

SIEMENS

AMS

SMP

PMS

SME

Microcomputer Systems

Software Handbook 1986/87



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Preface



Preface

1 Preface

This software handbook provides a survey of the currently available standard software modules for the Siemens AMS, SMP, PMS and SME microcomputer systems.

Why standard software modules?

Device control, synchronization and resource management as well as testing and installation or application of hardware and software tools are basic functions which must constantly be performed. They have to be carried out irrespective of the particular application at hand and can therefore be done using standard programs.

For this purpose, Siemens offers the user

- monitor programs
- driver programs and
- operating systems.

Operating systems gain increasing importance as they provide the user with a multitude of service functions via well-defined interfaces. This makes it possible to achieve a clear separation between user and system software. Besides reducing the effort needed for producing user software, the use of an operating system also makes it possible to use programs in more than one project.

Siemens is constantly expanding its pallet of standard software modules. This software handbook is therefore up-dated at regular intervals to reflect the latest status.

Note:

A useful supplement to this book is the "USP-RMOS2 Literature Set" which provides comprehensive information about the real-time operating system RMOS2.

It can be obtained from your local Siemens Office quoting ordering code L8000-B7-P1 (subject to a cover charge).

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Monitor Programs



Monitor Programs

2 Monitor Programs

Monitor programs are startup and testing aids for program development. Communication between the user and the monitor is by way of a system console.

The most important functions of a monitor program are:

- Reading out of and writing into memories
- Reading and writing in conjunction with I/O
- Reading out of and writing into the CPU registers
- Starting user programs with the facility to preselect breakpoint addresses

2.1 Hardware Requirements

The universally configurable monitor programs are adapted to the processor type used by means of a configuration run. Additional support for register control of the SAB 8087 numeric data coprocessor (if used) is provided by the 16-bit monitors. Various serial interfaces can be configured to provide communication with the monitor program.

Owing to the different hardware features of the individual central boards, EPROM monitors must be hardware-related.

2.2 Data Storage Medium

The monitor programs are supplied on diskette or in an EPROM device. With the aid of the diskette, the user can create his own monitor programs tailored to his performance requirements and hardware configuration by using a Siemens SME microcomputer development system.

The data storage medium for EPROM monitors is an SAB 2732A/2764. EPROM monitors consist of a subset of the commands available on the corresponding configurable monitors.

2.3 Operating Mode

The monitors operate in command mode. The universally configurable 16-bit monitors offer two entry modes:

- Standard entry
- Enhanced entry

In standard entry the monitor waits for certain parameters which are checked for competence while they are being entered. Correct parameter entry is followed by an advance to the next status level.

For enhanced entry, the input consists of one command line with 78 characters. Entries are supported by a line editor which provides easy editing and correction of the text entered. Alphabetic and numeric characters are directly entered into the buffer and displayed on the screen.

Monitor Programs

2.4 Survey of Monitor Programs

Type	Hardware requirements		Data storage medium	can be configured under
	Processor	Central board		
USP-MONLIB-A11/P	SAB 8085	8-bit CPU	Diskette	ISIS-SME ISIS-PDS CP/M85-PMS/SYS
USP-MONLIB-A81/P*	SAB 8086/ 8088/ 80186/ 80188/ 80286	16-bit CPU	Diskette	ISIS-SME ISIS-PDS SRI86-PMS/SYS
USP-MONLIB-A51/P*	SAB 8031	SAB 8031 CPU	Diskette	ISIS-SME ISIS-PDS SRI85-PMS/SYS
AMS-MON5-B1/32	–	AMS-M5	EPROM (SAB 2732)	–
AMS-MON6-B1/64	–	AMS-M6/-M61	EPROM (2 × SAB 2764)	–
AMS-MON16-B1/64	–	AMS-M16	EPROM (2 × SAB 2764)	–
AMS-MON26-B1/64*	–	AMS-M26	EPROM (2 × SAB 2764)	–
SMP-MON2-B1/32	–	SMP-E2/-E3/-E5	EPROM (SAB 2732)	–
SMP-MON8-B1/64	–	SMP-E7/-E8/ -E17	EPROM (SAB 2764)	–
SMP-MON14-B1/32	–	SMP-E4/-E14	EPROM (SAB 2732)	–
SMP-MON19-B1/64	–	SMP-E19	EPROM (SAB 2764)	–
SKC85-MON1-B1/P	–	SKC85	EPROM (SAB 2732)	–
SKC51-MON1-B1/128*	–	SKC51	EPROM (SAB 27128)	–

* in preparation

Monitor Programs

USP-MONLIB-A11/P

Ordering code C8256-A4-D204

Universally Configurable Monitor for SAB 8085 CPUs

Function

Program to test the hardware and software of SMP, SKC or AMS microcomputer systems using a central board with an SAB 8085 CPU. The monitor program is universally configurable, i.e. the user can create his own monitor programs tailored to his performance (e.g. commands) and hardware requirements.

Data Storage Media

One single-density and one double-density SME-compatible diskette (8").

One PDS-compatible double-density diskette (5 1/4").

One PMS-compatible single-density diskette (5 1/4").

The monitor program is supplied as locatable object code.

Configuration programs as locatable programs for:

- SME development systems under ISIS II or ISIS III,
- PMS-T85 development systems under CP/M-85,
- PDS 100 development systems under ISIS-PDS.

File exchange software (for serial loading and backup of programs) for:

- SME development systems under ISIS II or ISIS III,
- PMS-T85 development systems under CP/M-85,
- PDS 100 development systems under ISIS-PDS.

I/O Devices Required

CRT display terminals

Line printer (if optional logging desired)

SME, PMS-T85 or PDS 100 (if serial loading/backup is to be carried out)

Features

The following operations can be initiated by command entry:

- define assignment of physical to logical devices,
- query assignment of physical to logical devices,
- shift memory areas,
- search for character string in memory,
- display data from memory,
- fill memory area with byte constant,
- display and modify memory page,
- display and modify data from memory,
- disassemble contents of memory,
- write data from memory into EEPROMs,
- read data from a peripheral address,
- write data to a peripheral address,
- read data out of CPU registers and write it into registers,

Monitor Programs

- perform simple hexadecimal arithmetic operations,
- start user program with preset breakpoint addresses,
- execute user program in single-step mode,
- load a hex file from another computer (SME, PDS, PMS-T85),
- save user program and data from memory into a hex file of another computer.

Combination of the individual commands is optional which allows the user to create a custom monitor. Furthermore, the monitor has several subroutines which can be executed using PL/M or an assembler.

Hardware Requirements

Communication with the monitor requires a serial interface for asynchronous data transfer. The interface devices supported are the USART 8251, 9551 and 2661, MPSC 8274 and MUART 8256A. For serial loading and backup of programs, an additional interface of the above type is necessary. If a line printer is to be used, then an SAB 8255A parallel printer interface (centronics) must be provided. The required devices can either be operated in isolated I/O or memory-mapped I/O mode.

Memory Requirements

The memory area required depends on the number of monitor program functions.

Data memory: 256 bytes

Program memory: min. 2 Kbytes to max. 6 Kbytes

Monitor Programs

USP-MONLIB-A81/P

Ordering code C8256-A4-D31

Universally Configurable Monitor for SAB 8086/8088/80186/80188/80286 CPUs and SAB 8087 and 80287 Numeric Data Coprocessors.

Function

Program to test the hardware and software of SMP, SKC or AMS microcomputer systems using SAB 8086/8088/80186/80188 or SAB 80286 CPUs. The monitor program is universally configurable, i.e. the user can create his own monitor programs tailored to his performance (e.g. commands) and hardware requirements.

The monitor program is supplied as locatable object code in a library.

Configuration programs as locatable programs for:

- SME development systems under ISIS III or ISIS IV,
- PMS-T88/SMP-SYB88 development systems under SRI86.

File exchange software (for serial loading and backup of programs) for:

- SME development systems under ISIS III or ISIS IV,
- PMS-T88/SMP-SYB88 development systems under SRI86.

Data Storage Media

- One single-density and one double-density SME-compatible diskette (8").
- One PDS-100-compatible double-density diskette (5 1/4").
- One PMS-compatible single-density diskette (5 1/4").

I/O Devices Required

CRT display terminal

Line printer (if optional logging is desired)

SME III/IV/SMP-SYB88 computer (if serial loading/backup is required).

Features

The following operations can be initiated by command entry:

- define assignment of physical to logical devices,
- query assignment of physical to logical devices,
- specify displayed number base (hexadecimal, decimal, octal, binary),
- move contents of memory across segment boundaries,
- search for character string in memory,
- display data from memory,
- fill memory area with byte constant(s),
- display and modify data from memory,
- write data from memory to EEPROMs,
- display a comment line,
- set, display or clear breakpoint addresses with loop counter,
- read in data from a peripheral address,
- write data to a peripheral address,
- read data out of CPU registers and/or SAB 8087 coprocessor and write it into registers,

Monitor Programs

- perform desk calculator functions,
- start user program with preset breakpoint addresses,
- execute user program in single-step mode,
- load a hex file from another computer,
- save user program and data from memory into a hex file of another computer,
- display information about all monitor commands,
- examine and modify contents of CPU register.

Combination of the individual commands is optional which allows the user to create a custom monitor. Furthermore, the monitor has several subroutines which can be executed using PL/M-86 or an assembler. Two command entry modes – standard and enhanced entry (line-oriented) – are offered.

Hardware Requirements

Communication with the monitor program requires a serial interface with asynchronous data transfer. USART 8251, 9551 and 2661, MPSC 8274 and SCC AmZ8530 are supported as interface devices. A line printer requires a parallel printer interface (centronics) with an SAB 8255A. The required devices can either be operated in isolated I/O or memory-mapped I/O mode.

Memory Requirements

The memory area required depends on the number of monitor program functions.

Data memory: 768 bytes (including monitor stack)

Program memory: min. 2 Kbytes to max. 20 Kbytes

Monitor Programs

USP-MONLIB-A51/P

Ordering code C8256-A4-D205

Universally Configurable Monitor for the SAB 8031 CPU

Function

Program to test the hardware and software of SMP or AMS microcomputer systems using a central board with an SAB 8031 CPU. The monitor program is universally configurable, i.e. the user can create his own monitors tailored to his performance (e.g. commands) and hardware requirements.

The monitor program is supplied as locatable object code in a library.

Configuration programs as locatable programs for:

- SME development systems under ISIS II or ISIS III,
- PMS-T85/SMP-SYB85 development systems under SRI85,
- PDS-100 development systems under ISIS-PDS.

File exchange software (for serial loading and backup of programs) for:

- SME development systems under ISIS II or ISIS III,
- PMS-T85/SMP-SYB85 development systems under SRI85,
- PDS-100 development systems under ISIS-PDS.

Data Storage Media

- One single-density and one double-density SME-compatible diskette (8"),
- One PDS-100-compatible double-density diskette (5 1/4"),
- One PMS-compatible double-density diskette (5 1/4").

I/O Devices Required

CRT display terminal

SME/PDS-100/SMP-SYB85 computer (if serial loading/backup is required).

Features

The following operations can be initiated by command entry:

- shift memory areas,
- search for character string in memory,
- display data from memory,
- fill memory area with byte constant(s),
- display and modify data from memory,
- disassemble contents of memory,
- write data from memory into EEPROMs,
- set, display or clear breakpoint addresses with loop counter,
- read data out of CPU registers and write it into registers,
- perform simple hexadecimal arithmetic operations,
- start user program with preset breakpoint addresses,
- execute user program in single-step mode,
- load a hex file from another computer,
- save user program and data from memory into a hex file of another computer,
- display information about all monitor commands.

Monitor Programs

Combination of the individual commands is optional which allows the user to create a custom monitor. Furthermore, the monitor has several subroutines which can be executed using PL/M-86 or an assembler.

Hardware Requirements

Communication with the monitor requires a serial interface with asynchronous data transfer. Breakpoint addresses can only be used if the code and data area of the processor overlap.

Memory Requirements

The memory area required depends on the number of monitor program functions.

Data memory: 40 bytes (including monitor stack)

Program memory: min. 1 Kbyte to max. 6 Kbytes

Monitor Programs

AMS-MON5-B1/32

Ordering code C8065-A105-A8

Monitor Program for AMS-M5

Function

Program to test the hardware and software of the AMS microcomputer systems using the central board AMS-M5.

Data Storage Medium

EPROM 1x SAB 2732A

I/O Device Required

CRT display terminal

Features

The following operations can be initiated by command entry:

- define assignment of physical to logical devices,
- query assignment of physical to logical devices,
- shift memory areas,
- search for character string in memory,
- display data from memory,
- fill memory area with byte constant,
- display and modify data from memory,
- disassemble contents of memory,
- write data from memory to EEPROMs,
- read data from a peripheral address,
- write data to a peripheral address,
- read data out of CPU registers and write it into registers,
- perform simple hexadecimal arithmetic operations,
- start a user program with preset breakpoint addresses,
- execute user program in single-step mode.

Hardware Requirements

The serial interface SAB 8215A is used on the central board for communication with the monitor.

Memory Requirements

Data memory: 256 bytes
Program memory: 4 Kbytes

Monitor Programs

AMS-MON6-B1/64

Ordering code C8065-A107-A7

Monitor Program for the AMS-M6, AMS-M7 and AMS-M61

Function

Program to test the hardware and software of AMS microcomputer systems using the AMS-M6, AMS-M7 or AMS-M61 central boards.

Data Storage Medium

EPROM 2x SAB 2764

I/O Devices Required

CRT display terminal
Line printer (if optional logging desired)

Features

The following operations can be initiated by command entry:

- define assignment of physical to logical devices,
- query assignment of physical to logical devices,
- shift memory areas,
- specify displayed number base (hexadecimal, decimal, octal, binary),
- search for character string in memory,
- display data from memory,
- fill memory area with byte constant(s),
- display and modify data from memory,
- write data from memory into EEPROMs,
- read data from a peripheral address,
- write data to a peripheral address,
- read data out of CPU registers and write it into registers,
- set, display or clear breakpoint addresses with loop counter,
- start user program with preset breakpoint addresses,
- execute user program in single-step mode.

Hardware Requirements

A serial interface SAB 8251A is used on the respective central board for communication with the monitor.

Memory Requirements

Data memory: 768 bytes (including monitor stack)
Program memory: 8 Kbytes

Monitor Programs

AMS-MON16-B1/64

Ordering code C8065-A107-A8

Monitor Program for the AMS-M16

Function

Program to test the hardware and software of the AMS microcomputer systems using the AMS-M16 central board.

Data Storage Medium

EPROM 2x SAB 2764

I/O Devices Required

CRT display terminal
Line printer (if optional logging desired)

Features

The following operations can be initiated by command entry:

- define assignment of physical to logical devices,
- query assignment of physical to logical devices,
- shift memory areas,
- specify displayed number base (hexadecimal, decimal, octal, binary),
- search for character string in memory,
- display data from memory,
- fill memory area with byte constant(s),
- display and modify data from memory,
- write data from memory to EEPROMs,
- read data from a peripheral address,
- write data to a peripheral address,
- read data out of CPU registers and write it into registers,
- set, display or clear breakpoint addresses with loop counter,
- start user program with preset breakpoint addresses,
- execute user program in single-step mode.

Hardware Requirements

One channel of the AmZ8530 serial interface is used on the respective central board for communication with the monitor. The SMP-E327-A1 board is required for output to a line printer.

Memory Requirements

Data memory: 768 bytes (including monitor stack)
Program memory: 8 Kbytes

Monitor Programs

AMS-MON26-B1/64

Ordering code C8065-A107-A9

Monitor Program for the AMS-M26

Function

Program to test the hardware and software of AMS microcomputer systems using the AMS-M26 central board.

Data Storage Medium

EPROM 2x SAB 2764

I/O Devices Required

CRT display terminal
Line printer (if optional logging is desired)

Features

The following operations can be initiated by command entry:

- define assignment of physical to logical devices,
- query assignment of physical to logical devices,
- shift memory areas,
- specify displayed number base (hexadecimal, decimal, octal, binary),
- search for character string in memory,
- display data from memory,
- fill memory area with byte constant(s),
- display and modify data from memory,
- write data from memory into EEPROMs,
- read data from a peripheral address,
- write data to a peripheral address,
- read data out of CPU registers and write it into registers,
- set, display or clear breakpoint addresses with loop counter,
- start user program with preset breakpoint addresses,
- execute user program in single-step mode.

Hardware Requirements

The SAB 8251A serial interface is used on the respective central board for communication with the monitor. An SMP-E327-A1 board is required for output to a line printer.

Memory Requirements

Data memory: 768 bytes (including monitor stack)
Program memory: 8 Kbytes

Monitor Programs

Preliminary Data

SMP-MON2-B1/32

Ordering code C8065-A105-A7

Monitor Program for the SMP-E2, SMP-E3 and SMP-E5

Function

Program to test the hardware and software of the SMP microcomputer systems using the SMP-E2, SMP-E3 or SMP-E5 central boards.

Data Storage Medium

EPROM 1x SAB 2732A

I/O Device Required

CRT display terminal

Features

The following operations can be initiated by command entry:

- define assignment of physical to logical devices,
- query assignment of physical to logical devices,
- shift memory areas,
- search for character string in memory,
- display data from memory,
- fill memory area with byte constant,
- display and modify data from memory,
- disassemble memory contents,
- write data from memory into EEPROMs,
- read data from a peripheral address,
- write data to a peripheral address,
- read data out of CPU registers and write it into registers,
- perform simple hexadecimal arithmetic operations,
- start user program with preset breakpoint addresses,
- execute user program in single-step mode.

Hardware Requirements

The 2661 serial interface is used on the respective central board for communication with the monitor.

Memory Requirements

Data memory: 256 bytes
Program memory: 4 Kbytes

Monitor Programs

SMP-MON8-B1/64

Ordering code C8065-A107-A10

Monitor Program for the SMP-E7 and SMP-E8

Function

Program to test the hardware and the software of the SMP microcomputer systems using the SMP-E7 or SMP-E8 central boards.

Data Storage Medium

EPROM 1x SAB 2764

I/O Devices Required

CRT display terminal

Line printer (if optional logging desired)

Features

The following operations can be initiated by command entry:

- define assignment of physical to logical devices,
- query assignment of physical to logical devices,
- shift memory areas,
- specify displayed number base (hexadecimal, decimal, octal, binary),
- search for character string in memory,
- display data from memory,
- fill memory area with byte constant(s),
- display and modify data from memory,
- write data from memory into EEPROMs,
- read data from a peripheral address,
- write data to a peripheral address,
- read data out of CPU registers and write it into registers,
- set, display or clear breakpoint addresses with loop counter,
- start user program with preset breakpoint addresses,
- execute user program in single-step mode.

Hardware Requirements

An SAB 8251A serial interface is used on the SMP-E220 board for communication with the monitor. The SMP-E327-A1 board is required for output to a line printer.

Memory Requirements

Data memory: 768 bytes (including monitor stack)
Program memory: 8 Kbytes

Monitor Programs

Preliminary Data

SMP-MON14-B1/32

Ordering code C8065-A105-A9

Monitor Program for the SMP-E4 and SMP-E14

Function

Program to test the hardware and software of SMP microcomputer systems using the SMP-E4 or SMP-E14 central boards.

Data Storage Medium

EPROM 1x SAB 2732A

I/O Device Required

CRT display terminal

Features

The following operations can be initiated by command entry:

- define assignment of physical to logical devices,
- query assignment of physical to logical devices,
- shift memory areas,
- search for character string in memory,
- display data from memory,
- fill memory area with byte constant,
- display and modify data from memory,
- disassemble contents of memory,
- write data from memory into EEPROMs,
- read data from a peripheral address,
- write data to a peripheral address,
- read data out of CPU registers and write it into registers,
- perform simple hexadecimal arithmetic operation,
- start user program with preset breakpoint addresses,
- execute user program in single-step mode.

Hardware Requirements

The SAB 8256 multifunction μ P support controller is used on the respective central board for communication with the monitor.

Memory Requirements

Data memory: 256 bytes
Program memory: 4 Kbytes

Monitor Programs

SMP-MON19-B1/64

Ordering code C8065-A107-A11

Monitor Program for the SMP-E19

Function

Program to test the hardware and software of SMP microcomputer systems using the SMP-E19 central board.

Data Storage Medium

EPROM 1x SAB 2764

I/O Devices Required

CRT display terminal

Line printer (if optional logging desired)

Features

The following operations can be initiated by command entry:

- define assignment of physical to logical devices,
- query assignment of physical to logical devices,
- shift memory areas,
- specify displayed number base (hexadecimal, decimal, octal, binary),
- search for character string in memory,
- display data from memory,
- fill memory area with byte constant(s),
- display and modify data from memory,
- write data from memory into EEPROMs,
- read data from a peripheral address,
- write data to a peripheral address,
- read data out of CPU registers and write it into registers,
- set, display or clear breakpoint addresses with loop counter,
- start user program with preset breakpoint addresses,
- execute user program in single-step mode.

Hardware Requirements

One channel of the AmZ8530 serial interface is used on the respective central board for communication with the monitor. The SMP-E327-A1 board is required for output to a line printer.

Memory Requirements

Data memory: 768 bytes (including monitor stack)
Program memory: 8 Kbytes

Monitor Programs

Preliminary Data

SKC85-MON1-B1/P

Ordering code C8065-A105-D2

Monitor Program for the SKC85-E71/-E72

Function

Program to test the hardware and software of the SKC microcomputer systems using the SKC85-E71/-E72 central board with either a 3.072 MHz or 5 MHz clock.

Data Storage Medium

One 2732A EPROM for a 3.072 MHz or 5 MHz clock.

I/O Device Required

CRT display terminal

Features

The following operations can be initiated by command entry:

- define assignment of physical to logical devices,
- query assignment of physical to logical devices,
- shift memory areas,
- search for character string in memory,
- display data from memory,
- fill memory area with byte constant,
- display and modify data from memory,
- disassemble contents of memory,
- write data from memory into EEPROMs,
- read data from a peripheral address,
- write data to a peripheral address,
- read data out of CPU registers and write it into registers,
- perform simple hexadecimal arithmetic operations,
- start user program with preset breakpoint addresses,
- execute user program in single-step mode.

Hardware Requirements

The SID and SOD connections of the SAB 8085 CPU are used as a serial interface for communication with the monitor.

Memory Requirements

Data memory: 256 bytes
Program memory: 4 Kbytes

Monitor Programs

SKC51-MON1-B1/128

Ordering code C8065-A105-A12

Monitor Program for the SKC51-A7

Function

Program to test the hardware and software of SMP microcomputer systems using the SKC51-A7 central board.

Data Storage Medium

EPROM 1x SAB 27128

I/O Device Required

CRT display terminal

Features

The following operations can be initiated by command entry:

- shift memory areas,
- search for character string in memory,
- display data from memory,
- fill memory area with byte constant(s),
- display and modify data from memory,
- write data from memory into EEPROMs,
- read data out of CPU registers and write it into registers,
- set, display or clear breakpoint addresses with loop counter,
- start user program with preset breakpoint addresses,
- execute user program in single-step mode.

Hardware Requirements

The processor's serial interface is used for communication with the monitor.

Memory Requirements

Data memory: 40 bytes (including monitor stack)

Program memory: 8 Kbytes

Driver Programs



3 Driver Programs

A large amount of the software necessary for bubble memory controllers and peripheral controller boards is independent of the particular application. In the interest of rational programming it therefore makes sense to provide these programs as standard modules. The driver programs of the SMP system are a combination of generally usable subroutines for one board type. If you should wish DMA transfer in your application we can also offer a driver for this DMA controller. Thus smooth and straightforward functioning with all other driver programs can be answered. The DMA driver program is supplied together with all the other driver programs that have access to it, but can also be supplied separately. The table on the following page shows the most important features of the driver programs in the SMP system. Terms used are briefly explained in the following.

3.1 Processor Language

All the driver programs are available in two versions for different processor languages. Drivers for the SAB 8085A microprocessor have the suffix -A11 in the product type designation while those for the microprocessors SAB 8086/8088/80186/80188/80286 (in real address mode) have the suffix -A81.

3.2 Data Storage Medium

The driver programs are supplied on diskette. If specified in the table, another diskette containing the DMA driver is included in delivery. The user chooses a diskette that is suitable for his configuration. With the aid of the diskette, the user can link the driver program to his user program on a development system and write it into EPROM.

Driver Programs

3.3 Survey of Driver Programs

Product		Features		
Type	for board	Function	Processor languages	can be configured under
SMP-STR140-A11/P ¹⁾	SMP-E143	Software driver for magnetic bubble memory	8085	ISIS-SME ISIS-PDS *) CP/M85-PMS/SYS
SMP-STR140-A81/P ¹⁾			8086/88/ 188	UDI/ISIS-SME ISIS-PDS *) SRI86-PMS/SYS *)
SMP-STR308-A12/P ¹⁾	SMP-E308-A2 with 8291A	Software driver for IEC 625 talker/listener interface	8085	ISIS-SME ISIS-PDS *) CP/M85-PMS/SYS
SMP-STR308-A82/P ¹⁾			8086/88/ 188	UDI/ISIS-SME ISIS-PDS *) SRI86-PMS/SYS *)
SMP-STR309-A11-Q/P	SMP-E309	Software driver for IEC 625 talker/listener/controller interface	8085	ISIS-SME CP/M85-PMS/SYS
SMP-STR309-A81/P			8086/88/ 188	UDI/ISIS-SME ISIS-PDS *) SRI86-PMS/SYS *)
SMP-STR342-A11/P ¹⁾	SMP-E342	Software driver for diskette drive	8085	ISIS-SME ISIS-PDS *) CP/M85-PMS/SYS
SMP-STR342-A81/P ¹⁾			8086/88/ 188	UDI/ISIS-SME ISIS-PDS *) SRI86-PMS/SYS *)
SMP-STR346-A11/P	SMP-E346	Software driver for SMP-E346 (SCSI interface)	8085	ISIS-SME ISIS-PDS *) CP/M85-PMS/SYS
SMP-STR346-A81/P			8086/88/ 188	UDI/ISIS-SME ISIS-PDS *) SRI86-PMS/SYS *)
SMP-STR352-A11/P ¹⁾	SMP-E352	Software driver for CRT controller	8085	ISIS-SME ISIS-PDS *) CP/M85-PMS/SYS
SMP-STR352-A81/P ¹⁾			8086/88/ 188	UDI/ISIS-SME ISIS-PDS *) SRI86-PMS/SYS *)
SMP-STR353-A11/P	SMP-E353	Software driver for CRT controller	8085	ISIS-SME ISIS-PDS *) CP/M85-PMS/SYS
SMP-STR353-A81/P			8086/88/ 188	UDI/ISIS-SME ISIS-PDS *) SRI86-PMS/SYS *)
SMP-STRDMA-A11/P	SMP-E2/E3	Software driver for DMA controller (Am9517A)	8085	ISIS-SME ISIS-PDS *) CP/M85-PMS/SYS
SMP-STRDMA-A81/P	SMP-E7/E8/E17		8086/88/ 188	UDI/ISIS-SME ISIS-PDS *) SRI86-PMS/SYS *)

¹⁾ These software drivers require DMA and are delivered together with a suitable software driver for the DMA controller.

*) in preparation

Driver Programs

SMP-STR140-A11/P **SMP-STR140-A81/P**

Ordering code C8256-A2-D203

Ordering code C8256-A2-D217

Software Driver for SMP-E143

Function

Package of subroutines for the SMP-E143 (controller for bubble memory).
Available for central boards using the SAB 8085 or SAB 8088 microprocessor.

Data Storage Media

- A11/P: – one single-density and one double-density SME-compatible diskette (8"),
– one PMS-T85 compatible single-density diskette (5 1/4"),
– one PDS-compatible diskette (in preparation).
- A81/P: – one single-density and one double-density SME-compatible diskette (8"),
– one PDS-compatible diskette (in preparation).

All subroutines are supplied as relocatable object codes in a module library.

Interface

PL/M-compatible

Features

The program package allows execution of the following functions:

- initialize bubble memory,
- read out of bubble memory,
- write into bubble memory,
- search for a page in the bubble memory in preparation for a subsequent read access,
- search for a page in the bubble memory in preparation for a subsequent write access,
- read out of a boot loop,
- write into a boot loop,
- perform interrupt-driven transfer of data blocks between buffer and bubble memory,
- upon termination or abort of a command provide the result or error parameter.

The software driver supports also data transfer in DMA mode. This requires, however, that one central board is available with DMA controller and that the SMP-STRDMA-A11/A81 software driver is also used.

Hardware Requirements

The SMP-E143 board and between one and four SMP-E141/E142 memory modules are required as well as RAM and a central board.

The software driver is available in two versions to support the different central boards:
SMP-STR140-A11 for the SMP central boards using the SAB 8085 microprocessor
SMP-STR140-A81 for the SMP central boards using the SAB 8088 microprocessor

Memory Requirements

- SMP-STR140-A11: Program memory: approx. 1800 bytes
Data memory: approx. 160 bytes, plus RAM as buffer
- SMP-STR140-A81: Program memory: approx. 3000 bytes
Data memory: approx. 240 bytes, plus RAM as buffer

Driver Programs

SMP-STR308-A12/P **SMP-STR308-A82/P**

Ordering code C8256-A2-D207

Ordering code C8256-A2-D218

Software Driver for SMP-E308-A2

Function

Package of subroutines for the SMP-E308-A2 board (talker/listener interface for the IEC-625 bus). Available for central boards using the SAB 8085 or SAB 8088 microprocessor.

Data Storage Media

A12/P: – one single-density and one double-density SME-compatible diskette (8"),
– one single-density PMS-T85 compatible diskette (5 1/4"),
– one PDS-compatible diskette (in preparation).

A82/P: – one single-density and one double-density SME-compatible diskette (8"),
– one PDS-compatible diskette (in preparation).

All subroutines are supplied as relocatable object codes in a module library.

Interface

PL/M-compatible

Features

The program package allows execution of the following functions:

- initialize board,
- perform interrupt-driven transfer of data blocks with termination identifier,
- perform DMA-driven transfer of data blocks with presettable length,
- query transfer status,
- issue service request (SRQ) in connection with PP 1 interface support,
- query processing status of a service request,
- query interface status.

General Characteristics

Various modes of operation can be selected using the switches on the SMP-E308-A2 board (extended/simple talker/listener, transmit/non-transmit EOI for serial query, transmit/non-transmit EOI when transferring the termination identifier of a data block, adaptation to the central board type). Furthermore, there are software-controlled status indicators on the board. These switches and indicators are set and queried by the subroutines.

All possible address space settings of the board can be allowed for in the software driver.

Data transfers to and from the IEC bus can be requested using the appropriate subroutines without regard to the addressing status of the interface. By decoupling the IEC bus from the SMP bus the execution of device functions (user tasks) is assured even if IEC bus handshaking is blocked. User-specific DT (device trigger) and DV (device clear) routines can be defined.

Driver Programs

Hardware Requirements

The SMP-E308-A2 board, memory and one of the SMP central boards are required.

The software driver is available in two versions to support the different central boards:

SMP-STR308-A12 for the SMP central boards with the SAB 8085 microprocessor.

SMP-STR308-A82 for the SMP central boards with the SAB 8088 microprocessor.

Memory Requirements

The subroutines occupy approx. 1.5 Kbytes. They require approx. 0.5 Kbyte of RAM when executing.

Recommended Accessories

Software driver for DMA controller:

SMP-STRDMA-A11/D or SMP-STRDMA-A81/P (supplied as part of the SMP-STR308-A12/D or

SMP-STR308-A82/P packages).

Driver Programs

SMP-STR 309-A11-Q/P

Ordering code C8256-A2-D23

Software Driver for SMP-E309

Function

Package of subroutines for the SMP-E309 board (IEC-625 bus controller). All subroutines supplied in source code.

Data Storage Media

One single-density and one double-density SME-compatible diskette (8"), one double-density PDS-compatible diskette (5 1/4"), one single-density PMS-compatible diskette for CP/M-85 (5 1/4").

Interface

PL/M-compatible,
MBASIC-compatible (Microsoft).

Features

The program package allows execution of the following functions:

- transmission of addresses and arbitrary multiline messages in CACS (controller active state),
- switch over from CACS to CSBS (controller standby state), handshake release, switch back from CSBS to CACS after transfer of termination identifier,
- transmission of single-line messages: IFC, REM, LOC,
- processing a serial query: transmission of UNL, MLA and SPE, transmission of addresses and reception of status bytes, transmission of UNT and SPD,
- test for service request: report the status of the SRQ line.

Hardware Requirements

The SMP-E309 board, memory and a central board using an SAB 8085 microprocessor are required.

Memory Requirements

Data memory: approx. 55 bytes
Program memory: approx. 1 Kbyte

Driver Programs

SMP-STR309-A81/P

Ordering code C8256-A2-D210

Software Driver for SMP-E309

Function

Package of subroutines for the SMP-E309 board (IEC-625 bus controller). All subroutines are supplied as relocatable object codes in a module library.

Data Storage Media

One single-density and one double-density SME-compatible diskette (8"), one double-density PDS-compatible diskette (5 1/4").

Interface

PL/M-compatible,
C-compatible (CC86 by Mark Williams).

Features

The program package allows execution of the following functions:

- transmission of addresses and arbitrary multiline messages in CACS (controller active state),
- switch over from CACS to CSBS (controller standby state), handshake release, switch back from CSBS to CACS after transfer of the termination identifier,
- transmission of single-line messages: IFC, REM, LOC,
- execution of a serial query: transmission of UNL, MLA and SPE, transmission of addresses and reception of status bytes, transmission of UNT and SPD,
- test for service request: report the status of the SRQ line.

Hardware Requirements

The SMP-E309 board, memory and a central board using an SAB 8086/SAB 8088 microprocessor are required.

Memory Requirements

Data memory: approx. 50 bytes
Program memory: approx. 4 Kbytes

Driver Programs

SMP-STR342-A11/P **SMP-STR342-A81/P**

Ordering code C8256-A2-D204

Ordering code C8256-A2-D219

Software Driver for SMP-E342

Function

Package of subroutines for the SMP-E342 board (diskette drive controller) which facilitate physical access to the diskette. Supplied as library of relocatable function modules. Available for central boards using the SAB 8085 or SAB 8088 microprocessor.

Data Storage Media

A11/P: – one single-density and one double-density SME-compatible diskette (8"),
– one PMS-T85 compatible single-density diskette (5 1/4"),
– one PDS-compatible diskette (in preparation).

A81/P: – one single-density and one double-density SME-compatible diskette (8"),
– one PDS-compatible diskette (in preparation).

All subroutines are supplied as relocatable object codes in a module library.

Interface

PL/M-compatible

Features

The program package allows execution of the following functions:

- initialize board,
- format diskette side,
- query drive status,
- read data,
- write data.

General Characteristics

All possible address space settings of the board for isolated I/O can be allowed for in the software driver. Automatic positioning of the read/write head and automatic repeat of all functions in case of error are possible.

Hardware Requirements

The SMP-E342 board, memory and one of the SMP central boards with DMA controller are required.

The software driver is available in two versions to support the different central boards:

SMP-STR342-A11 for SMP central boards with the SAB 8085 microprocessor.

SMP-STR342-A81 for SMP central boards with the SAB 8088 microprocessor.

Memory Requirements

Program memory: approx. 1 Kbyte

Data memory: approx. 50 bytes

Plus buffer for the data transferred, the exact amount depending on the mode of operation.

Driver Programs

SMP-STR352-A11/P **SMP-STR352-A81/P**

Ordering code C8256-A2-D209

Ordering code C8256-A2-D221

Software Driver for SMP-E352

Function

Package of subroutines for the SMP-E352 board (CRT controller). Available for central boards using the SAB 8085 or SAB 8088 microprocessor.

Data Storage Media

A11/P: – one single-density and one double-density SME-compatible diskette (8"),
– one PMS-T85-compatible single-density diskette (5 1/4"),
– one PDS-compatible diskette (in preparation).

A81/P: – one single-density and one double-density SME-compatible diskette (8"),
– one PDS-compatible diskette (in preparation).

All subroutines are supplied as relocatable object codes in a module library.

Interface

PL/M-compatible

Features

In addition to the basic functions of the SMP-E352 controller, the program package allows execution of the following functions:

- initialize board,
- cursor functions,
- delete functions,
- editing functions,
- field functions,
- tabulator functions,
- character string functions,
- read functions.

The software driver supports two modes of data transfer between the CPU and the CRT display:

- direct data transfer to the image memory on the SMP-E352 board,
- interrupt-driven data transfer to an auxiliary memory area in RAM and transfer from there to the image memory in DMA mode (requires central board with DMA controller).

Hardware Requirements

The SMP-E352 board, a central board and, if DMA interrupt mode is desired, 4 Kbytes of RAM are required.

The software driver is available in two versions to support the different central boards:

SMP-STR352-A11 for SMP central boards with the SAB 8085 microprocessor.

SMP-STR352-A81 for SMP central boards with the SAB 8088 microprocessor.

Memory Requirements

SMP-STR352-A11: Program memory: max. approx. 13 Kbytes
Data memory: approx. 1/4 Kbyte, plus RAM as buffer

SMP-STR352-A81: Program memory: max. approx. 18 Kbytes
Data memory: approx. 1/4 Kbyte, plus RAM as buffer

Driver Programs

SMP-STR353-A11/P **SMP-STR353-A81/P**

Ordering code C8256-A2-D206

Ordering code C8256-A2-D222

Software Driver for SMP-E353

Function

Package of subroutines for the SMP-E353 board (CRT controller with graphics display processor). Available for central boards using the SAB 8085 or SAB 8088 microprocessor.

Data Storage Media

A11/P: – one single-density and one double-density SME-compatible diskette (8"),
– one PMS-T85-compatible single-density diskette (5 1/4"),
– one PDS-compatible diskette (in preparation).

A81/P: – one single-density and one double-density SME-compatible diskette (8"),
– one PDS-compatible diskette (in preparation).

All subroutines are supplied as relocatable object codes in a module library.

Interface

PL/M-compatible

Features

General:

- operating modes: alphanumeric and graphics mode
- support for light-pen applications

Alphanumeric mode:

- cursor control
- output ASCII characters (individually or blockwise)
- delete characters (individually or blockwise)
- up or down scrolling of the screen page
- determine position of the light pen

Graphics mode:

- output vectors
- output ASCII characters for alphanumeric labels

Hardware Requirements

The SMP-E353 board and a central board with a microprocessor corresponding to the software driver are required.

The software driver is available in two versions to support the different central boards:

SMP-STR353-A11 for SMP central boards with the SAB 8085 microprocessor.

SMP-STR353-A81 for SMP central boards with the SAB 8088 microprocessor.

Driver Programs

SMP-STRDMA-A11/P **SMP-STRDMA-A81/P**

Ordering code C8256-A2-D202

Ordering code C8256-A2-D216

Software Driver for DMA Controller

Function

Central management of the Am9517A DMA controller. Prevents conflicts if more than one module in a system call on the DMA controller. Library of relocatable function modules. Hardware configuration module. Available for central boards using the SAB 8085 or SAB 8088 microprocessor.

Data Storage Media

A11/P: – one single-density and one double-density SME-compatible diskette (8"),
– one PMS-T85 compatible single-density diskette (5 1/4"),
– one PDS-compatible diskette (in preparation).

A81/P: – one single-density and one double-density SME-compatible diskette (8"),
– one PDS-compatible diskette (in preparation).

All subroutines are supplied as relocatable object codes in a module library.

Interface

PL/M-compatible, non-reentrant function modules

Features

- initialization of the DMA controller
- channel-specific initialization of a DMA transfer
- initiate a software DMA request
- provide status information about transfer activities

Hardware Requirements

A central board with DMA controller is required.

The software driver is available in two versions to support the different central boards:

SMP-STRDMA-A11 for SMP central boards with the SAB 8085 microprocessor.

SMP-STRDMA-A81 for SMP central boards with the SAB 8088 microprocessor.

Memory Requirements

SMP-STRDMA-A11/P: approx. 2 Kbytes of EPROM
approx. 200 bytes of RAM

SMP-STRDMA-A81/P: approx. 1 Kbyte of EPROM
approx. 10 bytes of RAM

Operating Systems



4 Operating Systems

For measurement and control tasks it is often necessary that the microcomputer reacts to a peripheral request within a certain, predetermined period of time. Because of the close relationship between program execution and timing, this is known as real-time operation.

The individual tasks in the microcomputer must be organized according to chronological priority so that the timing requirements can be fulfilled with the given computing power of the CPU. These organizational functions apply to most applications, so it is best to provide the associated program in the form of a standard program. Operating systems are such standard programs.

The RMOS2 operating system is available for the SMP and AMS system. RMOS2 is a real-time multitasking multiprocessing operating system for 16-bit applications and supports the CPUs SAB 8088/8086/80186/80188/80286 (real address mode).

4.1 Hardware Required

Using the RMOS2 in an SAB 8086/8088 configuration requires one timer/counter (SAB 8253/8254 or Am9513A) and at least one interrupt controller (SAB 8259A or Am9519A). In the case of an SAB 80186/80188 no additional timer/counters or interrupt controllers are required.

The operating system program RMOS2 can be configured by the user to work with all interrupt, timer, DMA, serial and parallel interface devices available in SMP and AMS systems.

Product	Hardware requirements	Function	Notes
RMOS2-BUN-OBJ	AMS, SMP, SYB, SME	Functions of a real-time multitasking, multiprocessing operating system as well as 8087 support, interrupt task start, configuration module,	Bundled: Licensee may use RMOS2 to implement on AMS, SMP, SYB boards or SME system
RMOS2-UBU-OBJ	Proprietary hardware in an SAB 8086/8088/80186/80188/80286 configuration	high-level language interface, drivers, high-speed file system, debugger and system reporter	Unbundled: Licensee may use RMOS2 on hardware equipment not consisting of AMS, SMP, SYB boards or SME system

4.2 Real-Time Operating System RMOS2

The real-time multitasking multiprocessor operating system RMOS2 is designed for central boards using the SAB 8086, SAB 8088, SAB 80186, SAB 80188 und SAB 80286 (in 8086 mode) CPUs.

- Task management
- Resource management
- Priority management
- Time management
- Interrupt control

Using the RMOS2 in an SAB 8086/8088 configuration requires one timer/counter (SAB 8253/8254 or Am9513A) and at least one interrupt controller (SAB 8259A or Am9519A). In the case of an SAB 80186/80188 no additional timer/counters or interrupt controllers are required.

4.2.1 Features

- Task management for static and dynamic tasks
Locatable tasks can be reloaded.
- Priority management
Dynamic scheduling of task priorities (maximum of 256 levels).
- Interrupt-driven I/O
I/O wait cycles can be used by other tasks, device drivers or the operating system.
- I/O drivers
RMOS2 provides a default driver interface. Universal device drivers for byte-oriented input and/or output peripherals, byte-oriented CRT display terminals, diskette access, DMA support (Am9517A, SAB 8089, SAB 80186/80188, SAB 82258 ADMA), magnetic bubble memory access and computer-computer coupling are available as options.
- Multiprocessor support (tightly coupled multiprocessing)
The multiprocessor capability allows the work to be distributed evenly among the various processors or for a certain task to run only on a single processor.
- Dynamic memory management
Allows up to 32 memory pools, the memory space of which can be allocated or returned by the user according to his requirements.
- Dynamic debugger
The optional debugger is an effective aid for monitoring task execution. It allows the setting of breakpoints and the display and modification of memory contents.
- High-level language interface
Full standard support of the system services for PL/M-86, Intel PASCAL-86, FORTRAN-86 and Intel C-86 are available as additional interfaces.

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- Flexibility
Can be used in SAB 8086/8088/80286 (in 8086 mode) configurations; this requires one timer/counter (SAB 8253, SAB 8254 or Am9513A), and however, at least one interrupt controller (SAB 8259A or Am9519A). SAB 80186/80188 configurations need no additional timer/counters or interrupt controllers.
- Compact design
The configurable operating system requires between 3.0 and 13 Kbytes of program memory. The optional products, such as the various drivers, file management system and language interfaces, require additional memory.
- Configuration
SWCONF.ASM is used to configure the software parameters (tasks, mailboxes, semaphores, etc.) and HWCONF.ASM to configure hardware parameters (processor type, timers/counters and interrupt controllers).
- System reporter
With the aid of the optional system reporter, the states of the current tasks, RMOS2 resources and device drivers can be displayed.
- File management system
The optional file management system allows reading and writing of files.

4.2.2 System Functions

- Task management:
 - SAB 8087 support
 - Start a task
 - Place a task start in the queue
 - Start a task in response to an unrequested operator input or interrupt
 - Terminate a task
 - Terminate a task with time-dependent restart
 - Execute programs with controlled access
 - Dynamic priority change
 - Define a dynamic task
 - Reload a task
 - Multiprocessor support (tightly coupled multiprocessing)
- Task communication:
 - Send a message to a local mailbox
 - Receive messages of a local mailbox
 - Send messages to or receive messages from any other computing system (start the network manager task)

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- Task synchronization:
 - Set event flag(s)
 - Set event flag(s) after expiration of a time interval
 - Wait for setting of one or more event flag(s)
 - Test event flag(s)
 - Reset event flag(s)
 - Test and set a semaphore
 - Release a semaphore
- I/O management:
 - Request an I/O operation from a device driver
 - Perform a discrete I/O operation
- Time management:
 - Await expiration of a time interval
 - Await expiration of a minimum interval
 - Cancel time interval
 - Set date and time of day
 - Request date and time of day
 - Timeout monitoring for device drivers
- Memory management:
 - Request memory area from a memory pool
 - Return memory area to a memory pool
 - Request or return memory area for a reloadable task

4.2.3 System Data

Number of static tasks	up to 2048
Priority levels	256
Global event flag groups (8 flags each)	up to 31
Local (task-related) event flags (per task)	16
Local mailboxes	up to 256
Number of device drivers	up to 255
Devices (per device driver)	up to 255
Programs with controlled access	up to 256
Discrete I/O bytes	up to 8192
Memory pools	up to 32
Semaphores	up to 4096
System clock	selectable, min. 1 ms

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4.2.4 Memory Requirements (program memory)

RMOS2 operating system kernel	variable: approx. 3.0 to 13 Kbytes
CRT display driver	1.5 Kbytes
Driver for byte-oriented peripheral input and/or output	2.5 Kbytes
Dynamic debugger	3.8 Kbytes
Direct memory access (DMA) driver	1.0 Kbytes
Diskette driver for SMP-E342	3.5 Kbytes
System reporter	9 Kbytes
Intel PASCAL-86 interface	3.0 Kbytes
Intel C-86 interface	1.0 Kbytes
Computer-computer coupling driver	2.5 Kbytes
Bubble memory driver	3.5 Kbytes
File management system	7 Kbytes

4.2.5 Data Storage Media

One diskette compatible with SME; double density, 8".

One diskette compatible with SME, SYS and IBM-PC with MSDOS-SRI86; double density, double-sided, 5 1/4".

One diskette compatible with PMS/SYS with CP/M86-SRI86; double density, single-sided, 5 1/4".

One diskette compatible with ISIS-PDS; double density, 5 1/4".

Standard delivery:

Operating system kernel, various configuration programs for SMP and AMS CPUs, demonstration program and a complete set of documentation.

All RMOS2 modules are supplied as object programs (Intel ASM86 assembler).

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4.2.6 ROMS2 Package

The following modules are included in the standard delivery of RMOS2-BUN-OBJ and RMOS2-UBU-OBJ.

Product		Function	Notes
	Module		
RMOS2-BUN-OBJ or RMOS2-UBU-OBJ	USP-RMOS2NUC2-O/S	Basic function of a real-time multitasking multiprocessing operating system as well as 8087 support, interrupt task start, and configuration module	System configuration on component level (interrupt controller, timers, DMA, serial, and parallel interface), incl. RAM disk driver
	USP-RMOS2HLI1-S/S	C-86 interface PASCAL-86 interface FORTRAN-86 interface	Supports parameter supply for a C-86, PASCAL-86, FORTRAN-86 task (source code)
	USP-RMOS2IPK2-O/S	Interprocessor communication	Loosely coupled multi-processors
	USP-RMOS2BYT2-O/S	Driver for byte-oriented peripheral devices (CRT display terminal, printer, sheet teleprinter)	The following peripheral components can be figured SAB 8252, 2661, SAB 8274, SAB 8255, Am8530
	USP-RMOS2CRT2-S/S	CRT display driver	The following serial interfaces can be configured: SAB 8251, 2661, SAB 8274, Am8530, (source code)
	USP-RMOSCOM1-O/S	Communications driver	Computer/computer communication via serial and parallel interface
		RAM disk driver ¹⁾	Access to auxiliary storage simulated by RAM accesses
	USP-RMOS2DMA2-O/S	Standalone DMA driver for Am9517A, SAB 80188/186, SAB 8089 and SAB 82258	—
	SMP-RMOS2HDG1-O/S*	SCSI driver for SMP-E346	—
	SMP-RMOS2BUB2-O/S	Bubble memory driver for SMP-E143	Bubble memory with diskette organization
	SMP-RMOS2FD22-O/S	Diskette driver for SMP-E342	Single-density and double-density recording
	USP-RMOS2DEB2-O/S	Interactive debugger	—
	USP-RMOS2REP2-O/S	System reporter	—
	USP-RMOS2HSF1-O/S	High-speed file management system for diskette	Hierarchical organization incl. RAM disk driver
Universal Development Interface (UDI)	USP-RMOS2SRI1-O/S *	Standard runtime interface presents UDI surface	SRI calls correspond functionally to ISIS operating system calls

* in preparation

¹⁾ Is included in system kernel and file management system

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4.2.7 Extensions (optional)

Product		Function	Notes
	Module		
RMOS2-SDL1-OBJ	USP-RMOS2SDL1-O/S	SDLC secondary	Software requirements: SDLC primary
RMOS2-UDI-OBJ	USP-RMOS2SRI1-O/S	Universal development interface	SRI calls correspond functionally to ISIS operating systems calls, calling syntax corresponds to HSF 1

RMOS2-BUN-OBJ RMOS2-UBU-OBJ

Ordering code C8256-A1-D68

Ordering code C8256-A1-D69

Module Description

USP-RMOS2NUC2-O/S V2.0

Real-Time Multitasking Multiprocessor Operating System (operating system kernel)

Function

Operating system kernel of the real-time multitasking multiprocessor operating system for SMP and AMS-M central boards using the processors SAB 8086/8088/80186/80188 and SAB 80286 (real address mode).

RAM disk driver is included.

All modules are supplied as relocatable object codes in a library.

Interface

PL/M-86 compatible

Features

The kernel provides the following functions:

- system initialization,
- derivate the real-time system clock,
- control of task transfer,
- interrupt request handling,
- multiprocessor management.

In addition, the following optional functions are available:

- local message handling,
- event flag handling,
- semaphore handling,
- task wait for an event,
- dynamic priority change,
- I/O resource management,
- set or query time of day,
- limit the use of program blocks to individual tasks,
- single-bit input/output,
- error message output via serial device (if present),
- management and exchange of data,
- memory management,
- 8087 support,
- task start in response to an interrupt,
- dynamic task management,
- start loader task.

Hardware Requirements

The operating system kernel requires SMP or AMS-M central boards using SAB 8086, 8088, 80186 or 80188 processors.

When using the SAB 8086 or 8088 CPU, an additional timer/counter of type SAB 8253, SAB 8254 or Am9513A and at least one interrupt controller of type SAB 8259A or Am9519A are required.

Memory Requirements

Data memory: approx. 1.5 Kbytes minimum

Program memory: 12.5 Kbytes maximum

RAM Disk Driver under USP-RMOS2NUC2-O/S

Function

Optional software for USP-RMOS2NUC2-O/S V2.0.

Driver program (type II) which simulates access to an auxiliary storage unit (e.g. diskette) in RAM.

All subroutines are supplied as relocatable object codes in a module library.

Features

The program package allows execution of the following functions:

- reserve memory,
- release memory,
- read a block,
- write a block,
- initialize RAM.

General Characteristics

Use of the RAM disk driver with the file management system allows a faster access to frequently needed files.

The size of the RAM memory is only limited by the processor's address space.

Hardware Requirements

RAM

Software Requirements

No additional software is required besides the operating system kernel USP-RMOS2NUC2-O/S.

Memory Requirements

Data memory is not needed for management.

Program memory: approx. 0.5 Kbytes

Module Description

USP-RMOS2HLI1-S/S V2.0

*High-Language Interface for USP-RMOS2NUC2-O/S
(PASCAL, C, FORTRAN)*

Function

Additional software for the USP-RMOS2NUC2-O/S V2.0.

The Intel C-86 interface allows the C-86 tasks to execute all RMOS2 system calls.

The PASCAL interface allows the PASCAL-86 tasks to execute all RMOS2 system calls.

The FORTRAN interface allows the FORTRAN-86 tasks to execute all RMOS2 system calls.

All modules are supplied as source code in a library.

Features

All kernel and optional functions of the real-time multitasking, multiprocessor operating system USP-RMOS2NUC2-O/S can be called in the programming languages C-86, PASCAL-86 and FORTRAN-86.

The following optional subroutines can be called with the PASCAL interface:

- RMOS2 status analyses,
- PASCAL-86 support for handling RMOS2 software drivers.

Memory Requirements

Data memory is not required.

Program memory:	PASCAL interface:	max. 207 bytes
	C interface:	max. 1 Kbyte
	FORTRAN interface:	no specification yet

Module Description

USP-RMOS2IPK2-O/S V2.0

Interprocessor Communication for USP-RMOS2NUC2-O/S

Function

Optional software for the USP-RMOS2NUC2-O/S V2.0.

Package of subroutines to allow communication between multiple standalone RMOS2 applications (loosely coupled multiprocessor system).

Interprocessor communication is supplied as locatable object code in a module library.

Features

The interprocessor communication provides the following functions:

- supports up to 16 processors and up to 256 global mailboxes,
- send a message to a global mailbox (SENDMP system call),
- receive a message from a global mailbox (RECVMP system call),
- PL/M-86 interface for the system calls.

Hardware Requirements

Interprocessor communication requires one of the following configurations:

- a multiprocessor-capable system with priority logic, bus disable mechanism and a global or dual-ported memory area,
- two monoprocessor systems coupled via a dual-port memory area.

Software Environment

The interprocessor communication USP-RMOS2IPK2-O/S is included into the real-time operating system USP-RMOS2NUC2-O/S V2.0.

Memory Requirements

Requires 2 Kbytes of program memory.

The global (or dual-ported) data memory area required depends on the number and extent of the configurable global mailboxes.

Module Description

USP-RMOS2BYT2-O/S V2.0

USP-RMOS2NUC2-O/S Driver for Byte-Oriented Peripheral Input and/or Output Devices

Function

Optional software for USP-RMOS2NUC2-O/S V2.0.

Universal driver program for controlling input and/or output of byte-oriented peripheral devices.

Driver programs are supplied as locatable object codes in a library.

Features

The driver program allows execution of the following functions:

- reserve device,
- release device,
- read data from the peripheral device,
- write data into the peripheral device,
- read data in transparent mode,
- write data and read in transparent mode,
- write and read data,
- emergency write (reservation is ignored),
- initialize interface controller,
- perform interrupt handling.

General Characteristics

Multiple and differing interface modules such as the USART 8251A, PPI 8255, MPSC 8274, EPC1 2661 and SCC 8530 can be supported by the driver program at various addresses for either isolated I/O or memory-mapped I/O. The driver supports the use of a translation table, an extension table and prompting text.

Hardware Requirements

One of the above-mentioned interface controllers. Byte-oriented I/O must be interrupt-driven.

Memory Requirements

Data memory is not required.

Program memory: approx. 2.5 Kbytes

Module Description

USP-RMOS2CRT2-S/S V2.0

CRT Display Driver for USP-RMOS2NUC2-O/S

Function

Optional software for USP-RMOS2NUC2-O/S V2.0.

Universal type II driver program for I/O control of byte-oriented CRT display terminals.

Driver programs are supplied as source codes in a library.

Features

The driver program allows execution of the following functions:

- reserve device,
- release device,
- read data from CRT display,
- write data to the CRT display,
- read data in transparent mode,
- write data and read in transparent mode,
- write and read data,
- initialize serial interface controller,
- perform interrupt handling.

General Characteristics

Multiple and differing interface modules such as the USART 8251A, MPSC 8274, EPC1 2661 and SCC 8530 can be supported by the driver program at various addresses for either isolated I/O or memory-mapped I/O.

Hardware Requirements

One of the above-mentioned interface controllers is required for operation. The I/O must be interrupt-driven.

Memory Requirements

Data memory is not required.

Program memory: approx. 1.5 Kbytes

Module Description

USP-RMOS2COM1-O/S V2.0

Communications Driver for USP-RMOS2NUC2-O/S

Function

Optional software for USP-RMOS2NUC2-O/S V2.0.

Universal driver program for computer-computer communication via serial and parallel interfaces.

Driver programs are supplied as relocatable object codes in a library.

Features

The driver program allows execution of the following functions:

- reserve device,
- release device,
- read data,
- write data.

General Characteristics

Multiple and differing interface modules such as the USART 8251A, MPSC 8274, EPCI 2661 and SCC 8530 can be supported by the driver program at various addresses for either isolated I/O or memory-mapped I/O. The communications driver has full duplex capabilities with XON-XOFF protocol and uses an internal 50-character receive buffer.

Hardware Requirements

One of the above-mentioned interface controllers is required for operation. The I/O must be interrupt-driven.

Memory Requirements

Data memory is not required.

Program memory: approx. 1.5 Kbytes

Module Description

USP-RMOS2DMA2-O/S V2.0

Direct Memory Access (DMA) Driver for Am9517A, SAB 8089, SAB 80186/80188 and SAB 82258 ADMA under USP-RMOS2NUC2-O/S

Function

Optional software for USP-RMOS2NUC2-O/S V2.0.

Universal driver program for control of direct memory access.

All subroutines are supplied as relocatable object codes in a module library.

Features

The program package allows execution of the following functions:

- basic initialization: setting a particular mode of operation,
- channel-specific initialization of a DMA transfer,
- provide status information about transfer activities,
- break of a DMA transfer.

Hardware Requirements

An Am9517A, SAB 8089, SAB 80186/80188 or SAB 82258 ADMA is required.

Memory Requirements

No data memory is required.

Program memory: 1 Kbyte

Module Description

SMP-RMOS2BUB2-O/S V2.0

Bubble Memory Driver for SMP-E143 (E141/E142) under USP-RMOS2NUC2-O/S

Function

Optional software for USP-RMOS2NUC2-O/S V2.0.

Package of subroutines for the SMP-E 143 board (controller for bubble memory) which facilitates physical access to the bubble memory.

All subroutines are supplied as relocatable object codes in a module library.

Features

The program package allows execution of the following functions:

- initialize board,
- reserve a subunit,
- release a subunit,
- determine status of a subunit,
- read logical blocks,
- write logical blocks.

General Characteristics

All possible address space settings for isolated I/O of the board can be allowed for in the software driver.

Data transfer between the SMP-E 143 board and memory takes place with or without DMA.

Hardware Requirements

The SMP-A143 (E141/E142) board is required plus a DMA controller (e.g. Am9517A on the SMP-E7/E8/E17-A5 central boards) for DMA mode. RAM area is also required.

Software Requirements

In addition to the operating system kernel USP-RMOS2NUC2-O/S, the direct memory access (DMA) driver USP-RMOS2DMA2-O/S is required if DMA is to be used.

Memory Requirements

The subroutines occupy approx. 3.5 Kbytes of memory.

When executing, they require approx. 140 bytes of RAM to buffer organizational data of the bubble memory.

Module Description

SMP-RMOS2FD22-O/S V2.0

Diskette Driver for SMP-E342 under USP-RMOS2NUC2-O/S

Function

Optional software for USP-RMOS2NUC2-O/S V2.0.

Package of subroutines for the SMP-E342 board (diskette controller) which facilitates the physical access to the diskette.

All subroutines are supplied as relocatable object codes in a module library.

Features

The program package allows execution of the following functions:

- initialize driver and board,
- reserve disk drive,
- release disk drive,
- format diskette,
- determine status of disk drive,
- read logical blocks,
- write logical blocks,
- remove or redefine the configuration parameters of a disk drive.

General Characteristics

All possible address space settings for isolated I/O of the board can be allowed for in the software driver.

Data transfer between the SMP-E342 board and memory takes place in DMA mode.

Hardware Requirements

The SMP-E342 board, a DMA controller (e.g. Am9517A on the SMP-E7/E8/E17-A5 central board) and also a RAM area are required.

Software Requirements

In addition to the operating system kernel USP-RMOS2NUC2-O/S, the direct memory access (DMA) driver USP-RMOS2DMA2-O/S is also required.

Memory Requirements

Program memory: 3.8 Kbytes

Data memory: 5 to 10 Kbytes for diskette format;
will be requested from a memory pool.

Module Description

USP-RMOS2DEB2-O/S V2.0

Dynamic Debugger for USP-RMOS2NUC2-O/S

Function

Optional software for monitoring and controlling the status and execution of tasks operating in the real-time multitasking multiprocessor operating system USP-RMOS2NUC2-O/S V2.0 without falsifying real-time conditions.

All modules are supplied as relocatable object codes in a library.

Features

The debugger performs the following functions:

- control the execution and check the status of all tasks executing in the real-time operating system,
- check the complete memory contents and modify RAM contents as required,
- set up to 8 breakpoints in various tasks,
- check the register contents of an interrupted task and modify their contents if required.

Hardware Requirements

Serial, byte-oriented I/O device

Software Requirements

The dynamic debugger USP-RMOS2DEB2-O/S is linked to the real-time operating system USP-RMOS2NUC2-O/S.

The following functions must be available to the debugger:

- single-step interrupt and the 8086/8088 command INT3 which may not be used for anything else,
- I/O requires either
the CRT display driver USP-RMOS2CRT2-S/S or
the driver for byte-oriented peripheral I/O devices, USP-RMOS2BYT2-O/S.

Memory Requirements

Data memory: approx. 1 Kbyte

Program memory: approx. 3.8 Kbytes

Module Description**USP-RMOS2REP2-O/S V2.0**

System Reporter for USP-RMOS2NUC2-O/S

Function

Optional software for USP-RMOS2NUC2-O/S V2.0.

Package of subroutines for monitoring and analyzing the tasks, resources and device drivers managed by the operating system.

The system reporter is supplied as relocatable object code in a library.

Features

The system reporter allows both short and long form analysis of the following functions:

- tasks,
- device drivers,
- memory pools,
- semaphores,
- global event flags,
- programs with controlled access,
- local mailboxes,
- overlay memory pools.

Hardware Requirements

Byte-oriented output device

Software Requirements

The system reporter USP-RMOS2REP2-O/S is linked to the real-time operating system USP-RMOS2NUC2-O/S.

To operate the system reporter one of the following drivers is required for the output function:

- the CRT display driver USP-RMOS2CRT2-S/S or
- the driver for byte-oriented peripheral I/O devices USP-RMOS2BYT2-O/S.

Memory Requirements

Data memory: at least 600 bytes

Program memory: approx. 9 Kbytes

Module Description

USP-RMOS2HSF1-O/S V2.0

High-Speed File Management System for USP-RMOS2NUC2-O/S

Function

Optional software for USP-RMOS2NUC2-O/S V2.0.

Reading and writing of files to and from diskette files having hierarchical organization.

RAM disk driver is included.

All modules are supplied as relocatable object codes in a library.

Features

The file management system provides the following functions:

- initialize device (REMAP),
- establish access to a device (MOUNT) or terminate it (DISMOUNT),
- open file (OPEN),
- close file (CLOSE),
- delete file in directory or modify file name,
- check and modify file attributes,
- print directory (GET STATUS),
- transfer file from diskette to memory (READ),
- write data from memory to diskette (WRITE),
- record current file status (CHECKPOINT),
- search for directory or file (SEEK).

Specials

- Unlimited number of simultaneously open files,
- simultaneous access by several tasks to the same file (read only),
- comprehensive error status information passed to calling task,
- optional buffering of the last sector read from mass storage unit thus making renewed access unnecessary for repeated read requests,
- management of up to 100 blocks (5 12 bytes each) thus minimizing access to the mass storage unit,
- linking of byte and block-oriented drivers possible,
- emergency shutdown to close all open files immediately in case of power failure,
- simultaneous access of several processors to the file management system is allowed,
- hierarchical structure with the capability of managing devices, directories, files and records,
- each device can store up to 256 Mbytes, each file up to 32 Mbytes and each record between 1 and 5 12 bytes,
- access to the file management system is carried out via a system call (SVC),
- the following file formats can be processed: ISIS-II, HSFS format.

Software Requirements

The file management system USP-RMOS2HSF1-O/S is linked to the real-time operating system USP-RMOS2NUC2-O/S.

The following software is required for the output of error messages:

- a driver program for byte-oriented output devices:
e.g.: CRT display driver (USP-RMOS2CRT2-S/S) or driver program for byte-oriented peripheral I/O devices USP-RMOS2BYT2-O/S or

for data storage:

- a driver program for byte-oriented output devices and/or
- a driver program for block-oriented I/O devices:
e.g. driver for diskette accesses SMP-RMOS2FD22-O/S or driver for bubble memory SMP-RMOS2BUB2-O/S.

Memory Requirements

Data memory: approx. 1 Kbyte

Program memory: approx. 7 Kbytes

RMOS2-UDI-OBJ

Ordering code C8256-A1-D72

Module Description**USP-RMOS2SRI1-O/S***Standard Runtime Interface SRI86R under USP-RMOS2NUC2-O/S***Function**

Additional software for the USP-RMOS2NUC2-O/S V2.0.

Allows the development and running of universal development interface (UDI) programs. Additionally provides numerous command line interpreter (CLI) functions (like DELETE, DIR, RENAME, etc.).

All programs are supplied as relocatable object codes in a module library.

Features

The program package allows execution of the following functions:

- DELETE: delete a file,
- COPY: copy a file,
- DIR: print a file directory,
- IDISK: format a diskette,
- RENAME: rename a file,
- SUBMIT: command for batch processing,
- MOUNT: mount a device (e.g. drive),
- DISMOUNT: dismount a device,
- TIME: set and display the date/time,
- EXIT: exit the SRI86,
- load and start UDI programs such as compiler PL/M86, PASCAL-86, Link 86, etc.

Specials

- can be programmed into EPROM
- can be run in monoprocessor and multiprocessor environment
- system console is configured automatically

Software Requirements

The standard runtime interface is inserted into the real-time operating system USP-RMOS2NUC2-O/S.

Required are:

- byte driver (to configure system console and printer)
- HSFS file system,
- driver to store the data,
e.g. SMP-RMOS2FD22 (driver for diskette access),
SMP-RMOS2BUB2 (driver for bubble memory),
SMP-RMOS2HD62 (driver for Winchester).

Hardware Requirements

- Interrupt controller and timer,
- serial interface for system console,
- RAM (minimum 256 Kbytes when using the compilers),
- external storage (diskette, bubble memory, Winchester, RAM disk),
- optionally printer interface and printer,
- optionally 2nd serial interface for coupling.

Memory Requirements

- SRI86: 12 Kbytes of program memory
1.2 Kbytes of static memory
2 Kbytes and more of dynamic memory (memory pool)
- CLI: 7 Kbytes of program memory
1.5 Kbytes of static memory
3 Kbytes and more of dynamic memory (memory pool)

RMOS2-SDL1-OBJ

Ordering code C8256-A1-D75

Module Description**USP-RMOS2SDL1-O/S V2.0***SDLC/HDLC Secondary Station for USP-RMOS2NUC2-O/S***Function**

Supports the RMOS2 user by providing the functions of a secondary station for bit-oriented control procedures (SDLC/HDLC).

RMOS2SDL1 is supplied as locatable object code in a library.

Features

RMOS2SDL1 provides the following function calls:

- OPEN
(link setup and transfer of operation parameters)
- READ
(receive data)
- WRITE
(send data)
- CLOSE
(close down connection)

General Characteristics

- Can be used in an IBM-SNA environment with control unit 3705-II (ACF/NCP/VS REL. 3 and ACF/VTAM).
- Can be used in any SDLC/HDLC environment that includes a primary station.
- The following SDLC/HDLC commands and responses are supported by RMOS2SDL1:
 - RR (receive ready),
 - RNR (receive not ready),
 - SNRM (set normal response mode),
 - DISC (disconnect mode),
 - I (information),
 - TEST (basic data link test),
 - XID (exchange station identification),
- In the ISO/OSI communication model, RMOS2SDL1 covers all layers except the network layer.

Hardware Requirements

- Communication controller AmZ8530 (non-vectorized mode),
- RS 232C – RS 422A (V.24/V.28-V.11) interface for point-to-point circuits,
- RS 485 interface for multipoint connections.

Software Requirements

RMOS2SDL1 consists of four assembler tasks which are linked during system generation.

Memory Requirements

Program memory: approx. 7 Kbytes

Data memory: approx. 5 Kbytes



RMOS2-ROY-OBJ

Ordering code C8256-A1-D74

*Royalties for the Real-Time Multitasking Multiprocessing Operating System RMOS2***Function**

The licensee may copy and use the RMOS2-BUN-OBJ or RMOS2-UBU-OBJ, consisting of the following software modules:

USP-RMOS2NUC2-O/S
USP-RMOS2HLI1-S/S
USP-RMOS2IPK2-O/S
USP-RMOS2BYT2-O/S
USP-RMOS2CRT2-S/S
USP-RMOS2COM1-O/S
SMP-RMOS2HDG1-O/S¹⁾
SMP-RMOS2BUB2-O/S
SMP-RMOS2FD22-O/S
USP-RMOS2DEB2-O/S
USP-RMOS2REP2-O/S
USP-RMOS2HSF1-O/S

including the optional extension modules

USP-RMOS2SRI1-O/S²⁾
USP-RMOS2SDL1-O/S³⁾

and the corresponding software documentation for the generation of DERIVATIVE PROGRAMS and may grant third parties the right to use the DERIVATIVE PROGRAMS for in-house purposes.

Software Requirements

RMOS2-BUN-OBJ
or
RMOS2-UBU-OBJ

¹⁾ in preparation

²⁾ requires RMOS2-UDI-OBJ

³⁾ requires RMOS2-SDL1-OBJ

PMS Software



5 Software for PMS and SMP-SYS900

5.1 Survey of 8-Bit Software

Brief designation	Ordering code
CPM85-BASCOM	C8256-A11-D209
CPM85-BASINT	C8256-A11-A11
CPM85-SMPL85	C8256-B11-A12
CMP85-SRI85	C8256-B11-A45
CPM85-WORD85	C8256-A11-A9
PMS-EXCH/P	C8256-B11-D204

CPM85-SRI85

Ordering code C8256-B11-A45

Standard Runtime Interface

Function

Establishes an ISIS-II compatible user interface on the PMS-T85D or SMP-SYS900.

Data Storage Medium

One 5 1/4" diskette for PMS-T85D and SMP-SYS900.

Features

The SRI85 operating system interface under CP/M85 allows that utility, compiler and user programs which usually run on the Siemens SME microcomputer development system under ISIS can also be executed on the PMS-T85D portable test and development system and on the SMP-SYS900 system. It offers the possibility to execute 8-bit resident software and 16-bit cross software.

System commands as in ISIS are available for managing diskettes and I/O operations (ASSIGN, ATTRIB, COPY, etc).

The SRI system calls operate analogously to those of the ISIS operating system. Some examples are ATTRIB, CLOSE, CONSOL, DELETE, ERROR, etc.

Software Requirements

Operating system CP/M85 V2.2

CPM85-BASCOM

Ordering code C8256-A11-D209

BASIC Compiler

Function

A BASIC compiler for creating BASIC applications. It generates optimized, relocatable machine code which can be listed if desired.

Data Storage Medium

One 5 1/4" diskette for PMS-T85D and SMP-SYS900.

Features

The following are some of the advantages of compiled BASIC programs:

- the machine code of the user program can be stored on diskette, in ROM or on some other media,
- execution speed is 3 to 10 times faster than with interpreter,
- support for double-precision transcendental functions,
- the INCLUDE command allows the inclusion of other source files during compilation,
- protects source programs because only the compiled code need be made available.

Software Requirements

Operating system CP/M85 V2.2

CPM85-BASINT

Ordering code C8256-A11-A11

BASIC Interpreter

Function

BASIC interpreter for PMS-T85D and SMP-SYS900.

Data Storage Medium

One 5 1/4" diskette for PMS-T85D and SMP-SYS900.

Features

It is easy to create even large applications using the easy-to-learn programming language BASIC.

Some features are:

- four different types of variables,
- single-step execution of programs,
- Boolean operations such as OR, AND, NOT, XOR, EQV, IMP,
- formatted output using the PRINT-USING command,
- isolated I/O via ports,
- use of up to 10 assembler subroutines and nested commands.

Software Requirements

Operating system CP/M85 V2.2

CPM85-SMPL85

Ordering code C8256-B11-A12

PL/M Compiler

Function

SMPL is a PL/M compiler for SAB 8080/8085 processors.

Data Storage Medium

One 5 1/4" diskette for PMS-T85D and SMP-SYS900.

Features

The PL/M compiler produces relocatable object code which allows modular programming and simple debugging. It also allows comprehensive code optimization for short and effective instruction sequences.

Since the SMPL85 compiler can produce either CP/M or ISIS-II object code, extended compatibility with the SME development system is guaranteed.

Software Requirements

Operating system CP/M85 V2.2

CPM85-WORD85

Ordering code C8256-A11-A9

Text Formatter

Function

A screen-oriented text processing and print program capable of running under the CP/M85 operating system.

Data Storage Medium

One 5 1/4" diskette for PMS-T85D and SMP-SYS900.

Features

Text is entered and modified at the screen. The text is shown on the screen in much the same format as it will be printed later. Some functions are only carried out during printing (i.e. printing of italics).

The most important text processing functions are:

- insert characters,
- delete characters,
- find and change characters, repeatedly if desired,
- optional word break-down, page display, automatic formatting, hyphenation aid,
- right, left, up, down screen scrolling,
- set or delete labels – jump to labels,
- block commands (copy, delete, move, store block; set block pointer to start or end),
- file commands (delete, read in, copy, rename, print, store, read directory, change drive),
- text formatting (set right or left margin, release margin, set and delete tabulator position),
- various help menus for processing commands, formatting commands, print control,
- switching functions for word break-down, page makeup, automatic formatting, fixed or variable tabulators, soft hyphenation, hyphenation aids.

Software Requirements

Operating system CP/M85 V2.2

PMS Software

PMS-EXCH/P

Ordering code C8256-A11-D204

Coupling Software

Function

The coupling software is a set of utility programs which transfer files via a serial interface. The programs differ in their dependence on the target system and the operating systems used there.

Data Storage Media

One 5 1/4" diskette for PMS-T85D/T88D and SMP-SYS900.

One 8" diskette for SME series II/III.

Scope of Functions

The coupling software allows the transfer of software between PMS-SME, PMS-PMS, SYS-SME, SYS-SYS, PMS-SYS and SME-SME. Each of the utility programs can transmit as well as receive. The program reads files from floppy disk or magnetic disk and transmits them using a serial channel, or receives them from a serial channel and writes them onto floppy disk or magnetic disk. The data transfer is completely transparent. Both, text files and object files can be transferred.

A transfer rate between 1200 and 19200 bits/s can be selected.

Software Requirements

Capable of being run on the PMS-T85D/T88D under the CP/M85 or CP/M86 operating system.

It can be run on the SME series II/III both under ISIS and under CP/M.

PMS Software

5.2 Survey of 16-Bit Software

Brief designation	Ordering code
CPM86-BASCOM	C8256-A11-A32
CPM86-BASINT	C8256-A11-A33
CPM86-SRI86	C8256-B11-A120
CPM86-WORD86	C8256-A11-A35

PMS Software

CPM86-SRI86

Ordering code C8256-B11-A120

Standard Runtime Interface

Function

The SRI86 establishes a UDI (universal development interface) compatible user interface on the PMS-T88D and SMP-SYS900 systems.

Data Storage Medium

One 5 1/4" diskette for PMS-T88D and SMP-SYS900.

Features

The SRI186 operating system interface under CP/M86 allows that utility, compiler and user programs which usually run on the Siemens SME series III microcomputer development system under ISIS can also be executed on the PMS-T88D portable test and development system and on the SMP-SYS900 system.

CPM86-SRI86 has two entry points for SAB 8086 software interrupts. These allow the user software to employ UDI system routines. It is thus theoretically possible to run all SME series III 16-bit software on PMS and SMP-SYS900 systems.

Software Requirements

Operating system CP/M86



PMS Software

CPM86-BASCOM

Ordering code C8256-A11-A32

BASIC Compiler

Function

A BASIC compiler for creating BASIC applications. It generates optimized, relocatable machine code which can be listed if desired.

Data Storage Medium

One 5 1/4" diskette for PMS-T88D and SMP-SYS900.

Features

Some of the advantages offered by compiled BASIC programs are:

- execution speed is 3 to 10 times faster than with interpreter,
- support for double-precision transcendental functions,
- the INCLUDE command allows the inclusion of other source files during compilation,
- does not support the SAB 8087 coprocessor.

Software Requirements

Operating system CP/M86

CPM86-BASINT

Ordering code C8256-A11-A33

BASIC Interpreter

Function

BASIC interpreter for PMS-T88D and SMP-SYS900.

Features

It is easy to create even large applications using the easy-to-learn programming language BASIC.

Some features are:

- single-step execution of programs,
- four different types of variables,
- Boolean operations such as OR, AND, NOT, XOR, EQV, IMP,
- formatted output using the PRINT-USING command,
- isolated I/O via ports,
- the use of up to 10 assembler subroutines and nested commands,
- does not support the SAB 8087 coprocessor.

Software Requirements

Operating system CP/M86

CPM86-WORD86

Ordering code C8256-A11-A35

Text Formatter

Function

A screen-oriented text processing and print program capable of running under the CP/M86 operating system.

Data Storage Medium

One 5 1/4" diskette for PMS-T88D and SMP-SYS900.

Scope of Functions

Text is entered and modified at the screen. The text is shown on the screen in much the same format as it will be printed later. Some functions are only carried out during printing (i.e. printing of italics).

The most important text processing functions are:

- insert character,
- delete character,
- find and change characters, repeatedly if desired,
- optional word break-down, page display, automatic formatting, hyphenation aid,
- right, left, up, down screen scrolling,
- set or delete labels - jump to labels,
- block commands (copy, delete, move, store block; set block pointer to start or end),
- file commands (delete, read in, copy, rename, print, store, read directory, change drive),
- text formatting (set right or left margin, release margin, set and delete tabulator position),
- various help menus for processing commands, formatting commands, print control,
- switching functions for word break-down, page makeup, automatic formatting, fixed or variable tabulators, soft hyphenation, hyphenation aids.

Software Requirements

CP/M86 operating system

General Terms for the Use of Software Products



6 General Terms for the Use of Software Products of the Siemens Components Group

1 Definitions

- 1.1 "Siemens": Siemens Aktiengesellschaft, Berlin and Munich.
- 1.2 "SPS": the software product sheet, which is part of this agreement.
- 1.3 "SW": the software product(s) as defined in the SPS.
- 1.4 "LICENSEE": the lawful recipient of the SW and SW DOCUMENTATION.
- 1.5 "DERIVATIVE PROGRAM": programs which the LICENSEE generates through compiling and linking with the SW.
- 1.6 "SW DOCUMENTATION": the data sheet related to the SW and other documentation handed over by Siemens with the SW.
- 1.7 The SW in the SPS is subdivided into the following classes:
 - "Class A SW":
SW for which Siemens provides warranty (7.1).
 - "Class B SW":
SW for which Siemens provides partial warranty (7.4).
 - "Class C SW":
SW from third parties for which Siemens has acquired the application rights, including the rights to pass on to other parties in unamended form (vendor program) or in amended form (composite program), and for which Siemens provides partial warranty (7.5).
- 1.8 The TYPE OF USE is differentiated in the SPS as follows:
 - "NA 1":
the LICENSEE may use the SW and SW DOCUMENTATION in unamended form for in-house purposes.
 - "NA 2":
the LICENSEE may grant third parties the right to use the SW and SW DOCUMENTATION in unamended form for in-house purposes.
 - "NA 3":
the LICENSEE may grant third parties the right to grant other third parties the right to use the SW and SW DOCUMENTATION in unamended form for in-house purposes.
 - "NA 4":
the LICENSEE may use the SW and SW DOCUMENTATION to generate DERIVATIVE PROGRAMS and grant third parties the right to use the DERIVATIVE PROGRAMS for in-house purposes.
 - "NA 5":
the LICENSEE may use the SW and SW DOCUMENTATION to generate DERIVATIVE PROGRAMS and may grant third parties the right to grant other third parties the right to use the DERIVATIVE PROGRAMS for in-house purposes.
- 1.9 In the SPS there are two types of SYSTEM TYPE:
 - "SINGLE USER":
the SW may only be used once at a particular time.
 - "MULTIUSER":
the SW may be used concurrently by several users at a particular time.
- 1.10 The "SCOPE OF APPLICATION" is the time, place, and application-related area in and at which the SW may be used with the hardware specified in the SPS.

General Terms for the Use of Software Products

- 1.11 The "HARDWARE ENVIRONMENT" is the range of hardware products in which the SW is implemented.
- 1.12 The "MASTER COPY" is the software supplied by Siemens and accepted by the LICENSEE.

2 Software Application Rights

- 2.1 On effecting the payment for use, the LICENSEE is granted the non-exclusive and non-transferrable right to use the SW in the SCOPE OF APPLICATION as specified in the SPS, on the hardware as specified in the HARDWARE ENVIRONMENT in the SPS. The actual TYPE(S) OF USE and the SYSTEM TYPE of the SW are described in the SPS.
- 2.2 The potential generation of DERIVATIVE PROGRAMS according to NA 4 and NA 5 is limited to the SCOPE OF APPLICATION and SYSTEM TYPE defined in the SPS.
- 2.3 In the case of supplementary conditions being defined for Class C SW in the SPS, those must be adhered to by the LICENSEE and take priority over these general terms insofar as they are contradictory.
- 2.4 Insofar as the TYPE OF USE defined in the SPS entitles the transfer of the SW or SW DOCUMENTATION to third parties, the LICENSEE shall impose on said third parties obligations corresponding to section 2.1 to 2.3.

3 Copying Rights

- 3.1 The LICENSEE is entitled to copy the SW and the SW DOCUMENTATION to the extent defined in the SPS. The LICENSEE must ensure that the alphanumeric marks, manufacturer's marks and copyright marks on the SW and SW DOCUMENTATION shall remain unchanged and complete on the copies.
- 3.2 The LICENSEE may make up to three copies from the MASTER COPY for his archives. These copies may only be employed if the MASTER COPY has become unusable.
- 3.3 The LICENSEE is obliged to ensure that all copies of the SW and SW DOCUMENTATION are numbered serially in such a way that the SW series number in the SPS is recognizable, and same is obliged to ensure that proper and accountable records are kept on the location of such copies. Siemens has the right to examine the respective documents on request.
- 3.4 Insofar as the TYPE OF USE specified in the SPS allows the transfer of the SW and SW DOCUMENTATION to third parties, the LICENSEE shall impose on said third parties obligations corresponding to section 3.1 to 3.3.

4 Rights Pertaining to Siemens or its Licensors, Secrecy

- 4.1 All industrial property rights (including but not limited to copyrights, trademarks or patents) related to the SW, the SW product designations and SW DOCUMENTATION are not affected by these general terms for the use of SW, and the SW, the SW product designations and SW DOCUMENTATION shall remain unlimited valid as trade secrets or confidential information belonging to Siemens or its licensors.

General Terms for the Use of Software Products

- 4.2 The LICENSEE shall take precautions to indefinitely ensure that the SW and the SW DOCUMENTATION are not disclosed to third parties without the written consent of Siemens unless otherwise provided for in the TYPE OF USE defined in the SPS. Insofar as the TYPE OF USE enables the transfer of the SW and SW DOCUMENTATION to third parties, the LICENSEE shall impose an obligation corresponding to section 4.1 on said third parties.

5 Payment for Use

- 5.1 The payment for use is specified in the SPS. Apart from such payment, the value-added tax effective at that time shall be invoiced separately.
- 5.2 Non-recurring payments shall be made immediately on delivery of the SW. Monthly payments for use shall be paid for the rest of the calendar quarter effective at the time of delivery, and then in advance for each following quarter.
- 5.3 If as a result of changes in the cost situation, Siemens' prevailing monthly listed rates are reduced or increased, then the corresponding monthly payments as per SPS shall be changed accordingly insofar as they have not already been due.
- 5.4 Apart from such payments, Siemens shall at its prevailing rates separately invoice the following:
- assistance in installing the SW
 - assistance in debugging and preparation of error sheets (on-site or per telephone)
 - assistance in the analysis of and elimination of SW malfunctions caused by improper handling or errors in the application of the SW or other circumstances beyond Siemens' control (on-site or per telephone).
- Payments shall be effected immediately upon receipt of invoice.

6 Delay

If Siemens, for reasons for which Siemens may be held responsible, fails to deliver SW and SW DOCUMENTATION in due time and, therefore, the LICENSEE can not implement the SW in the agreed upon SCOPE OF APPLICATION, the LICENSEE may claim liquidated damages amounting to 0.5% of the agreed upon non-recurring payment for use, or 25% of the agreed upon monthly payment for use, for each full week of delay, but not for more than a total of ten weeks, provided that the LICENSEE can establish credibility that he has suffered damage due to the delay. Causes of delay for which Siemens shall not be held responsible shall be deemed to be (but not limited to) mobilization, war, riot, strike and lockout. Any further claims for damages shall be excluded unless liability is mandatory in cases of intent or gross negligence.

General Terms for the Use of Software Products

7 Warranty

- 7.1 The warranty for Class A SW includes debugging during the warranty periods specified in the SPS. The elimination of errors, i.e. deviations from the SW specifications in the data sheet, shall be performed by furnishing a new version of the SW. A precondition of this is that the error be reproducible and that it appears in the latest SW version received by the LICENSEE.
The LICENSEE shall provide Siemens with all documentation and information required for the elimination of errors.
- 7.2 If Class A SW is reclassified as Class B SW or is withdrawn from the market, the warranty obligation in its previous form shall expire at the latest twelve months after notification of the reclassification or withdrawal.
- 7.3 In the case of SW which may be used for the generation of DERIVATIVE PROGRAMS, Siemens provides a warranty up to the interface. Apart from this Siemens provides no warranty for this SW unless the LICENSEE can establish in a test run of the MASTER COPY that there is no causal connection between the modification and the error produced.
- 7.4 If errors occur in Class B SW, i.e. there are deviations from the SW specifications in the data sheet, Siemens shall have the option during the warranty period specified in the SPS of either providing the SW in the source language at no extra charge or in assisting the LICENSEE in eliminating the error. Siemens shall be entitled to a consideration for such assistance at Siemens' prevailing rates.
- 7.5 Siemens assumes warranty for material or manufacturing faults in the data carriers in Class C SW. In the case of SW errors occurring during the warranty period specified in the SPS, i.e. deviation from the SW specifications in the data sheet, Siemens shall have the option of either providing a corrected SW version available to Siemens at no extra charge or assist the LICENSEE in error elimination. Siemens shall be entitled to a consideration for such assistance at Siemens' prevailing rates.

8 Period of Validity of Agreement

- 8.1 The LICENSEE's rights to the SW and SW DOCUMENTATION expire on expiry of the period of use specified in the SPS. The LICENSEE may, however, cancel the agreement in writing and without notice if Class B or Class C SW does not function in accordance with the specifications defined in the data sheet within the warranty period defined in the SPS.
- 8.2 If it is agreed to hand over Class A SW for a monthly payment of use and Siemens reclassifies this SW as Class B or withdraws this SW from the market, then the LICENSEE is entitled to cancel the agreement prematurely without prior notice.
- 8.3 The LICENSEE's rights to the SW and SW DOCUMENTATION expire if the LICENSEE fails to adhere to a term of these general terms for the use of SW products, even after expiry of a reasonable respite. Insofar as the TYPE OF USE defined in the SPS allows the transfer of the SW and SW DOCUMENTATION to third parties, the LICENSEE shall impose an obligation corresponding to section 8.1 on said third party.
- 8.4 Upon expiry of the agreement, the LICENSEE shall either destroy or return to Siemens all SW copies and SW DOCUMENTATION and copies thereof without delay.

General Terms for the Use of Software Products

9 Liability

Siemens shall be liable for injury to persons for which Siemens may be held responsible and, in the event of damage to property for which Siemens may be held responsible, Siemens shall reimburse the cost of restoring such property up to an amount of DM 1,000,000 for any one event. In the case of loss or damage to data medium, the liability for damage does not include the cost of reconstructing lost data. Any further claims for damages other than the compensation expressly specified in these general terms for the use of SW products, in particular in respect to damage resulting from consultation, assistance in the installation of SW or errors in SW shall be excluded unless liability is mandatory in cases of intent, gross negligence or absence of assured characteristics.

10 Amendments

Supplemental agreements and amendments to the agreement are not binding unless agreed upon in writing.

Software Survey



Software Survey

7 Software Survey

(Monitors, drivers and operating system programs)

Type	Description	Ordering code	Page
Monitor programs			
USP-MONLIB-A11/P	Program for testing hardware and software of SMP, SKC, and AMS mikrocomputers having central boards which use an SAB 8085 as CPU	C8256-A4-D204	17
USP-MONLIB-A81/P	Program for testing the hardware and software of SMP, SKC, and AMS microcomputers having central boards using an SAB 8086/8088/80186/80188 or SAB 80286 as CPU	C8256-A4-D31	19
USP-MONLIB-A51/P	Program for testing the hardware and software of SMP and AMS microcomputers having central boards which use an SAB 8031 as CPU	C8256-A4-D205	21
AMS-MON5-B1/32	Monitor program for AMS-M5	C8065-A105-A8	23
AMS-MON6-B1/64	Monitor program for AMS-M6/-M7/-M61	C8065-A107-A7	24
AMS-MON16-B1/64	Monitor program for AMS-M16	C8065-A107-A8	25
AMS-MON26-B1/64 *	Monitor program for AMS-M26	C8065-A107-A9	26
SMP-MON2-B1/32	Monitor program for SMP-E2/-E3/-E5	C8065-A105-A7	27
SMP-MON8-B1/64	Monitor program for SMP-E7/-E8	C8065-A107-A10	28
SMP-MON14-B1/32	Monitor program for SMP-E4/-E14	C8065-A105-A9	29
SMP-MON19-B1/64	Monitor program for SMP-E19	C8065-A107-A11	30
SKC85-MON1-B1/P	Monitor program for SKC85-E71 with a clock frequency of 3.072 MHz or 5 MHz respectively	C8065-A105-D2	31
SKC51-MON1-B1/128	Monitor program for SKC51-A7	C8065-A105-A12	32

* in preparation

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Type	Description	Ordering code	Page
Driver programs			
SMP-STR140-A11/P	Software driver for SMP-E143 and SAB 8085 CPU	C8256-A2-D203	37
SMP-STR140-A81/P	Software driver for SMP-E143 and SAB 8086/8088 CPU	C8256-A2-D217	37
SMP-STR308-A12/P	Software driver for SMP-E308 and SAB 8085 CPU	C8256-A2-D207	38
SMP-STR308-A82/P	Software driver for SMP-E308 and SAB 8086/88 CPU	C8256-A2-D218	38
SMP-STR309-A11-Q/P	Software driver for SMP-E309 and SAB 8085 CPU (source code)	C8256-A2-D23	40
SMP-STR309-A81/P	Mini software driver for SMP-E309 and SAB 8086/88 CPU	C8256-A2-D210	41
SMP-STR342-A11/P	Software driver for SMP-E342 and SAB 8085 CPU	C8256-A2-D204	43
SMP-STR342-A81/P	Software driver for SMP-E342 and SAB 8086/88 CPU	C8256-A2-D219	43
SMP-STR346-A11/P	Software driver for SMP-E346 and SAB 8085 CPU	C8256-A2-D208	36
SMP-STR346-A81/P	Software driver for SMP-E346 and SAB 8086/88 CPU	C8256-A2-D214	36
SMP-STR352-A11/P	Software driver for SMP-E352 and SAB 8085 CPU	C8256-A2-D209	43
SMP-STR352-A81/P	Software driver for SMP-E352 and SAB 8086/88 CPU	C8256-A2-D221	43
SMP-STR353-A11/P	Software driver for SMP-E353 and SAB 8085 CPU	C8256-A2-D206	44
SMP-STR353-A81/P	Software driver for SMP-E353 and SAB 8086/88 CPU	C8256-A2-D222	44
SMP-STRDMA-A11/P	Software driver for DMA controller and SAB 8085 CPU	C8256-A2-D202	45
SMP-STRDMA-A81/P	Software driver for DMA controller and SAB 8086/88 CPU	C8256-A2-D216	45

Software Survey

Type	Description	Ordering code	Page
Operating systems			
RMOS2-BUN-OBJ	Real-time multitasking multiprocessing operating system, bundled to AMS/SMP/PMS/SYS	C8256-A1-D68	56
RMOS2-UBU-OBJ	Real-time multitasking multiprocessing operating system, unbundled	C8256-A1-D69	56
	Modules of RMOS2 V2.0: Kernel of real-time multitasking multiprocessor operating system Interprocessor communication High-level language interface Driver for byte-oriented peripheral devices CRT display driver Communication driver Standalone DMA driver for Am9517A, SAB 80186/188, SAB 8089* Bubble memory driver for SMP-E143 Diskette driver for SMP-E342 Interactive debugger System reporter High-speed file system		
RMOS2-ROY-OBJ	Copying rights for RMOS2-BUN-OBJ and RMOS2-UBU-OBJ	C8256-A1-D74	74
RMOS2-UDI-OBJ	Extensions: Universal development interface	C8256-A1-D72	70
RMOS2-SDL1-OBJ	SDLC secondary driver	C8256-A1-D75	72

* in preparation

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