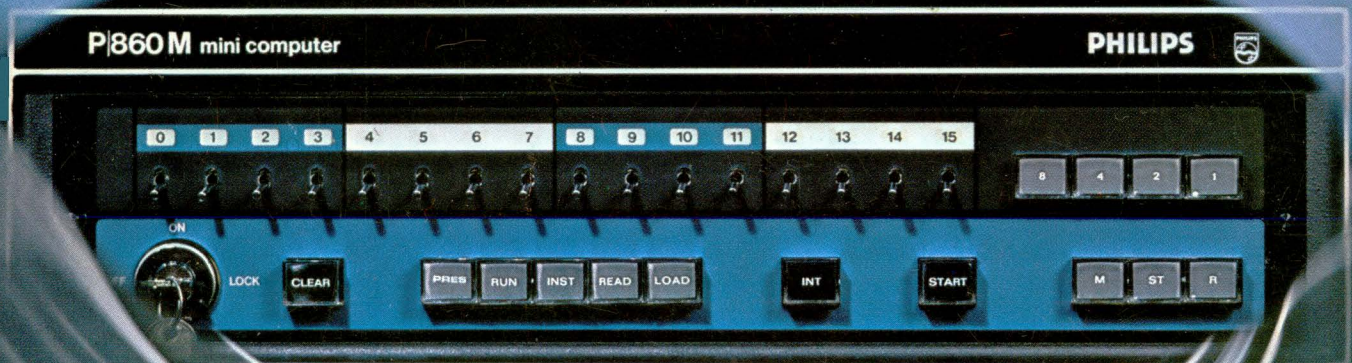


mini computers for OEM's who want that little extra



Data  
Systems

**PHILIPS**

# INTRODUCTION

The important thing to know about the Philips P800M minicomputer family is that it is specifically intended for OEMs. It is something more than just a well-designed, reliable series of machines; it is a truly upward compatible family with all the flexibility and expandability required to meet the many and varied demands of the OEM market. In fact it is everything that could be expected from a company with the considerable expertise of Philips in the many minicomputer application areas.

From telecommunications through medical data systems to the complexities of industrial automation Philips is a recognized field leader.

And all this know-how has gone into making a minicomputer family that can be integrated quickly and efficiently into practically any system configuration.

Consider just some of the features which give these machines their amazing versatility:

- Memory capacity ranging from  $\frac{1}{2}$ k (P850M) to 32k (P860M) 16-bit words. Expansion simple and inexpensive by plug-in modules.
- Central processor organized around sixteen, 16-bit general purpose registers. Fourteen are available for general usage, including indexing and indirect addressing; two are reserved for stack pointer and instruction counter.
- An extensive interrupt facility ranging from a one-level priority system with up to 16 lines for the P850M, to a multi-level priority system of up to 48 levels with 63 lines for the P860M.

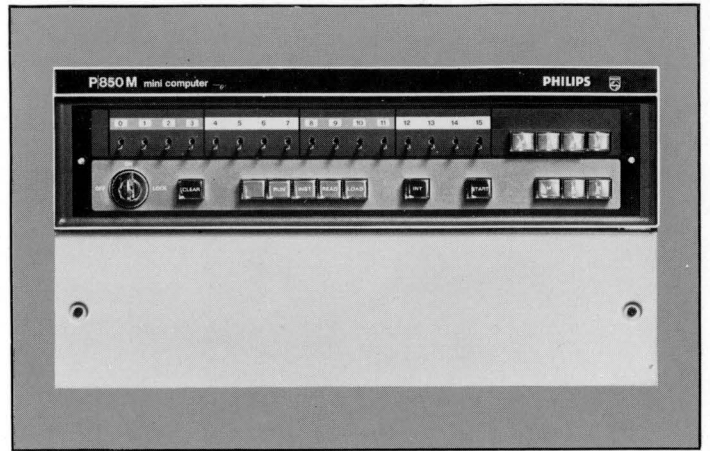
- A stack processing facility associated with the interrupt system.
- A powerful instruction set which includes byte manipulation facilities, literal instructions, multiple load and store, multiple shift, bit test, and the possibility for direct addressing of all memory locations. Indexed addressing does not increase execution time.
- A universal I/O bus featuring direct plug-in connection of all standard peripheral equipment.
- A highly flexible range of interfacing equipment covering the widest possible range of both digital and analogue I/O requirements.
- Comprehensive data communication equipment covering inplant and outplant installations in half duplex or full duplex mode with synchronous or asynchronous operation.
- A complete range of standard software perfectly complementing the internal processing power and efficiency of the P800Ms.
- Modular power supplies.
- All equipment mountable in standard 19-inch racks with no special environment required.

Philips has an extensive capability for providing total systems based on minicomputers. That is why Philips can offer so much assistance to the OEM in demonstrating how the P800Ms can best be used to solve his particular problems. And as an added bonus, OEM discounts of up to 41% are offered.

# P850M

This is the smallest member of the family. Memory capacity is  $\frac{1}{2}$ k, 1k,  $1\frac{1}{2}$ k or 2k 16-bit words; cycle time is 3.2 microseconds; height including power supply is only  $5\frac{1}{4}$  inches for the 1k model. The standard version can take  $\frac{1}{2}$ k or 1k of core plus 2 I/O cards while the extended version can take  $\frac{1}{2}$ k, 1k,  $1\frac{1}{2}$ k or 2k of core plus 9 I/O cards. Both versions fit into standard 19-inch racks.

The processor is organized around sixteen, 16-bit general purpose registers and is backed by a powerful instruction set. A programmed channel is standard and up to 15 interrupt lines are available for connection to external devices. Those with their own control units can be connected directly into the universal I/O bus, while others can be connected by Philips or user designed device control unit cards. Also available with the P850M are real-time clock and power failure detection with automatic restart.



Additional flexibility is provided by a specially designed digital I/O system (DIOS), a modular I/O system (MIOS) and a variety of level adaption cards. This equipment ensures that devices in practically all application fields can be interfaced with the P850M. Moreover, a comprehensive range of data communication equipment is available including synchronous, asynchronous and multiple low speed line control units.

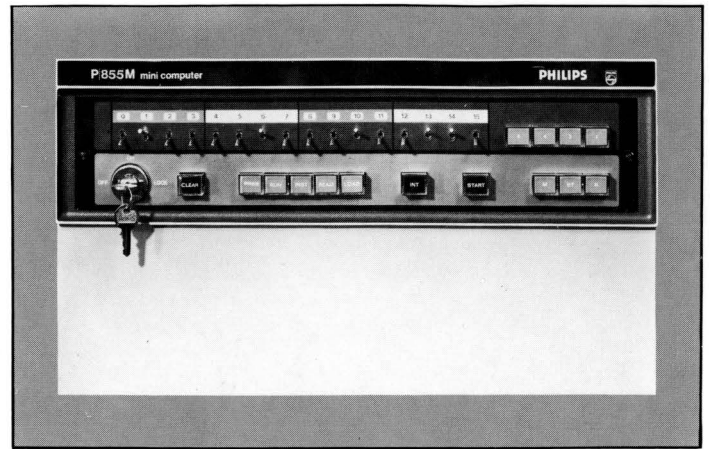
Standard peripheral equipment available for connection to the P850M includes operator's typewriters (with or without punched tape equipment), a card reader, high-speed punched tape equipment and line printers.

Undoubtedly, the P850M is the ideal choice where interfacing ease, programming efficiency and low cost are more important parameters than higher priced memory speed and capacity.

# P855M

For larger configurations, the P855M is a flexible, readily expandable, easy to program minicomputer with a cycle time of 1.2 microseconds. Memory capacity ranges from 4k to 32k 16-bit words in 4k plug-in modules and the instruction set has been enlarged to include double-length arithmetic and multiple shift instructions. Hardware multiply and divide instructions are also available. Thus the P855M is the ideal machine for applications requiring enlarged memory capacity, increased processing power and medium to high data transfer rates.

I/O potential has also been greatly improved by means of a multi-level, priority interrupt facility. 23 lines on 8 levels are standard with an expansion capability of up to 63 lines on 48 levels. This system not only allows connection of a greater number of peripherals but is particularly important for the real-time operating systems available for the P855M. For example, interrupt levels can be used by software as well as by hardware to enable multiprogramming between programs running concurrently in a real-time situation. A memory protect facility is available to ensure strict program security under these conditions.



Other important additions include a multiplex channel, a DMA channel and a memory increment data break (MIDB) facility. The multiplex channel can accommodate up to 15 device controllers with transfer rates as high as 165,000 16-bit words per second, while the DMA channel can handle up to two controllers at maximum transfer rates of 830,000 16-bit words per second. MIDB is an invaluable tool for analytical work as it allows external analytical equipment to generate central processor interrupts and automatically increment memory locations.

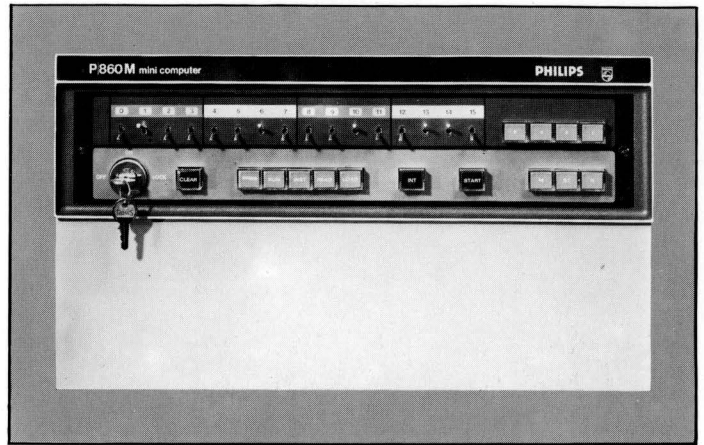
Fixed and moving head disc units are both available with the P855M, as well as a plotter and two types of magnetic tape units, plus, of course, all peripherals available with the P850M.

With up to 32k of core plus 8 I/O or control card slots, this machine fits into standard 19-inch racks. A choice of control panels is available and no special environment is required. If an excellent price/performance ratio is a criterion, then this machine must be considered. The performance is good, the price is moderate and OEM discounts of up to 41% are available.

# P860M

The P860M has specifications that would be more than acceptable for many larger computers. Yet it is a genuine minicomputer at genuine mini prices. It combines all the best features of the P850M and P855M but its memory cycle time is down to 840 nanoseconds. This is why the P860M displays above average performance in all operation modes, whether arithmetic, logical or I/O. For instance, the programmed channel achieves a maximum data transfer rate of 40,000 16-bit words per second, the multiplex channel - 240,000 16-bit words per second and the DMA channel - 1,200,000 16-bit words per second.

Adding to its strength is the comprehensive range of standard software offered with the P860M. No fewer than four system monitors are available together with two assemblers and two FORTRAN compilers. And to complete the package, a useful selection of programming aids is offered. These include update processors, text editors, debugging programs and linkage editor/loaders for either stand-alone or monitor-controlled operation.



The range of standard peripheral equipment available for the P860M covers virtually all device categories, and to cater for special or custom made peripherals, a comprehensive selection of interfacing equipment is available. Included are general purpose device control unit cards, blank circuit boards (some with hole patterns), standard connectors, equipment shelves, bus extenders, etc. Moreover, to ensure ease of mechanical integration, all interfacing equipment, all options, most of the peripherals and the P860M itself can all be mounted in standard 19-inch racks.

The P860M is undoubtedly the ideal choice for systems requiring a fast and efficient minicomputer with above average performance characteristics.

# SOFTWARE: SYSTEM MONITORS

In line with Philips determination to provide a customer with the best possible overall system, the software offered with the P800M minicomputer family is comprehensive and completely compatible throughout the range. It perfectly complements the internal processing power and efficiency of these minicomputers and offers a great deal of assistance to the user by simplifying the preparation of his system programs.

#### *1.5k Executive system*

This is a highly modular package that converts the P850M from a well-engineered minicomputer into a flexible and usable tool. Modules available include a one-stage bootstrap loader, arithmetic routines, interrupt handler, debugging routine, I/O routines and two relocating program loaders. One of the program loaders even allows the operator to specify programs to be loaded at specific base addresses.

#### *4k Executive monitor*

This is basically a one-level, single task supervisor that, in addition to loading and supervising user programs, is able to execute a number of functions required by these programs. Operation is intended for non real-time situations. Additions to this basic module are dynamic memory allocation, operator communications and debugging facilities plus a limited form of multitasking brought about by 'scheduled label' routines. The system is basically paper tape oriented but can be easily extended for a range of peripherals including card reader, line printer and magnetic tape.

#### *8k Real-time monitor*

This monitor takes full advantage of the real-time facilities provided by the P855M and P860M machines. As well as all the features of the 4k

monitor, it has multitasking, multiprogramming and concurrent program handling facilities. Interrupt routines can be connected to up to 48 hardware levels on 63 lines, while a maximum of 14 software priority levels are available for user tasks. Memory partitioning is also possible and allows foreground and background areas to be defined with an additional area reserved for dynamic allocation of buffer space. On-line use of assemblers, compilers and debugging programs makes this monitor ideal for a programming environment. It is basically punched tape oriented but can easily be extended to handle other peripherals.

#### *8k Disc real-time monitor*

This is an extension of the 8k real-time monitor. It provides all the same features but also includes the possibility of calling foreground programs into memory from fixed or moving head disc equipment.

#### *4k Disc operating monitor*

Designed for fixed or moving head disc equipment, this system allows entry of commands from a console and can easily be extended to a number of consoles thus greatly simplifying user operation. As well as accommodating user files, it supports all system software components such as assemblers, compilers, debugging and update programs. It is an invaluable tool for program development.

#### *Data communication extensions*

For all four system monitors, extensions are available to facilitate synchronous and asynchronous data communications. To support these extensions, packages are offered containing a line procedure handler and driver for a synchronous line control unit, plus a driver for an asynchronous multiple line control unit.

# SOFTWARE: ASSEMBLERS & COMPILERS

## *2k Stand-alone assembler*

This is one of the smallest assemblers available today, yet it accepts the full instruction set of the P850M, requires only one pass to produce absolute or relocatable object code and allows error recovery during actual assembly. Each source statement line is scanned in free form, making source program preparation much simpler and giving much less chance of error than with many others. Assembly listing and 'halt on error' are optional. And assembled object programs are fully compatible with those produced by the larger Philips assemblers.

## *4k assembler*

This one-pass assembler handles the expanded instruction set of the P855M and P860M. It contains many additional features such as symbolic reference capabilities, definition of entries and externals, plus extra facilities for pseudo instructions and assembly directives. Operator control messages are included to assist assembler handling; error messages are much more comprehensive; and error recovery during actual assembly is again an important feature. Three versions are available; one stand-alone and two monitor-controlled (including disc oriented monitors).

## *8k assembler*

This is an extended version of the 4k assembler designed to run only under monitor control. Still more features for pseudo instructions and assembly

directives are included with some macro and conditional assembly facilities. Double buffered I/O is an important extra, as is optional symbol table output. Interaction with FORTRAN written programs through commons is also possible.

## *4k basic FORTRAN compiler*

This is an extremely efficient compiler that accepts basic USASI FORTRAN source programs and produces interpretive code object modules. It is self-initializing, requires only one pass over each source module and does not require reloading between successive compilations. Flexibility of the system is greatly increased by a number of extensions including mixed mode expressions, strings within quotes and up to three dimensions per array. Moreover, programs written in Philips extended FORTRAN may call assembly language sub-routines. Source line listing is optional but error messages are always printed even when source line listing is suppressed. Two versions are available; one stand-alone and one monitor-controlled. Each has a comprehensive sub-routine library including a complete mathematical complement.

## *8k FORTRAN IV Compiler*

This accepts full USASI FORTRAN IV and generates directly executable object code. It requires only one pass, and is designed to be run always under monitor supervision. Comprehensive sub-routine and mathematical libraries are available.

# SOFTWARE: PROGRAMMING AIDS

## *Update processors*

The update processors offer a fast and efficient means by which source programs and object libraries can be corrected or copied, with or without a listing. Source programs in ASCII code can be corrected by insertion or deletion of lines, while object libraries can be updated by insertion or deletion of modules. A 1k stand-alone version is available for the P850M computer while, for the P855M and P860M, 2k stand-alone and monitor-controlled versions are offered.

## *4k Text editors*

This program permits alteration, deletion, insertion or movement of text on a character, character string or line level. It is very flexible and designed for conversational interaction through the operator's typewriter. Two versions are available; one stand-alone and one monitor-controlled.

## *4k Debugging programs*

The debugging programs offer conversational debugging facilities for FORTRAN or Assembly language programs, providing a convenient means by which the user can trace the execution of his program and perform extensive diagnostic procedures. Basic and extended versions are available both designed to run under monitor control.

## *4k Linkage/editor loaders*

These processors can link a number of object programs that make external references to one another, and can produce the end program on punched tape, magnetic tape or disc. If all external references are satisfied, they can also load the program into core during the linkage process. The user can specify whether he requires link edit (program output) or link load (executable program in core), and which peripherals are to be used for the process. Two versions are available; one stand-alone and one monitor-controlled.

## *Utility packages*

Utility packages are available for binary core dump on paper tape, ASCII core dump on operator's typewriter or line printer, premark on moving head disc, core dump to disc and labels for magnetic and cassette tape.

# PERIPHERALS

All models can be supplied with or without control units.

## *P841 Operator's Teletypewriter*

Four different models are available covering light or heavy duty applications, with or without punched tape equipment. Operating speed for all models is 10 c.p.s.

## *Punched Tape Equipment*

Two types of reader and two types of punch are available, all adjustable for 5, 6, 7 or 8 channel tape. The P801 and P802 readers operate at 333 and 600 c.p.s., respectively. The P803 and P804 punches operate at 75 and 150 c.p.s., respectively. All machines are thoroughly field-proven and can be mounted into standard 19-inch racks.

## *P806 Card Reader*

This is a photo-electric, full 80-column card reader that operates at 250 cards per minute.

## *Line Printers*

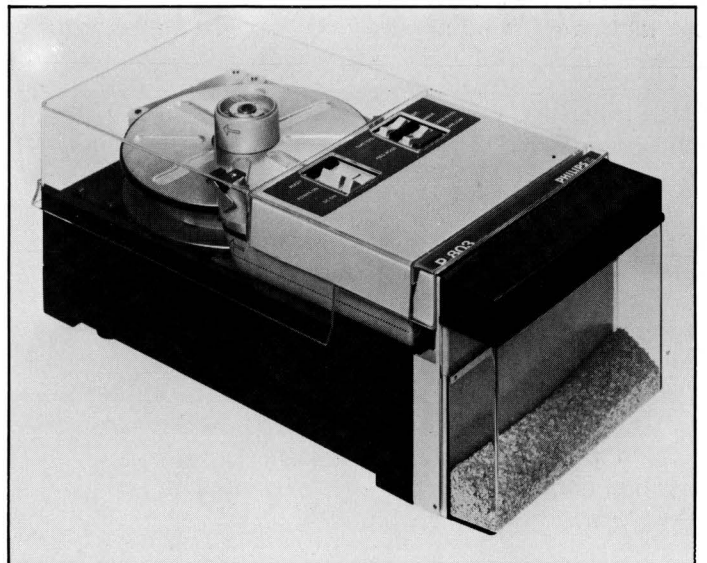
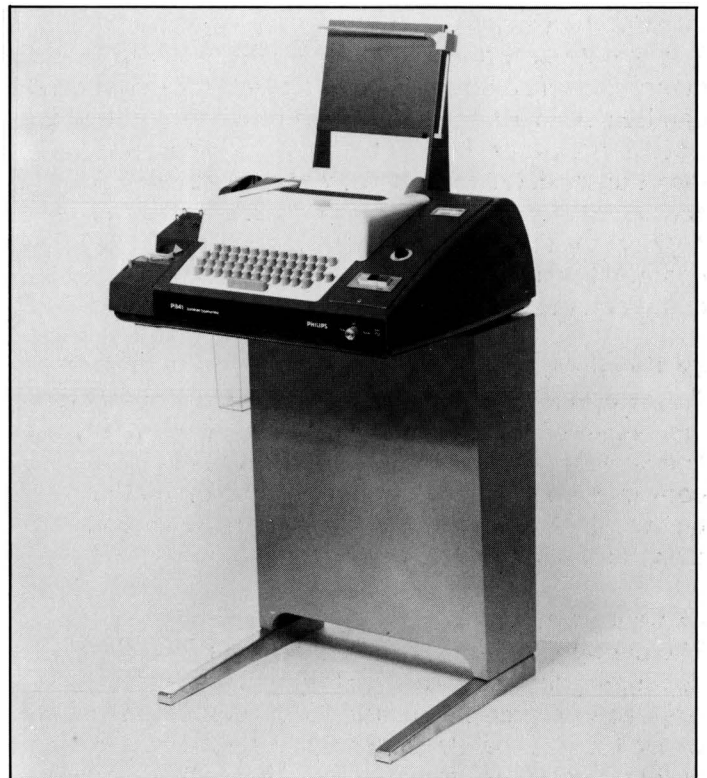
Three line printers are available at a variety of speeds and line widths. All have 64 character sets. The P810 has a line width of 80 characters and a minimum printing speed of 356 l.p.m. The P811 has a line width of 132 characters and a minimum speed of 245 l.p.m. The P812 also has the larger line width but can print at 670 l.p.m.

## *Plotters*

The two plotters have a step size of 0.01-inches, 0.005-inches or 0.1mm. Plotting speed is up to 300 steps per second in 8 directions. The P813-001 and -002 have plotting widths of 11-inches and 28.55-inches, respectively. These plotters are available only with the P855M and P860M machines.

## *Display Equipment*

A teletype compatible display control unit is available. It is suitable for variable speeds and has a CCITT/V24 interface.



### *P833 Cassette Tape Drive*

The control unit for the cassette tape drive units can accommodate up to four units. Each unit operates at a maximum transfer rate of 6000 b.p.s. at 7.5in./sec. tape speed. Total capacity of one tape is over 5 million bits at a density of 800 b.p.i. The system can be mounted in a standard 19-inch rack.

### *P831 Tape Unit*

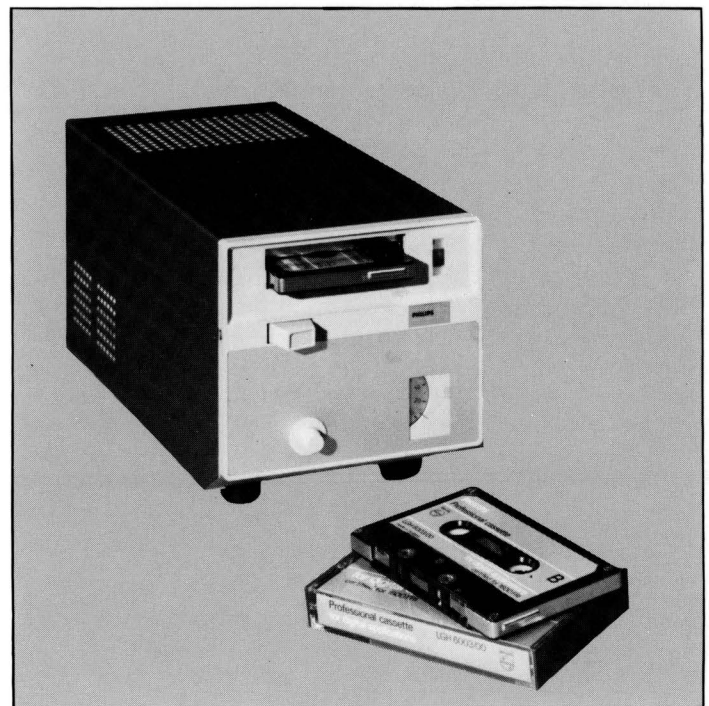
Two IBM compatible models are available. Both operate on 9-tracks at 800 b.p.i. with 10.5-inch reels. The P831-002 operates at 25 i.p.s. and the -004 at 45 i.p.s. Both use read after write operation. The formatter and control unit are both designed to control four tape units. Full tape units are available only with the P855M and the P860M machines.

### *P821 Fixed-head Disc*

This has a capacity of up to 560,000 characters. The rotational speed of 3000 r.p.m. plus the possible density of 36,000 bits per track give an extremely high transfer rate. Access time is an average of only 10 milliseconds. The system comes with power supply and will mount with the optional control unit (for four drives) into a standard 19-inch rack. This equipment is available only with the P855M and P860M machines.

### *P822 Moving-head Disc*

With these units, each interchangeable disc cartridge can hold up to 2.7 million characters. The cartridges themselves are of a very advanced design and are completely reliable. For instance, when a cartridge is removed from the disc unit, it seals itself automatically against damaging dust particles. The transfer rate is in excess of 100,000 characters per second and the average positioning time is only 125 milliseconds. The unit comes with power supply and can be mounted in a standard 19-inch rack with the optional control unit (for two drives). Slides are incorporated for ease of access for routine maintenance. This equipment is available only for the P855M and P860M machines.



# INTERFACES

The P850M, P855M and P860M offer a wide range of interfaces for almost every possible application, including the data communication networks.

## *MIOS*

Modular I/O system is a rack mountable unit that connects easily into the I/O bus. It will handle almost any digital or analog input and output and will be tailored, cost-wise and performance-wise, for each application.

## *DIOS*

This is a simple circuit board that plugs straight into the I/O bus circuit. It enables the connection of higher voltage devices, such as relays, to the whole family.

An optional maintenance console is available, which is especially suited for examination of MIOS. General purpose I/O interface cards are also available. These make the interfacing of non standard peripherals a comparatively easy job.

## *Data Communication*

These mini computers can be used for all the standard d.c. applications, including data concentrator, terminal controller, intelligent terminal station and front-end processor. The following LCUs are available.

## *MELCU*

Multiple Low Speed Line Control Unit provides the interface between one of the family and up to 8 full duplex asynchronous low-speed lines. Features include a variety of standard line speeds plus any other low speed as an option; characters of 5, 6, 7 or 8 bits; odd, even, or no parity check; direct connection to the programmed channel; diagnostics via an optional control panel. For distant connections a Modem interface unit is available.

## *ASYLCU*

Asynchronous Line Control Unit can interface one of the family and one low or medium speed line up to 2400 bits per second. Features include half- or full-duplex transmission; odd, even, or no parity check; assembly and disassembly of characters; stripping or generation of start/stop bits; automatic answering capability; diagnostics via an optional panel.

## *SYLCU*

Synchronous Line Control Unit is for medium or high speed lines up to 50,000 bits a second for inplant connection or up to 9,600 bits a second for switched, leased or dedicated lines. It has the same features as ASYLCU plus LRC or CRC capability; direct connection to a multiplex channel; ECMA or BSC procedures; point to point or multipoint networks.

# PHILIPS RESOURCES

Sales of more than two thousand million pounds and a staff of 367,000 put Philips into 4th position in Fortunes list of top international companies. It is the largest and most dynamic, truly international electronics company in the world. In 1971, Philips sales increased by £360 million over the previous year, and sales in the field of professional equipment rose substantially, accounting for a third of turnover.

The professional side of Philips includes computers, medical equipment, telecommunications and defense systems, with a diversity of electrical and electronic equipment ranging from thousands of oscilloscopes to millions of transistors. The various divisions responsible for this equipment within Philips work closely with the mini computer organizations with regard to applications, interfaces and general problem solving.

Philips have manufactured mini computers since 1959 and are also one of the largest suppliers of all the necessary components, from memories to control cards. All components are subjected to the same high standards of control and inspection as the computers themselves which makes the final product amongst the most reliable available anywhere.

However, the experience and manufacturing capability of Philips are only a part of Philips resources. Our rise to our present status has resulted in one of the most outstanding world wide sales and service success stories ever recorded. Philips has full scale national organizations in 60 countries and large agencies in many others to handle its many products. OEM sales and service organizations are already established in all major European countries and Japan. Other centres are being set up world wide.

Philips resources mean a lot when it counts.



# PHILIPS OEM MARKETING

Industry Group Small Computers P.O. Box 245, Apeldoorn, the Netherlands  
phone: 05760- 30123; telex 4 91 42

Full details can be had from the above address or:

## EUROPE

**Sweden**  
Svenska AB Philips Data Systems  
Lidingövägen 50  
102 50 Stockholm 27  
Tel. 08 635000

**Denmark**  
Philips Electrologica A/S  
Prags Boulevard 80  
2300 Kobenhavn S  
Tel. 2222

**Norway**  
Philips Data Systems  
Nils Hansens vei 2  
P.O. Box 73 Bryn  
Oslo 6  
Tel. 67 93 80

**Finland**  
OY Philips AB  
Kaivokatu 8  
Helsinki 10  
Tel. 10915

**Belgium**  
NV Philips-Electrologica  
Anspachlaan 1  
1000 Brussel  
Tel. 193900

**France**  
Philips Data Systms  
Département OEM  
5 Square Max Hymans  
75015, Paris 15  
Tel. 734 77 59

**Western Germany**  
Philips Electrologica GmbH  
Geschäftsbereich Computer-Systeme  
Schwannstrasse 3  
4 Düsseldorf  
Tel. 45 66-1

**Italy**  
Philips S.P.A.  
Divisione Sistemi  
Viale Fulvio Testi, 327  
20162 Milano  
Tel. 6420951

**Switzerland**  
Philips AG  
Binzstrasse 18  
8027 Zürich  
Tel. 442211

**England**  
Philips Electrologica Ltd.  
7/8 Lygon Place  
Ebury Street  
London SW1W OLA  
Tel. 730 3416

**FAREAST**  
**Japan**  
Nihon Philips Corporation  
P.O. Box 13  
World Trade Center  
Hamamatsu-cho, Minato-Ku  
Tokyo 105  
Tel. 03 435 5211

**NORTH AMERICA**  
**U.S.A.**  
North American Philips Corp.  
Dept. 007  
100 East 42nd Street  
New York N.Y. 10017  
Tel. 212 697 3600

**Canada**  
Philips Electronics Industries Ltd.  
Telecommunications Division  
1001, Ellesmere Road  
Scarborough 706  
Ontario  
Tel. (416) 752 1981

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