RNB ENTERPRISES
INCORPORATED
2967 W. Fairmount Avenue
hoenix AZ. 85017
(602)265-7564

VAK-1 USER MANUAL
PRELIMARY

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THE EXCLUSIVE ALTERNATIVE FOR QUALITY

GENERAL

The RNB VAK-1 is a motherboard for the KIM-1, SYM-1 and AIM65 microcomputers. You will now be able to add additional RAM, ROM, and I/O boards to your microcomputer.

The VAK-1 motherboard provides buffering and power distribution for up to 8 additional computer boards. When shipped, it is wired for use with the RNB heavy duty, regulated power supply. All RNB expansion boards are supplied ready for operation with the VAK-1 using this type of power supply. The older KIM-2 and KIM-3 were designed to operate from an unregulated 8V power supply. In order to use these older style memory boards one could remove Q1 (2N3055) and strap TP3 to TP4 on either KIM-2 or KIM-3.

It is also possible to add regulators VR1 and VR2 (See VAK-1 schematic) and operate the entire system from +8VDC. If a KIM-1 microcomputer is used, VR3 is needed to supply +12 for audio tape operation. When using unregulated power, regulators must be added to all VAK expansion boards used with this modified VAK-1.

Before using your VAK-1, it is necessary to assemble the card cage according to the enclosed instructions.

When installing expansion cards in the VAK-1 cage, always insert them so that the component side is facing the VAK-1 D.C. power connector.

For the DO-IT-YOURSELF fan, experimenter (universal) boards are available to fit the VAK-1 with wire-wrap socket holes, power distribution and bus buffers. Contact RNB Enterprises for further data.

The VAK-1 motherboard is covered by a 90 day factory warranty. Service is available at standard rates after your warranty expires.

THEORY OF OPERATION

The VAK-1 buffers address lines AB0 through AB15, Read/Write and Phase 2 clock lines using U7, U8, and U9 (8T95's). These buffers impose very light loads on the microcomputer board. However, they do provide considerable current drive for the expansion boards.

U6 (DP8304) is a non-symetrical bidirectional bus driver used on the eight data lines (DB0-DB8). It also loads the microcomputer bus lightly and drives the expansion boards with gusto.

Data bus control is accomplished by sensing the state of Pin 16 (Board Select) on each expansion board separately. Pin 16 is forced into the high state ("1") if the particular board is selected otherwise it remains low. The sensing is accomplished using U2 and U3 (SN74154's). When a board is removed from its socket on the motherboard the input to the 75154 will drop to a low state ("0"). This feature is unique to this IC type. The 75154's operate as inverters driving U4 (74S133). Consider U4 as a negative logic 9 input "OR" gate. If any of the 9 inputs drop to a low logic level, the output becomes high. This high level is used on the KIM-1 board to de-select any of its memory or I/O chips. The output of U4 is fed through jumper V to U and to pin K on the KIM-1 applications connector. This strap is not required on the SYM-1.

The output of U4 is also fed to the VAK-1 data bus drivers U6 via an inverter U5. A low on pin 9 of U6 enables the driver. Pin 11 of U6 controls the bus direction. A low on this pin causes data to flow from the expansion cards to the microcomputer.

U1 is provided to decode the address FFF8 through FFF. This is where the special vectors are located for interrupts and reset. In order to disable the VAK-1 system from every responding to these special addresses, install a jumper from R to S.

U10 (7417) is used to buffer and drive the NMI, IRQ and READY lines back to the microcomputer if they are received from expansion boards,.

Connectors have been provided on the motherboard for a current mode Teletype and an Audio Cassette. It is hoped that these connectors will be easier to use than the original method of connection. If the user has his peripherals already wired to a 44 pin edge connector, it may be plugged into the Auxiliary Application port on the VAK-1 motherboard.

ADDING VOLTAGE REGULATORS

Etched circuitry is provided for regulators (VR1, VR2, and VR3) so that the VAK-1 and the microcomputer board can be operated from the unregulated 8VDC and 16VDC. The regulators are installed standing up with their heat sink tabs fastened to the side of the card cage. Be sure to add the tantalum electrolytic capacitors C1-C6 otherwise oscillations may occur. Change jumper DE to EF and jumpers AB to BC.

VR3 is only needed with the KIM-1 microcomputer. In order to use it, change jumper HJ to JK. +8VDC is fed into the PWR connector on Pin 6. +5VDC is fed in on Pin 2. Therefore, it is possible to use both +5VDC (regulated) and +8VDC (unregulated) simultaneously if mixed expansion board types are used.

RMC JACK

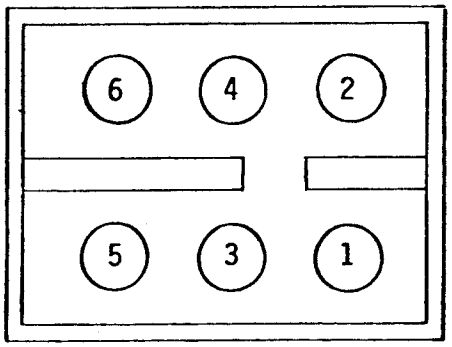
This jack has been provided for the remote start-stop (cassette) feature available from the SYM-1 board. Consult the SYM-1 manual for application information. Also remove any jumper on terminal J before using.

A-OUT JACK

The audio output jack is normally supplied strapped for low level output (jumper M-N). This is compatible with microphone inputs on most tape cassette recorders. If a higher level output is desired, change the jumper from M-N to N-P.

PWR Connector

(TOP VIEW)



1. +12 (or +16)
2. +5
3. GND
4. GND
5. -12 (or -16)
6. +8

CARD-CAGE ASSEMBLY

Take all the pieces out of the box and place them on a flat surface. Open the plastic bags containing the parts for the card-cage. Sort and separate all the pieces into seperate piles.

Please note: The long nylon pieces are the card-guides and that there is a top and a bottom to them, that may not be obvious at first. Looking at the side containing the groove, one end of the groove is flaired while the other is not. When following the assembly directions below, be sure that the flaired end is pointing away from the side of the end-plate containing the tabs that are used to mount the card-cage to the motherboard.

Take two of the extruded side-rails and attach them to one end of one of the end-plates using the self-tapping #6-32 screws and the lockwashers. Make sure that the mounting tabs protrude on the opposite side that the rails are mounted to. DO NOT TIGHTEN THE SCREWS. Twist the extrusions in such a manner that the flaired side faces the opposite sid of the end-plate. Now, slip on a 3/4" nylon spacer on each side-rail. Next, slip on one of the nylon card-guides on to both side-rails at the same time (a slight repositioning of the side-rails may be required). Now, slip a 1/2" nylon spacer on each side-rail, then another card-guide. Repeat the process of sliding on a 1/2" nylon spacer on each side-rail and then a nylon card-guide, until you have eight (8) card-guides in position.

After placing the 8th card-guide, slip on a 3/4" nylon spacer on each side-rail. Now, mount the other two (2) side-rails to the other end of the same end-plate. Next, mount the remaining spacers and card-guides in the same manner as the first side. Now, use the remaining self-tapping screws to mount the other end-plate to the four side-rails. Make sure the end-plates mounting tabs protrude from the opposite side of the side-rails. DO NOT TIGHTEN THE SCREWS AT THIS TIME.

Mount the card-cage to the motherboard using the standard #6-32 screws and KEPS NUTS as shown in the drawing. Mkae sure the head of the screws are on the bottom or solder-side of the motherboard and the nuts are on the top of the mounting tabs of the card-cage. DO NOT TIGHTEN THE SCREWS.

Insert an expansion board into the slot closest to the power connector of the card-cage/motherboard and into the edge-connector on the motherboard (this may require some repositioning of the card-cage). Now, gently press the top two side-rails together at the location of the inserted expansion board. Release and tighten the screws that hold the two side-rails on that end. Now, repeat the same process for the bottom two side-rails. Next, on the same side of the card-cage, tighten the mounting screw that is the closest to the back of the mother-board. Remove the expansion board from the motherboard and replace it into the slot that is the furtherest from the power connector, and repeat the same process.

Remove the expansion board from the card-cage and replace the board in the slot closest to the power connector. heck and see if the adjustment of the other side threw this side out of adjustment. If so, readjust and then check the other side. If not, tighten the last two screws.