



R6500 Microcomputer System PRODUCT DESCRIPTION

AIM 65 EXPANSION MOTHERBOARD

OVERVIEW

The AIM 65 Expansion Motherboard (Part No. A65-009) is used to extend the AIM 65 system bus to external add-on modules. Its five on-board connectors support all modules designed for Rockwell's SYSTEM 65 or Motorola's Exorcisor[®], as well as other modules offered by Rockwell, Motorola, Burr-Brown and a variety of other manufacturers.

The AIM 65 system bus lines (address, data and control) are buffered to provide ample drive capability. Address decode logic for mapping internal and external addresses in 4K-byte increments is also provided.

® "Exorcisor" is a registered trademark of Motorola, Inc.

FEATURES

- AIM 65 bus expansion
- Accepts up to five compatible modules
- Address selection in 4K-byte increments
- System bus lines are fully buffered
- DMA logic provided

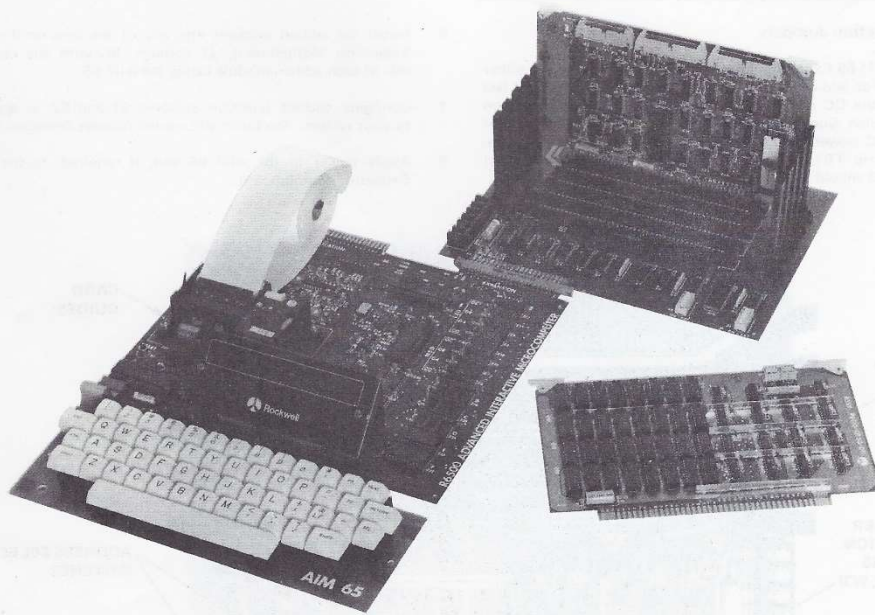
FUNCTIONAL DESCRIPTION

In reading the following text, refer to the attached schematic, PA00-X143.

The Address Bus lines A0-A15 and Control Bus lines $\overline{02}$, SYNC, R/W and $\overline{01}$ from the AIM 65 are buffered with 8T97 devices Z3, Z4, Z5 and Z6. The Data Bus lines D0-D7 are buffered and inverted with 8T26A devices Z1 and Z2. The address, data and R/W lines are controlled by the external DMA line. If DMA is high, the address, data and R/W buffers are enabled to drive. If DMA is low, these buffers are placed in the off state, allowing an external controller to drive the address, data and R/W lines. The remaining buffered lines, $\overline{01}$, $\overline{02}$ and SYNC, are unaffected by the state of DMA.

Control lines RDY, \overline{RES} , \overline{NMI} , \overline{IRQ} and S.O. are unbuffered, but are brought directly to the AIM 65 Expansion Connector.

Address decoding is provided on the AIM 65 Expansion Motherboard. Device Z10 (SN74159) is used to decode the four high-order address lines, A12-A15. The one-of-16 outputs are connected to a set of 16 switches, S1 and S2. When one or more of the switches are closed/opened, the decode logic (Z11, Z7, Z8 and Z9) enables/disables Data Bus drivers Z1 and Z2. The R/W line determines the direction of data flow.



AIM 65 EXPANSION MOTHERBOARD

SWITCHES AND JUMPERS

Internal/External Address Selection Switches

Sixteen switches on the AIM 65 Expansion Motherboard permit the user to define whether each 4K-byte portion of the system address space is internal or external to the AIM 65. When a switch is set to ON, its corresponding 4K address range is external (i.e., on the AIM 65 Expansion Motherboard). Conversely, when a switch is set to OFF, its corresponding 4K address range is internal (i.e., on the AIM 65 Microcomputer). Table 1 shows the address range corresponding to each switch on the Expansion Motherboard.

CAUTION

Be careful in assigning external address space, since it may conflict with internal functions of the AIM 65. See Section 7.3.2 of the AIM 65 User's Guide for AIM 65 address assignments.

Table 1. Address Selection Table

Switch	Address Range (Hex)
S2-1	0000 to 0FFF
-2	1000 to 1FFF
-3	2000 to 2FFF
-4	3000 to 3FFF
-5	4000 to 4FFF
-6	5000 to 5FFF
-7	6000 to 6FFF
-8	7000 to 7FFF
S1-8	8000 to 8FFF
-7	9000 to 9FFF
-6	A000 to AFFF
-5	B000 to BFFF
-4	C000 to CFFF
-3	D000 to DFFF
-2	E000 to EFFF
-1	F000 to FFFF

DC Power Selection Jumpers

Power for the AIM 65 Expansion Motherboard can be supplied in either of two ways. For add-on modules with current requirements of less than 0.5 amp, the DC power (+5, +12 and -12 Vdc) brought in on AIM 65 Expansion Connector J3 is adequate. For higher current requirements, DC power should be supplied through Expansion Connector power strip TB1, and Jumpers W1 (+5 Vdc), W2 (+12 Vdc) and W3 (-12 Vdc) should be removed.

Ø2 Clock Jumper

AIM 65 Expansion Motherboard connectors J2 through J6 provide the Ø2 clock on Pin J. This clock signal can be optionally provided on Pin L as well, by installing Jumper W4 on the Expansion Motherboard.

INSTALLATION

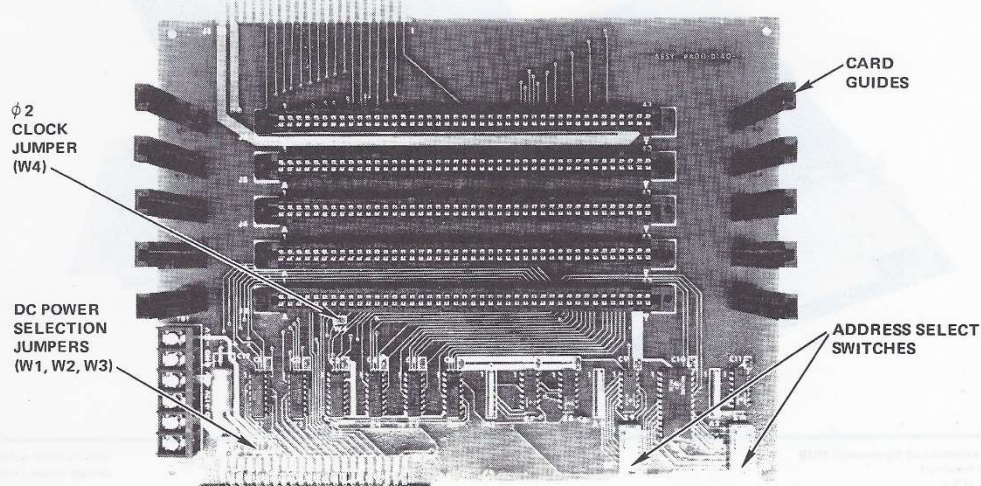
The following procedure should be used to install the AIM 65 Expansion Motherboard onto the AIM 65 Microcomputer:

1. Mount the ten supplied card guides on the AIM 65 Expansion Motherboard with the screws provided (two screws per guide), with one card guide on each end of connectors J2 through J6.
2. The kit includes five self-adhesive rubber feet. Install a rubber foot in each corner of the Expansion Motherboard, and one foot in the center.
3. Remove jumpers W1, W2 and W3, if required. See DC Power Selection Jumpers.
4. Certain add-on modules access the Ø2 clock on Pin L. Install Jumper W4 if your add-on modules have this requirement.
5. Connect Expansion Motherboard Connector P1 to AIM 65 Expansion Connector J3.

CAUTION

Never install or remove the AIM 65 Expansion Motherboard or add-on modules with system power on. It may cause damage to the AIM 65, the Expansion Module or the add-on module.

6. Install the add-on modules into any of the slots on the AIM 65 Expansion Motherboard, J2 through J6, with the component side of each add-on module facing the AIM 65.
7. Configure address selection Switches S1 and S2, as appropriate to your system. See Internal/External Address Selection Switches.
8. Apply power to the AIM 65 and, if required, to the AIM 65 Expansion Motherboard.



USING MULTIPLE EXPANSION MOTHERBOARD

Edge connector J1 on the AIM 65 Expansion Motherboard permits you to install additional Expansion Motherboards in your system. The pinouts on J1 are the same as on P1, except that the Data Bus signals are inverted on J1. Therefore, on each additional Expansion Motherboard the socketed Data Bus driver devices, Z1 and Z2, must be replaced with the 8T28 noninverting drivers before installing those Expansion Motherboards in the system.

Further, address selection switches S1 and S2 on the first Expansion Motherboard must have all external address ranges of its own, as well as all subsequent modules, selected. Similarly, the second Expansion Motherboard must have all external address ranges of its own and subsequent modules selected, and so on.

For example, consider a system with three AIM 65 Expansion Motherboards. In this system, addresses \$4000 through \$4FFF are dedicated to devices on Expansion Motherboard #1 (the Module connected to the AIM 65), addresses \$7000 through \$8FFF are dedicated to devices on Expansion Motherboard #2 and addresses \$9000 through \$9FFF are dedicated to devices on Expansion Motherboard #3. The switch settings for the three Expansion Motherboards are as follows:

- On Expansion Motherboard #1, Switches S2-5, S2-8, S1-8 and S1-7 must be ON; all other switches must be OFF.
- On Expansion Motherboard #2, Switches S2-8, S1-8, and S1-7 must be ON; all other switches must be OFF.
- On Expansion Motherboard #3, Switches S1-7 must be ON; all other switches must be OFF.

EXPANSION MOTHERBOARD PIN ASSIGNMENTS

Connectors P1 and J1

Connector P1, the interface to the AIM 65 microcomputer, is a 44-pin connector with pin assignments given in Table 2.

The same bus signals are extended out to Edge Connector J1 on the AIM 65 Expansion Motherboard except that the Data Bus signals D0 through D7 on connector pins 15 through 8 are presented in inverted form (D0-D7) on Connector J1.

Connectors J2 through J6

Table 3 shows the pin assignments for Connectors J1 through J6 on the AIM 65 Expansion Motherboard. Unused pin locations are inter-connected on Connectors J2 through J6.

Table 2. Pin Assignments for Connector P1

PIN	SIGNAL	PIN	SIGNAL
22	GND	Z	RAM R/W
21	+5V	Y	02
20	CSA	X	TEST
19	CS9	W	R/W
18	CS8	V	SYS R/W
17	+12V	U	SYS 02
16	-12V	T	A15
15	D0	S	A14
14	D1	R	A13
13	D2	P	A12
12	D3	N	A11
11	D4	M	A10
10	D5	L	A9
9	D6	K	A8
8	D7	J	A7
7	RES	H	A6
6	NMI	F	A5
5	S.O.	E	A4
4	IRQ	D	A3
3	01	C	A2
2	RDY	B	A1
1	SYNC	A	A0

Table 3. Pin Assignments for Connectors J2-J6

Pin No.	Name	Pin No.	Name	Pin No.	Name	Pin No.	Name
1	+5 VDC	23		A	+5 VDC	A	SYNC
2	+5 VDC	24	GND	B	+5 VDC	B	GND
3	+5 VDC	25		C	+5 VDC	C	S. O.
4		26	GND	D	IRQ	D	DMA
5	RES	27	RDY	E	NMI	E	
6	R/W	28	WP7*	F		F	
7	01	29	D1	H	GND	H	D3
8	GND	30	D5	J	02	J	D7
9	GND	31	D0	K	GND	K	D2
10	***	32	D4	L	(02)**	L	D6
11	-12 VDC	33	A15	M	-12 VDC	M	A14
12		34	A12	N		N	A13
13		35	A11	P		P	A10
14		36	A8	R		R	A9
15		37	A7	S		S	A6
16	+12 VDC	38	A4	T	+12 VDC	T	A5
17		39	A3	U		U	A2
18		40	A0	V		V	A1
19	WP4*	41	GND	W		W	GND
20	WP5*	42	GND	X	WP1*	X	GND
21		43	GND	Y	WP3*	Y	GND
22	WP6*			Z	WP2*		

*Tied directly to ground, disabling write-protect feature.

**If jumper W4 installed.

***3K pull-up RESISTOR to +5 VDC.

SPECIFICATIONS

Motherboard Dimensions:	11.3 in. x 8.95 in.
Expansion Capacity:	Five modules
Interfaces:	AIM 65 and SYSTEM 65 compatible
Edge Connectors:	44 pins on 0.156 in. centers
Expansion Connectors:	86 pins on 0.156 in. centers
Operating Temperature:	0°C to +70°C
Power Requirements (Module Only):	+5 Vdc $\pm 5\%$ @ 0.8 amp

LOGIC LEVELS

$T_A = 0^\circ\text{C}$ to $+70^\circ\text{C}$, $V_{CC} = +5\text{V} \pm 5\%$

Characteristic	Symbol	Min	Max	Unit	Conditions
Inputs					
A0-A15, D0-D7, $\bar{O}2$, $\bar{O}1$, SYNC, R/ \bar{W}	V_{IL}		0.8	V	$I_{IL} = -400 \mu\text{A}$
$\bar{D}0$ - $\bar{D}7$	V_{IH}	2.0	V_{CC}	V	$I_{IH} = 40 \mu\text{A}$
Outputs					
D0-D7	V_{OL}		0.5	V	$I_{OL} = 20 \text{ ma}$
	V_{OH}	2.4		V	$I_{OH} = -2 \text{ ma}$
$\bar{D}0$ - $\bar{D}7$	V_{OL}		0.5	V	$I_{OL} = 48 \text{ ma}$
	V_{OH}	2.4		V	$I_{OH} = 10 \text{ ma}$
A0-A15, $\bar{O}2$, $\bar{O}1$	V_{OL}		0.5	V	$I_{OL} = 48 \text{ ma}$
SYNC, R/ \bar{W}	V_{OH}	2.4		V	$I_{OH} = -5.2 \text{ ma}$



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