealings with new prospects, especially those whose level of competence in the computer field makes

the present PDP-16 concept incomprehensible. It will provide an easily recognized entity to be referenced in advertising and promotional campaigns.

The PDP-16/M will give DEC's lowest cost family of computers the identity it now lacks. Also, it will give DEC, the largest producer of minis, the lowest cost computer currently available.

1.2 Product Definition

1.2.1 Hardware

The PDP-16/M is a 16 bit microprogrammed minicomputer designed to be as modular as current technology will allow. All options are implemented as functional units which plug into the data and control busses. The standard chassis, identical to the PDP-8/M chassis, is prewired to accept a wide range of options.

1.2.2 Software

The PDP-16/M program is stored in a solid state, re-programmable, read only memory. The basic memory module is 8 bits by 256 words to 1024 words maximum. Programs can be written using special software packages on the PDP-8 or PDP-10. The PDP-8 can then be used to simulate the PDP-16/M control ROM until the program has been debugged. Finally, using the PDP-8 with special front end, or a memory loading service provided by the PDP-16 group, the control memory is coded and the PDP-16/M is ready to go on line.

1.2.2.1 PDP-16/M Assembler

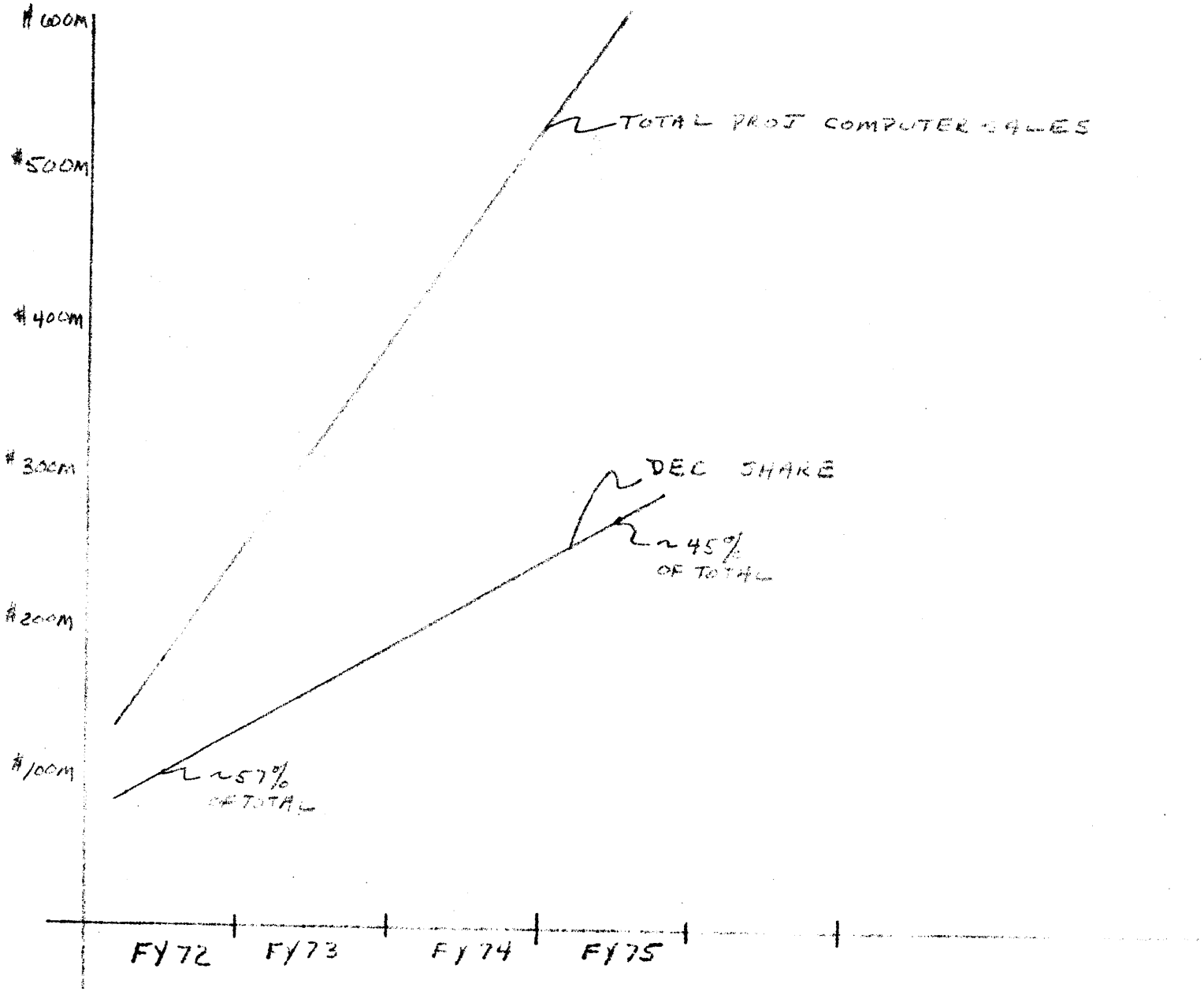
The assembler uses a high level language with only five basic instructions. A person can go from novice to expert in a matter of a few hours.Programming a PDP-16/M is easier than programming a PDP-8.

1.3 PDP-16/M Availability

The PDP-16/M will be announced at the 1972 IEEE show in New York City. Contrary to the way things are normally done in the computer industry, we will, at that time, have units in stock and ready for delivery. All applicable software packages will also be ready.

2.0 Goals (See Figures 1 through 3)

Total PDP-16/M for FY'73 and '74 are projected at fairly low levels. I feel that the product is easily justified, however, because the PDP-16/M will effect an increase in PDP-16 sales, for reasons previously stated, and, since the PDP-16/M is simply a repackaging of existing components, the development expense is very low.


$600M
$500M
$400M
$300M
$200M
$100M
TOTAL PROJ COMPUTER SALES
DEC SHARE
~45%
OF TOTAL
~57%
OF TOTAL
FY 72
FY 73
FY 74
FY 75

F15

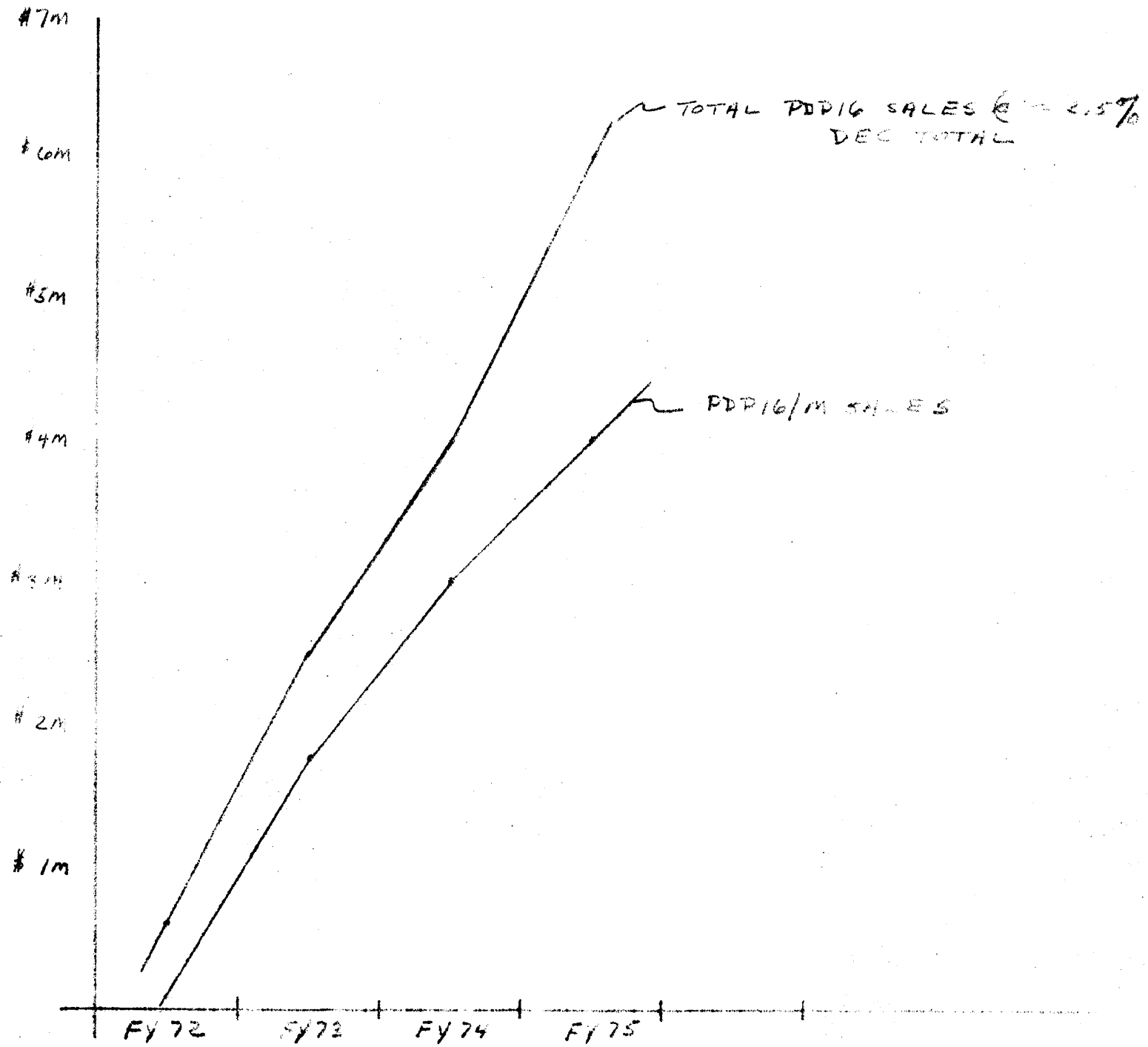

#7m
$6m
#5m
#4m
#3m
#2m
$1m
TOTAL PDDIG SALES @ ~ 2.5%
DEC TOTAL
PDDIG/M SALES
Fy 72
Fy 73
Fy 74
Fy 75

FIG 2

	FY 72	FY 73				FY 74	FY 75
	Q4	Q1	Q2	Q3	Q4		
PDP 16/M BOOKINGS / % OF PROD. LINE	75 / 25	200 / 50	300 / 70	500 / 70	750 / 75	3000 / 75	4800 / 80
SHIPMENTS	40	150	250	450	700	2800	4500
BACKLOG	35	85	135	185	235	435	735

FIG 3

3.0 Markets

The PDP-16/M, due to its low cost and flexibility, is applicable across a wide range of vertical market segments.

The bulk of PDP-16/M applications will be in the area of small dedicated controller/computers requiring arithmetic capability ranging from very simple to relatively complex. Memory requirements will be low, generally under 1K, system flexibility and adaptability will be important as will the ability to modify programs. Since a high percentage of sales will be to OEM's, price will be a gating factor in the final decision.

Some representative types of systems that fit the above description are listed below.

Communications

Many communications systems have related problems requiring little or no memory. The PDP-16/M is cost-effective in the following areas:

1. Time-division-multiplexors - Multiple communications lines are multiplexed on a single (faster) line.
2. Time-division-switching - Multiple communications lines can be switched arbitrarily by time sampling of the basic digital waveform and retransmitting. Systems for switching multiple Teletype or alphanumeric terminals can be switched among multiple computers and line speed inputs.

3. Remote sampling and data transmission - Remote (unattended) sites can be sensed (e.g., analog and data transmitted to a central site).

4. Telephone digit checking - A PDP-16/M can check to see if a particular phone is calling within a restricted area.

5. "Smart-terminal" control - Multiple terminals are interconnected, controlled, and their data transmitted on a time-multiplexed basis. The flexibility of 16/M allows functional specialization of the terminals.

Control

Continuous (sampled) and discrete control systems are easily configured. In many applications the information about the behavior can also be analyzed and recorded or transmitted.

1. Conventional plant (sampled) closed loop - A single computer can control a large number of loops.

2. Crane control - Switch input conditions are examined and the crane is moved accordingly via control outputs to stepping motors and motor contactors.

3. Conveyor control - The status (items) of a conveyor is held in PDP-16/M's memory, and at appropriate times, gates are opened to transfer the items to appropriate storage bins.

4. Transfer machine control -

Education

Students build systems using microprogramming techniques. The very simple interface illustrates principles without tiresome detail required in large minicomputer interfacing.

1. Computer organization and design - The 16/M has both room for adding additional instructions and/or the instruction-set may be rewired.

2. Computer interfacing - Most interface logic is present, but other interfaces can be designed.

3. Computer microprogramming - The structure of the 16/M is similar to that of microprogrammed machines. Students are free to develop interpreters for instruction sets.

4. Computer programming - The microprogram-program interface can be explored.

5. Hardware-software interface - Additional, more complex, hardwired instruction can be added for greater speed.

Data Logging, Waveform Analysis, Waveform Synthesis

The 16/M provides far more flexibility than hardwired data loggers.

1. Data logging and alarm scanning - Analog inputs are compared with preset values, and out-of-range alarm conditions can be printed out or transmitted via communications lines.

2. Waveform data logging - Input (sampled) data is analyzed to compute average, rate of change, high, low, and histogram in the same way that a conventional data logger would be used.

3. Data reduction - Time sampling and transmission of information of waveform reconstruction information.

Data Format and Media Conversion

Data in one form (e.g., 8-bit BCD) or media (e.g., 6-hole paper tape) is converted to another format and/or media.

1. Typesetting tape converstion - Data in one code and format is converted to another.
2. Paper tape to magnetic tape
3. Sampled analog to paper or magnetic tape
4. Card to magnetic tape

Computer Interfacing with Pre-and Post-Processing of Information

The PDP-16/M provides two capabilities which can be beneficial for these applications: a simple interface; and processing. The former allows systems to be operational earlier than with hard-wired logic. By having programming capabilities much pre- and post-processing can be carried out within the interface prior to placing final data at the main computer's access.

Scientific Experimentation

Many of the previous applications areas arise in this area: control, data logging and analysis, communication, etc. Because of the low cost, many scientific instruments can now be computer interfaced.

1. Experiment control
2. Data logging, analysis and recording
3. Data conversion - Providing access to other computers without tying up a minicomputer.
4. Computer interfacing - Interfacing capability to existing minicomputers.

As indicated in the organizational chart on the last page of this report, each person in the marketing group has responsibility for research in a specific market/applications area. Based on this research and the resulting proposals, the group will address itself to attractive areas with products and/or ad campaigns designed to develop other market areas in a manner similar to that planned for the education market.

The education market seems to be an area that can be tapped with minimum investment in time and money while providing significant sales volume. This, therefore, will be our initial area of concentration. With negligible effort in this area to date, bookings plus solid commitments are approaching $100K for FY '72. It is expected that the new education oriented brochure which describes a new PDP-16/M lab package and the assignment of a marketing specialist to exploit this market will result in annual sales in excess of $300K.

In addition, the product line is working closely with several people in the Mid-Atlantic Region in performing a PDP-16/M marketing survey for the state of New Jersey. Using Dun's files and DEC's files on existing customers and lost sales, a telephone campaign is being conducted to locate significant PDP-16 potential. Prospects uncovered in this campaign will be qualified by the sales force and the product line and invited to a full day sales/technical seminar on the PDP-16/M. Initial seminars are scheduled for the week of 3/6/72. If the plan proves to be viable, it will be used throughout the East Coast, and eventually throughout the country.

The PDP-16 group is working hard to make the most of limited sales and marketing manpower, and, to a man, feels that success is in sight.

5.0 Sales and Marketing Expenses

5.1 Cost of Sales, Yield, Anticipated Advertising and Public Relations Expenses (Figure 4).

5.2 Advertising and Marketing Strategy

5.2.1 Marketing

The PDP-16/M will be promoted to the public and to the sales organization as a powerful, flexible, inexpensive controller/computer. We will stress ease of use, ease of programming, and ease of configuring, three areas which were suspect with the original PDP-16 concept.

5.2.2 Training

Training of customers and the sales force will play an important part in the success of the PDP-16/M. The training department is currently considering details of a one week customer hardware/software course. Also, as soon as schedules can be arranged, the PDP-16 Marketing group will begin presenting seminars to the sales force and to groups of customers in the field.

5.2.3 Advertising

An ad campaign stressing the points covered in 5.2.1 will break in March in the IEEE issues. As far as is possible, the ads will be run on a regional basis, covering only the East Coast, the two sales regions in which we are actively supporting the product.

5.2.4 Promotional Literature

Several pieces of literature, an OEM oriented brochure, a price list/configurer, a programming card and an educational brochure are in the works and will be available for IEEE.

5.0 SALES AND MARKETING EXPENSES FOR PDP-16/M

5.1 Sales

	FY'72				FY'73				FY'74	FY '75
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4		
Number of Sales Engineers[1]				1	2	3	5	7.5	7.5	12
Cost @ $8K/Q				8	16	24	40	60		
Yield per Quarter				60	100	100	100	100		
Yield per Year				60				400	400	400

5.2 Advertising and Sales Promotion

Advertising and Sales Promotion				30	10	20	20	20	100	150

FIGURE 4

6.0 MARKETING ORGANIZATION