Rockwell

A65/40-2000, -3000, -4000 and -5000 AIM 65/40 MICROCOMPUTER

OVERVIEW

The AIM 65/40 microcomputer integrates the AIM 65/40 modular components—Single Board Computer (SBC), 40-Character Display or Video Display Controller (VDC) module, Graphics Printer, and a Standard or Extended Keyboard—into a complete self-contained system including an application-oriented I/O ROM and a ROM resident operator-oriented Debug Monitor/Text Editor. The display and printer modules are mounted onto the SBC while the keyboard is detached—all peripherals are connected through removable 40-conductor ribbon cables. The peripherals can easily be relocated to other positions to satisfy unique installation requirements.

In its integrated form, a desk-top installation of the AIM 65/40 microcomputer system can perform a wide range of specialized data acquisition, data reduction, control, and monitor functions in either OEM or end-user configurations. As a development tool, the system can support software developed in either assembly or high level language for operation in AIM 65/40 or RM 65 based microcomputers at a fraction of the cost of other systems.

As an advanced generation of the popular AIM 65 microcomputer, the separate AIM 65/40 assemblies provide increased processing throughput, improved keyboard, display and printer modules, and expanded application interfaces. The 6502 CPU-based AIM 65 Single Board Computer, with a full address complement of memory capacity on-board, extremely flexible I/O, and interrupt driven I/O handlers in firmware, is the heart of the AIM 65/40 microcomputer system. The AIM 65 Graphics Printer, with its separate microcomputer controller, prints 40 columns of characters using a complete set of upper and lower case alphabetic, numeric, semi-graphic, and special characters in the text mode at 240 lines per minute, and also provides a full graphics mode of 280 dots by n rows. The AIM 65/40-Character Display, with its own microprocessor-based controller, features an easy-to-read fluorescent display, and provides a full complement of alphanumeric and special characters as well as internal editing, scrolling, and blinking functions. The terminal-style AIM 65 Standard Keyboard contains a full-size main keyboard plus a separate row of eight dedicated function keys and isolated RESET and ATTN keys.

The system comes with a 4K-byte I/O ROM and an 8K-byte interactive debug monitor and text editor. Optional assembler and common high level language compilers/interpreters improve programmer productivity, increase program reliability, and simplify program maintenance. ROM-based firmware includes a disk operating system, symbolic assembler, universally accepted BASIC interpreter, and a highly efficient FORTH system with resident compiler, interpreter, and macro assembler. Optional disk-based software includes a macro assembler, BASIC compiler and FORTH target compiler.

FEATURES

- Single Board Computer with extensive memory and I/O
  - —6502 CPU
  - —131K addressing, in Two 65K-byte banks
  - —Up to 48K-bytes of on-board RAM, with write-protect
  - —Up to 32K-bytes of on-board PROM or ROM
  - —User-Prioritized Interrupts, up to six levels
  - —User-Dedicated parallel I/O interface
  - —User-Dedicated RS-232C serial interface
  - —Audio cassette/TTY (20 mA current) interface
  - —RM 65 bus expansion interface
- Graphics Printer
  - —Text mode provides upper/lower case alphanumerics, Math, and Special Characters at 240 lines/minute
  - —Full graphics mode provides 280-dot resolution
  - —Quiet, reliable thermal operation
- 40-Character Display
  - —Full upper case alphanumeric and special characters
  - —Bright, crisp vacuum fluorescent display
  - —Display, edit, auto-scroll, and character blinking functions
- Full-Size Terminal-Style Standard Keyboard
  - —57 keys, including locking ALL CAPS key
  - —Eight user function keys, plus ATTN and RESET
- I/O ROM
  - —Auto-start initialization
  - —Interrupt-driven peripheral I/O handling
  - —RAM vectored I/O with expansion hooks
  - —General purpose I/O and utility subroutines
- ROM-Resident Interactive Debug Monitor
  - —Accepts instructions in mnemonic form
  - —Machine level debug functions
  - —Command file for automatic command execution
- ROM-Resident Text Editor
  - —Line and screen oriented commands
  - —Read, list, insert, delete functions
  - —Cursor control functions
  - —Automatic and manual block change functions
- Extensive Documentation
  - —Comprehensive user's manual
  - —I/O ROM and Monitor/Editor assembly listings
  - —Programming and hardware manual
  - —Summary booklet and wall schematic

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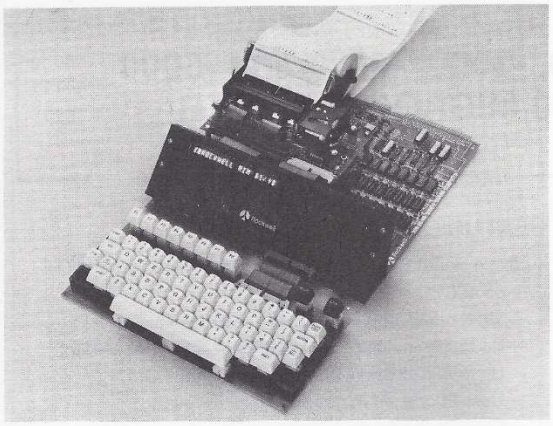


A65/40-5000 AIM 65/40 Microcomputer

ORDERING INFORMATION

Microcomputers

Part No.	Description
A65/40-2000	AIM 65/40 SBC with 32K RAM, Monitor ROMs, Extended Keyboard, and VDC Module
A65/40-3000	AIM 65/40 SBC with 32K RAM, Monitor ROMs, Extended Keyboard, VDC Module & Graphics Printer
A65/40-4000	AIM 65/40 SBC with 32K RAM Monitor ROMs, Standard Keyboard and 40 Char. Display
A65/40-5000	AIM 65/40 with 32K RAM Monitor ROMs, Standard Keyboard, 40 Char. Display and Graphics Printer

Firmware Options

Part No.	Description
A65/40-7010	AIM 65/40 Assembler ROM
A65/40-7020	AIM 65/40 BASIC Interpreter ROMs
A65/40-7040	AIM 65/40 Math Package ROM
A65/40-7050	AIM 65/40 FORTH ROMs
A65/40-7090	AIM 65/40 Disk Operating System Version 1.0 (DOS 1.0) ROM
A65/40-7092	AIM 65/40 Bootstrap Disk Operating System Version 1.0 (BDOS 1.0) ROM

Software Options (5¼" Disks)

Part No.	Description
A65/40-7012	AIM 65/40 Macro Assembler and Linking Loader(1)
A65/40-7024	AIM 65/40 BASIC Compiler Disk(2)
A65/40-7052	AIM 65/40 FORTH Target Compiler(2)

Notes:
1. Requires RM 65 FDC Module (RM65-5101E) and A65/40-7092 BDOS 1.0 ROM.
2. Requires RM 65 FDC Module (RM65-5101E) and either A65/40-7090 DOS 1.0 or A65/40-7092 BDOS 1.0 ROM.

FUNCTIONAL DESCRIPTION

SINGLE BOARD COMPUTER (SBC) MODULE

The A65/40-1000 SBC Module contains an R6502 CPU, a 1 MHz clock circuit, on-board device decoders, interrupt request priority circuit, reset conditioning, and both PROM/ROM and RAM memory. On-board sockets accept up to 65K bytes of read-only and read/write memory. Up to 32K bytes of PROM/ROM and up to 48K bytes of RAM may be installed. All on-board memory may be enabled in 4K-byte blocks, yielding an optimal mix of on-board/off-board memory and I/O to be addressed. The RAM may also be write-protected in 8K-byte segments. Dual bank addressing allows an additional 56K bytes of memory or I/O to be accessed off-board.

The SBC module is connected by removable cables to the 40-Character Display and the Graphics Printer over identical Centronics type parallel handshaking interfaces. The SBC is also connected to the Standard Keyboard through a removable interface cable. These peripheral ports may be also used as general purpose bi-directional data ports with parallel, serial, interrupt, and timer capabilities controlled by user programming of two on-board R6522 Versatile Interface Adapter (VIA) devices.

A separate user-dedicated R6522 VIA interfaces with the Parallel I/O Connector. The high current drive capacity of the VIA's eight "B" port lines can directly drive many industry-standard devices, such as solid state relays. The RS-232C connector provides an interface that allows the SBC to function as a data set or data terminal. An Audio/TTY Connector interfaces to one or two audio cassette recorders and to a 20 mA current loop serial interface.

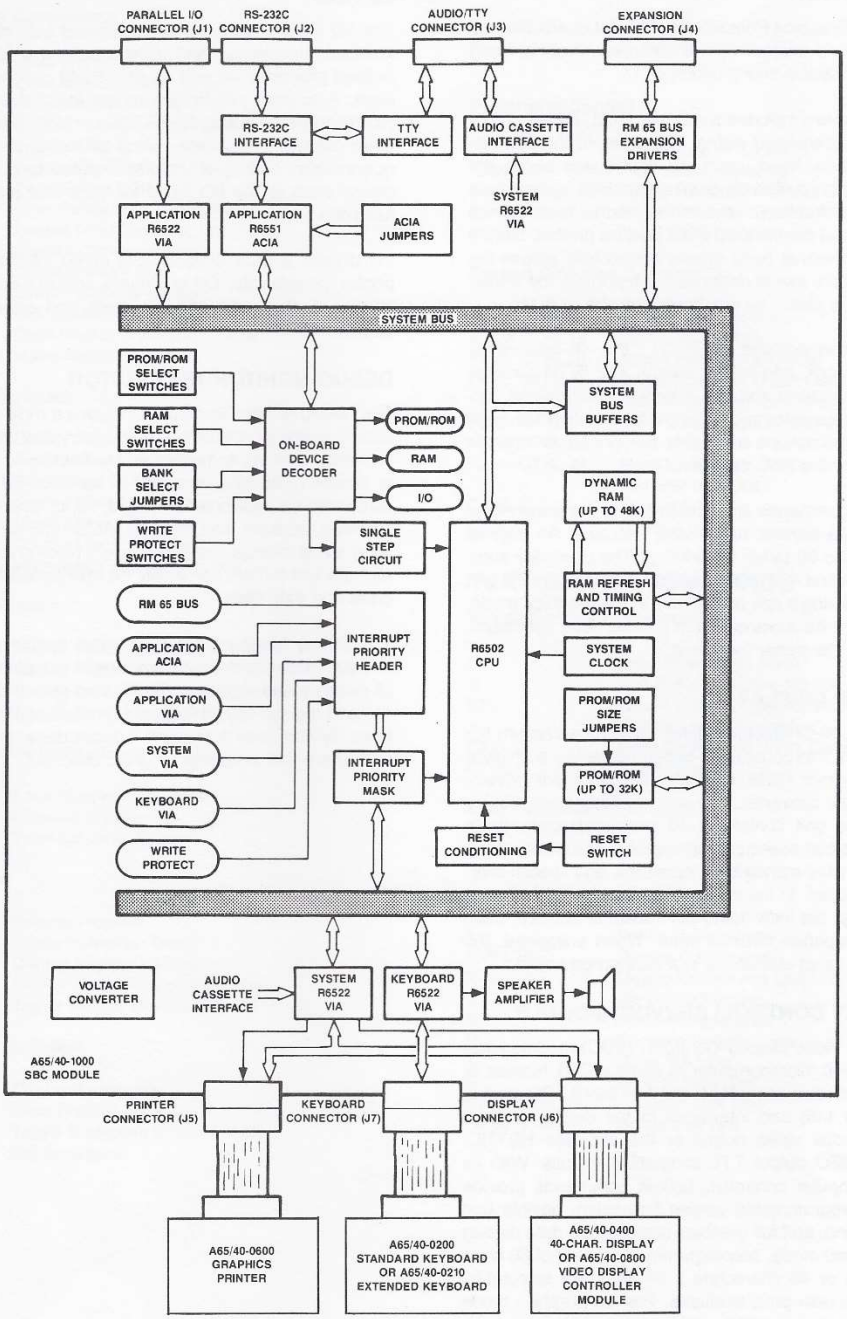
An Expansion Connector extends the system bus to Rockwell RM 65 bus compatible memory, I/O, or peripheral controller modules. Up to six levels of interrupt priority may be assigned to on-board and off-board peripherals.

STANDARD KEYBOARD

The A65/40-0200 Standard Keyboard is a full-size terminal style alphanumeric keyboard containing 66 momentary contact single pole single throw (SPST) keys and one locking SPST key. The keyboard has a complement of 63 momentary contact keys in an 8 x 9 matrix with nine positions unused. An ALL CAPS locking key is also in this matrix. Nine strobe and eight return lines are used to determine which key is pressed. Three momentary contact keys—RESET, ATTN, and PAPER FEED are outside of the keyboard matrix. These key switches have dedicated returns.

EXTENDED KEYBOARD

The A65/40-0210 Extended Keyboard has the added features of an industry standard numeric keyboard and cursor control keys.



AIM 65/40 System Block Diagram

GRAPHICS PRINTER

The A65/40-0600 Graphics Printer includes a dot matrix thermal printer mechanism, a microcomputer controller, thermal head drivers, and motor/strobe timing circuitry.

The printer mechanism includes a thermal head, platen, motor drive linkage, and associated wiring. There are 40 thermal elements on the thermal head, each of which spans seven dot fields; each element is a discrete point which rides against heat sensitive paper. Control logic turns on the thermal head drivers to heat the sensitized paper when a dot is to be printed. During a print cycle, the thermal head moves horizontally across the paper; when an entire row of dots has been printed, the printer motor advances the platen by one horizontal row of dots.

The printer controller includes an R6504 CPU, 4K-byte ROM, RAM, I/O, timer, clock, and reset circuitry. The ROM contains both the CPU instructions and the individual character bit patterns. The controller performs printer motor and thermal head timing and control functions to enable the printer to operate independently from the SBC module.

Data and control commands are transmitted to the printer over the Centronics type parallel handshake interface. An internal buffer accepts up to 80 bytes for printing. The controller automatically prints the first 40 7 x 8 dot-matrix characters in the text mode or after receiving a row of 280 dots in the graphics mode. The paper can also be advanced with a paper feed command, or manually using the paper feed switch.

40-CHARACTER DISPLAY

The A65/40-0400 40-Character Display contains a vacuum fluorescent display, a microprocessor-based controller, a 2K-byte character font/program ROM, character and segment drivers, and a DC/DC power converter. The vacuum fluorescent display is a single sealed unit containing 40 separately controllable digits. Each digit is composed of a 16-segment font which allows a full set of upper case alphabetics, numerics, and special characters to be displayed. In the semi-graphics mode, the 16 segments of each digit are individually controlled. In addition, each digit includes a separate decimal point. When energized, the digits form bright, crisp characters in a blue-green color.

VIDEO DISPLAY CONTROLLER (VDC) MODULE

The A65/40-0800 Video Display Controller (VDC) module interfaces the AIM 65/40 microcomputer to either a CRT monitor or TV receiver. The module connects to the AIM 65/40 SBC module display connector (J5) and interfaces to the display through either the composite video output or the separate HSYNC, VSYNC, and VIDEO output TTL compatible signals. With its integral microcomputer controller, built-in commands provide selectable and programmable screen formatting, flexible text handling and editing, and full graphics drawing and data display functions. In the text mode, preprogrammed formats of 80 characters x 24 lines or 40 characters x 24 lines are selectable. Other formats are user programmable. The full graphics mode incorporates bit mapping of 280 x 224 pixels, which is compatible with the Graphics Printer.

I/O ROM

The I/O ROM includes preprogrammed auto-start initialization, interrupt, input/output and utility functions which support user-defined programs as well as AIM 65/40 optional firmware/software. Auto-start initialization jumps to predetermined PROM/ROM addresses during RESET processing. The application program can assume direct control of the system for continued operation, or it can just initialize required functions, then return control back to the I/O ROM for continued auto-start of other functions.

I/O drivers directly support AIM 65/40 intelligent display and printer peripherals. Other drivers support the RS-232C/TTY interfaces, the audio cassette ports and control the on-board speaker.

DEBUG MONITOR/TEXT EDITOR

The Debug Monitor/Text Editor includes a wide selection of functions to simplify computer program entry and checkout. Text can be easily entered, edited, saved, and retrieved using either line or screen oriented commands in the Text Editor. A character cursor can be positioned left, right, up, or down to aid character insertion, addition, and deletion. Automatic and selective character string change capability makes block changes as desired. Multiple text buffers can easily be maintained for separate program and data files.

The Debug Monitor controls program execution in single step and run modes and allows convenient examination and altering of memory and registers. Single step operation allows instruction and register trace for detail examination of executed instructions. Symbol level debugging reduces dependence on absolute addresses and simplifies program checkout.

DEBUG MONITOR COMMANDS

Monitor Control Commands

CTRL RESET	Enter and Initialize Monitor (Cold Reset)
RESET	Enter Monitor (Warm Reset)
ATTN	Non-Maskable Interrupt
ESC	Escape to Monitor Command Level
E	Initialize Text Buffer and Enter Text Editor
C	Recover Text Buffer and Enter Text Editor
T	Reenter Text Editor
F1 - F8	Enter Function 1 - Function 8
+	Repeat Last Command
&	Execute Command String
O	Toggle Memory Bank
CTRL Z	Direct Peripheral Control
CTRL Z CTRL Z	SBC Module RAM Self Test
CTRL C	Clear Display And Home Cursor
CTRL N	Home Cursor

Display/Alter Registers

R	Display Register Contents
A	Display/Alter Accumulator
P	Display/Alter Processor Status
S	Display/Alter Stack Pointer
X	Display/Alter X Register
Y	Display/Alter Y Register
*	Display/Alter Program Counter

Display/Alter Memory

M	Display Selected Memory Contents
SPACE	Display Higher Memory Locations
–	Display Lower Memory Locations
/	Alter Current Memory Contents

Enter/Disassemble Instructions

I	Enter Mnemonic Instruction
K	Disassemble Memory
;	Enter Symbolic Address

Execution/Trace

G	Execute Program
Z	Toggle Instruction Trace
J	Display Register Heading
H	Display Jump and Branch History
V	Toggle Symbol Table On/Off

Breakpoint Manipulation

?	Display Breakpoints
#	Clear Breakpoints
4	Toggle Breakpoint Enable On/Off
B	Set Breakpoint

Load/Dump Memory

L	Load Memory
D	Dump Memory
F	Verify Memory

Peripheral Control

CTRL P	Toggle Auto-Print On/Off
PRINT	Print Display Contents
1	Toggle Recorder 1 Control On/Off
2	Toggle Recorder 2 Control On/Off
3	Verify Tape Checksum

Screen Oriented Commands

F1 (or CTRL Q)	Home Cursor on Line
F2 (or CTRL R)	Clear Line to Right
F3 (or CTRL S)	Toggle Insert Mode On/Off
F4 (or CTRL T)	Delete Character Under Cursor
F5 (or CTRL U)	Move Cursor Left (Left Arrow)
F6 (or CTRL V)	Move Cursor Right (Right Arrow)
F7 (or CTRL W)	Move Line/Cursor Down (Down Arrow)
F8 (or CTRL X)	Move Line/Cursor Up (Up Arrow)
CTRL A	Add (Insert) a Line
CTRL B	Break a Line
CTRL D	Delete a Line

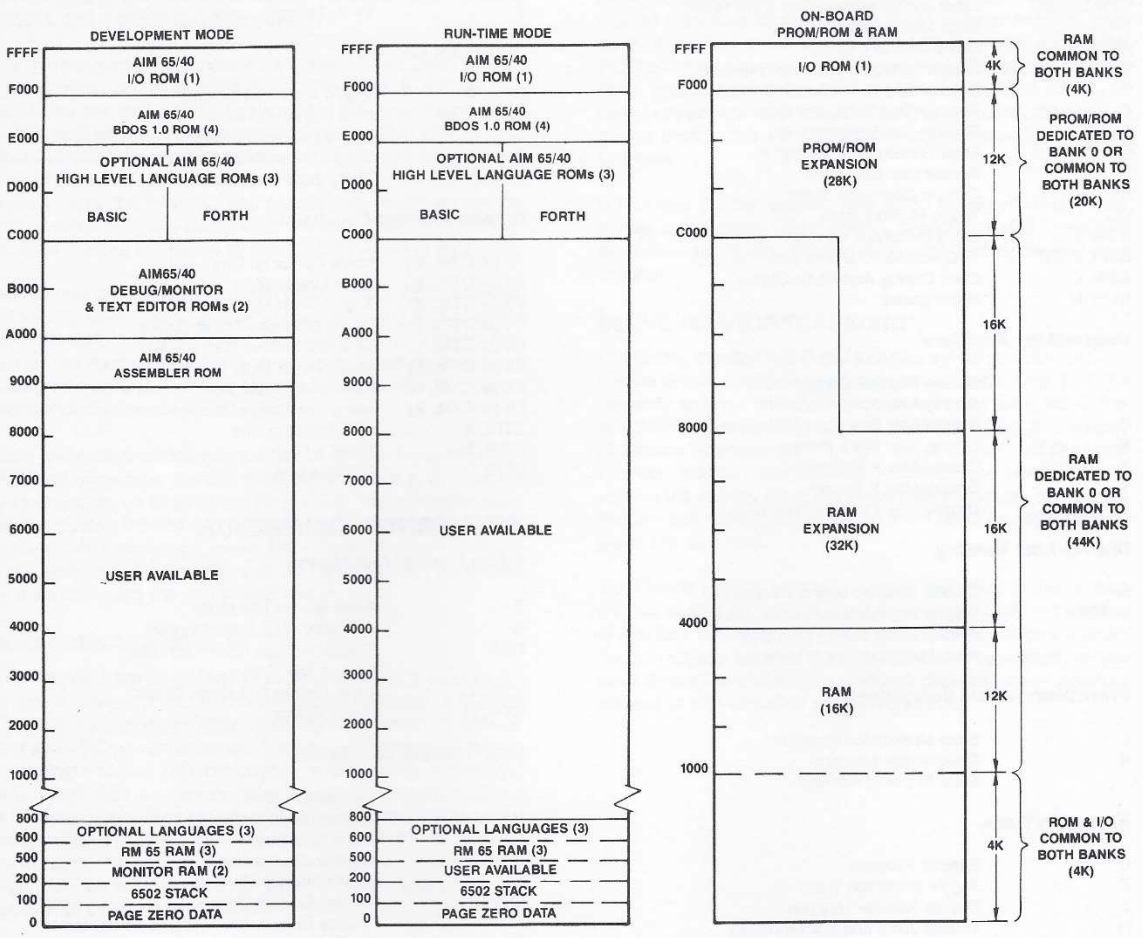
TEXT EDITOR COMMANDS

Editor Control Commands

S	Enter Screen Edit Mode
Q	Quit Editor and Enter Monitor
ESC	Return to Editor Command Level
+	Repeat Last Command
CTRL C	Clear Display and Home Cursor
CTRL N	Home Cursor

Line Oriented Commands

L	List Multiple Lines
R	Read Multiple Lines
I	Insert One Line
O	Overlay Current Line
K	Delete Multiple Lines
(SPACE)	Display Current Line
?	Display Current and Last Line Addresses
G	Go to Line Number
U	Go up Multiple Lines
D	Go down Multiple Lines
T	Go to Top Line
B	Go to Bottom Line
F7 (or CTRL W)	Go Down One Line
F8 (or CTRL X)	Go Up One Line



Notes:

(1) AIM 65/40 System peripheral I/O addresses are assigned to FF80-FFDF.

(2) User available during application program operation if the debug and text editor functions are not used.

(3) User available if the optional language and the RM 65 expansion module ROMs are not used.

(4) Requires RM65-5101E Floppy Disk Controller (FDC) module.

(5) 56K bytes of RAM (0 – $DFFF) is available for disk-based assembler/compilers and user programs. I/O ROM and BDOS 1.0 ROM require 8K bytes ($E000-$FFFF).

AIM 65/40 SBC Memory Map

SBC Module Connector J1 (Parallel Application) Pin Assignments

Pin	Signal	I/O	Type	Pin	Signal	Type
1	CB2	I/O	NMOS	2	NC/+5V*	Power
3	CB1	I/O	NMOS	4	GND	Power
5	PB7	I/O	NMOS	6	GND	Power
7	PB6	I/O	NMOS	8	GND	Power
9	PB5	I/O	NMOS	10	GND	Power
11	PB4	I/O	NMOS	12	GND	Power
13	PB3	I/O	NMOS	14	GND	Power
15	PB2	I/O	NMOS	16	GND	Power
17	PB1	I/O	NMOS	18	GND	Power
19	PB0	I/O	NMOS	20	GND	Power
21	PA7	I/O	NMOS	22	GND	Power
23	PA6	I/O	NMOS	24	GND	Power
25	PA5	I/O	NMOS	26	GND	Power
27	PA4	I/O	NMOS	28	GND	Power
29	PA3	I/O	NMOS	30	GND	Power
31	PA2	I/O	NMOS	32	GND	Power
33	PA1	I/O	NMOS	34	GND	Power
35	PA0	I/O	NMOS	36	GND	Power
37	CA2	I/O	NMOS	38	GND	Power
39	CA1	I	NMOS	40	NC/+5V*	Power

Note: *Pins 2 and 40 can be optionally jumpered to +5V (maximum current through each pin should not exceed 200 mA).

SBC Module Connector J2
(Serial Application) Pin Assignment

Pin	Signal	I/O	Type	Pin	Signal	I/O	Type
1	GND		Power	2	$\overline{TD}$	O	RS-232C
3	$\overline{RD}$	I	RS-232C	4	RTS	I/O	RS-232C
5	CTS	I/O	RS-232C	6	DSR	I/O	RS-232C
7	GND		Power	8	DCD	I/O	RS-232C
9	NC			10	NC		
11	NC			12	NC		
13	NC			14	NC		
15	NC			16	NC		
17	NC			18	NC		
19	NC			20	DTR	I/O	RS-232C
21	NC			22	NC		
23	NC			24	NC		
25	NC			26	NC		

SBC Module Connector J3
(Audio/TTY) Pin Assignments

Pin	Signal	I/O	Type	Pin	Signal	Type
1	TTY RTS	I	TTY	2	GND	Power
3	TTY TD	O	TTY	4	GND	Power
5	TTY RD	I	TTY	6	GND	Power
7	TTY RTN		Power	8	GND	Power
9	AUDIO OUT	I	TTL	10	GND	Power
11	AUDIO IN	O	TTL	12	GND	Power
13	CTRL 2 RTN	O	Relay	14	GND	Power
15	CTRL 2	I	Relay	16	GND	Power
17	CTRL 1 RTN	O	Relay	18	GND	Power
19	CTRL 1	I	Relay	20	GND	Power

SBC Module Connector J4 (RM 65 Bus) Pin Assignments

Bottom (Solder Side)					Top (Component Side)				
Pin	Signal Mnemonic	Signal Name	I/O	Type	Pin	Signal Mnemonic	Signal Name	I/O	Type
Wa		Not Connected		—	Wc		Not Connected		—
Xa	+5V	+5 Vdc Line (See Note)		Power	Xc	+5V	+5 Vdc (See Note)		Power
1a	GND	Ground		Power	1c	+5V	+5 Vdc		Power
2a	BADR/	Buffered Bank Address	O	3S TTL	2c	BA15/	Buffered Address Bit 15	O	3S TTL
3a	GND	Ground		Power	3c	BA14/	Buffered Address Bit 14	O	3S TTL
4a	BA13/	Buffered Address Bit 13	O	3S TTL	4c	BA12/	Buffered Address Bit 12	O	3S TTL
5a	BA11/	Buffered Address Bit 11	O	3S TTL	5c	GND	Ground		3S TTL
6a	BA10/	Buffered Address Bit 10	O	3S TTL	6c	BA9/	Buffered Address Bit 9	O	3S TTL
7a	BA8/	Buffered Address Bit 8	O	3S TTL	7c	BA7/	Buffered Address Bit 7	O	3S TTL
8a	GND	Ground		Power	8c	BA6/	Buffered Address Bit 6	O	3S TTL
9a	BA5/	Buffered Address Bit 5	O	3S TTL	9c	BA4/	Buffered Address Bit 4	O	3S TTL
10a	BA3/	Buffered Address Bit 3	O	3S TTL	10c	GND	Ground		Power
11a	BA2/	Buffered Address Bit 2	O	3S TTL	11c	BA1/	Buffered Address Bit 1	O	3S TTL
12a	BA0/	Buffered Address Bit 0	O	3S TTL	12c	BØ1	Buffered Phase 1 Clock	O	TP TTL
13a	GND	Ground		Power	13c	BSYNC	Buffered Sync		3S TTL
14a	BSO	Buffered Set Overflow	I	OC TTL	14c	BDRQ1/	*Buffered DMA Request 1		
15a	BRDY	Buffered Ready	I	OC TTL	15c	GND	Ground		Power
16a		*User Spare 1			16c	−12V/−V	*−12 Vdc/−V		
17a	+12V/+V	*+12 Vdc/+V			17c		*User Spare 2		
18a	GND	Ground Line		Power	18c	BFLT/	Buffered Bus Float	I	OC TTL
19a	BDMT/	*Buffered DMA Terminate			19c	BØ0	*Buffered External Phase 0 Clock		
20a		*User Spare 3			20c	GND	Ground		Power
21a	BR/$\overline{W}$/	Buffered Read/Write "Not"	O	3S TTL	21c	BDRQ2/	*Buffered DMA Request 2		
22a		*System Spare			22c	BR/$\overline{W}$	Buffered Read/Write	O	3S TTL
23a	GND	Ground		Power	23c	BACT/	Buffered Bus Active	I	OC TTL
24a	BIRQ/	Buffered Interrupt Request	I	OC TTL	24c	BNMI/	Buffered Non-Maskable Interrupt	I	OC TTL
25a	BØ2/	Buffered Phase 2 "Not" Clock	O	3S TTL	25c	GND	Ground		Power
26a	BØ2	Buffered Phase 2 Clock	O	3S TTL	26c	BRES/	Buffered Reset	O	OC TTL
27a	BD7/	Buffered Data Bit 7	I/O	3S TTL	27c	BD6/	Buffered Data Bit 6	I/O	3S TTL
28a	GND	Ground		Power	28c	BD5/	Buffered Data Bit 5	I/O	3S TTL
29a	BD4/	Buffered Data Bit 4	I/O	3S TTL	29c	BD3/	Buffered Data Bit 3	I/O	3S TTL
30a	BD2/	Buffered Data Bit 2	I/O	3S TTL	30c	GND	Ground		Power
31a	BD1/	Buffered Data Bit 1	I/O	3S TTL	31c	BD0/	Buffered Data Bit 0	I/O	3S TTL
32a	+5V	+5 Vdc		Power	32c	GND	Ground		Power
Ya	+5V	+5 Vdc (See Note)		Power	Yc	+5V	+5 Vdc (See Note)		Power
Za		Not Connected		—	Zc		Not Connected		—

Note: *Not used on the SBC. Signal name reflects RM 65 Bus reserved function.

SBC Module Connector J5 (Printer) Pin Assignments

Pin	R6522 Signal	R6522 I/O	Printer Signal	Printer I/O	Type	Pin	Signal	Type
1 (1)	+5V	O	+5V	O	Power	2	GND	Power
3	NC		NC		—	4	GND	Power
5	NC		NC		—	6	GND	Power
7	NC		NC		—	8	GND	Power
9	NC		NC		—	10	GND	Power
11	NC		NC		—	12	GND	Power
13	NC		NC		—	14	GND	Power
15	PAPER FEED (2)		PAPER FEED (2)		TTL	16	GND	Power
17	$\overline{\text{RES}}$	O	$\overline{\text{RES}}$	O	TTL	18	GND	Power
19	PB1	I/O	$\overline{\text{STROBE}}$	O	NMOS	20	GND	Power
21	PA7	I/O	Data 7	O	NMOS	22	GND	Power
23	PA6	I/O	Data 6	O	NMOS	24	GND	Power
25	PA5	I/O	Data 5	O	NMOS	26	GND	Power
27	PA4	I/O	Data 4	O	NMOS	28	GND	Power
29	PA3	I/O	Data 3	O	NMOS	30	GND	Power
31	PA2	I/O	Data 2	O	NMOS	32	GND	Power
33	PA1	I/O	Data 1	O	NMOS	34	GND	Power
35	PA0	I/O	Data 0	O	NMOS	36	GND	Power
37			$\overline{\text{NC}}$		—	38	GND	Power
39	CA2	I/O	$\overline{\text{ACK}}$	I	NMOS	40 (1)	+5V	Power

Notes: (1) Maximum +5V current through J5 should not exceed 200 mA per pin.
(2) Connected to J7-39 through jumper W3.

SBC Module Connector J6 (Display) Pin Assignments

Pin	R6522 Signal	R6522 I/O	Printer Signal	Printer I/O	Type	Pin	Signal	Type
1 (1)	+5V		+5V		Power	2	GND	Power
3	NC		NC		—	4	GND	Power
5	NC		NC		—	6	GND	Power
7	NC		NC		—	8	GND	Power
9	NC		NC		—	10	GND	Power
11	NC		NC		—	12	GND	Power
13	NC		NC		—	14	GND	Power
15	PAPER FEED (2)		PAPER FEED (2)	O	TTL	16	GND	Power
17	$\overline{\text{RES}}$		$\overline{\text{RES}}$	O	TTL	18	GND	Power
19	PB0	I/O	$\overline{\text{STROBE}}$	O	NMOS	20	GND	Power
21	PA7	I/O	Data 7	O	NMOS	22	GND	Power
23	PA6	I/O	Data 6	O	NMOS	24	GND	Power
25	PA5	I/O	Data 5	O	NMOS	26	GND	Power
27	PA4	I/O	Data 4	O	NMOS	28	GND	Power
29	PA3	I/O	Data 3	O	NMOS	30	GND	Power
31	PA2	I/O	Data 2	O	NMOS	32	GND	Power
33	PA1	I/O	Data 1	O	NMOS	34	GND	Power
35	PA0	I/O	Data 0	O	NMOS	36	GND	Power
37			$\overline{\text{NC}}$		—	38	GND	Power
39	CB2	I/O	$\overline{\text{ACK}}$	I	NMOS	40	+5V	Power

Notes: (1) Maximum +5V current through J6 should not exceed 200 mA per pin.
(2) Connected to J7-39 through jumper W3.

SBC Module Connector J7 (Keyboard) Pin Assignments

Pin	R6522 Signal	R6522 I/O	Keyboard Signal	Keyboard I/O	Type	Pin	Signal	Type
1 (2)	CB2	I/O	$\overline{RES}$	I	TTL	2 (1)	NC/+5V	Power
3 (3)	CB1	I/O	$\overline{ATTN}$	I	TTL	4	GND	Power
5	PB7	I/O	MSB7	O	NMOS	6	GND	Power
7	PB6	I/O	MSB6	O	NMOS	8	GND	Power
9	PB5	I/O	MSB5	O	NMOS	10	GND	Power
11	PB4	I/O	MSB4	O	NMOS	12	GND	Power
13	PB3	I/O	MSB3	O	NMOS	14	GND	Power
15	PB2	I/O	MSB2	O	NMOS	16	GND	Power
17	PB1	I/O	MSB1	O	NMOS	18	GND	Power
19	PB0	I/O	MSB0	O	NMOS	20	GND	Power
21	PA7	I/O	MRT7	I	NMOS	22	GND	Power
23	PA6	I/O	MRT6	I	NMOS	24	GND	Power
25	PA5	I/O	MRT5	I	NMOS	26	GND	Power
27	PA4	I/O	MRT4	I	NMOS	28	GND	Power
29	PA3	I/O	MRT3	I	NMOS	30	GND	Power
31	PA2	I/O	MRT2	I	NMOS	32	GND	Power
33	PA1	I/O	MRT1	I	NMOS	34	GND	Power
35	PA0	I/O	MRT0	I	NMOS	36	GND	Power
37	CA2	I/O	MSB8	I	NMOS	38	GND	Power
39 (4)	CA1	I	PAPER FEED	I	NMOS	40 (1)	NC/+5V	Power

Notes: (1) Pins 2 and 40 can be optionally jumpered to +5V (maximum current through each pin should not exceed 200 mA).
(2) Pin 1 can be optionally jumpered to the RESET circuit or to CB2.
(3) Pin 3 can be optionally jumpered to the $\overline{NMI}$ circuit or to CB1.
(4) Pin 39 can be optionally jumpered as PAPER FEED or to CA1.

NMOS INTERFACE (Input Voltage = +5.0V, TA = 25°C)

Symbol	Parameter	Min	Max	Unit
V_{IH}	Input High Voltage	2.4	5.0	V
V_{IL}	Input Low Voltage	−0.3	+0.4	V
I_{IH}	Input High Current (V_{IH} = 2.4V)	−100	−300	μA
I_{IL}	Input Low Current (V_{IL} = 0.4A)	−1.0	−1.6	mA
V_{OH}	Output High Voltage ($I_{LOAD} \leq -100A$)	2.4	5.0	V
V_{OL}	Output Low Voltage ($I_{LOAD} \leq -3$ mA)	—	0.4	V
I_{OH}	Output High Current (Sourcing) ($V_{OH} \geq 2.4V$)	−100	—	μA
	($V_{OH} \geq 1.5V$, VIA PB0-PB7 only)	−1.0	—	mA
I_{OL}	Output Low Current (Sinking) ($V_{OL} \leq 0.4V$)	1.6	—	mA

TTL — Industry standard LS TTL.
OC TTL — Industry standard Open Collector LS TTL.
3S TTL — Industry standard Tri-State LS TTL.
TP TTL — Industry standard Totem Pole LS TTL.

SPECIFICATIONS

Parameter	Value
Dimensions	
Width	11.85 in. (301 mm)
Length[1]	19.75 in. (502 mm)
Height[2]	4.6 in. (117 mm)
Shipping	
Size	12.5 in. (320 mm) × 16.5 in. (420 mm) × 15 in. (385 mm)
Weight	13.3 lb. (6 kg)
Weight	
With Printer	4 lb. 4 oz. (1.58 kg)
Without Printer	3 lb. 4 oz. (1.21 kg)
Environment	
Operating Temperature	
With Printer	0°C to 50°C
Without Printer	0°C to 70°C
Storage Temperature	
With Printer	0°C to 70°C
Without Printer	−25°C to 85°C
Relative Humidity	0% to 85% (without condensation)
Power Requirements	
With Printer	+5V ±5% regulated @ 2.6A (typ); 3.4A (max.); 3.4A (peak)[3] +24V (+3.6V, −2.6V) unregulated @ 2.5A (typ); 4.0A (max.); 6.3A (peak)[4]
Without Printer	+5V ±5% regulated @ 1.8A (typ); 2.4A (max); 2.4A (peak)[3]
Interface Connector	
J1 (Parallel Application)	40-pin edge connector (0.100 in. centers). Pre-drilled holes for installation of 40-pin 3M #3432-1002, or equivalent, mass terminated connector.
J2 (Serial Application)	26-pin edge connector (0.100 in. centers). Pre-drilled holes for installation of 25-pin AMP #206584-1, or equivalent, mass terminated connector.
J3 (Audio/TTY)	20-pin edge connector (0.100 in. centers). Pre-drilled holes for installation of 20-pin 3M #3492-1002, or equivalent, mass terminated connector.
J4 (RM 65 Expansion)	72-pin edge connector (0.100 in. centers). Pre-drilled holes for installation of a 64-pin DIN 41612 Euroconnector or 72-pin TI H42-51-11-36, or equivalent, connector to directly mate to one Rockwell RM 65 module.
J7 (Keyboard)	40-pin 3M #3495-1002, or equivalent. Mates with 3M #3418-0000T, or equivalent, ribbon cable connector.
J5 (Printer) and J6 (Keyboard)	40-pin 3M #3495-2002, or equivalent. Mates with 3M #3418-0000T, or equivalent, ribbon cable connector.

Notes:
1. Specified for 2 in. separation between keyboard and SBC modules. The length may be reduced if keyboard and SBC modules are overlapped/canted or may be extended by installation of a longer interface cable. A cable up to four feet in length may be installed.
2. Specified for the printer mounted to the SBC module on 1 in. standoffs. The printer may be mounted up to 2.5 in. above the SBC module using the installed 3 in. cable or may be installed to operate with a cable up to four feet in length.
3. Power requirements are specified for 8 PROM/ROM devices (32K bytes) 0.6A (typical) and 1.2A (maximum) total, and for 16 RAM devices (32K bytes) with 0.9A (typical) and 1.7A (maximum) total, installed.
4. +24V peak current specified as worst case with printer duty cycle of 75%. For most cases, a +24V 4A power supply is sufficient.

REFERENCE DOCUMENTS

The following product literature is available for further product information.

Order Number	Document Title
D74	A65/40-0200, A65/40-0210 Standard and Extended Keyboard Data Sheet
D76	A65/40-0400 40-Character Display Data Sheet
D75	A65/40-0600 Graphic Printer Data Sheet
D86	A65/40-0800 Video Display Controller Module Data Sheet
D77	A65/40-1000 Single Board Computer Module Data Sheet
D123	A65/40-7010 Assembler ROM
D128	A65/40-7012 Macro Assembler and Linking Loader
D120	A65/40-7020 BASIC Interpreter ROMs
D118	A65/40-7024 BASIC Compiler
D130	A65/40-7040 Math Package ROMs
D122	A65/40-7050 FORTH ROMs
D119	A65/40-7052 FORTH Target Compiler
D116	A65/40-7090 Disk Operating System Version 1.O ROM
D129	A65/40-7092 Bootstrap Disk Operating System Version 1.O ROM

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