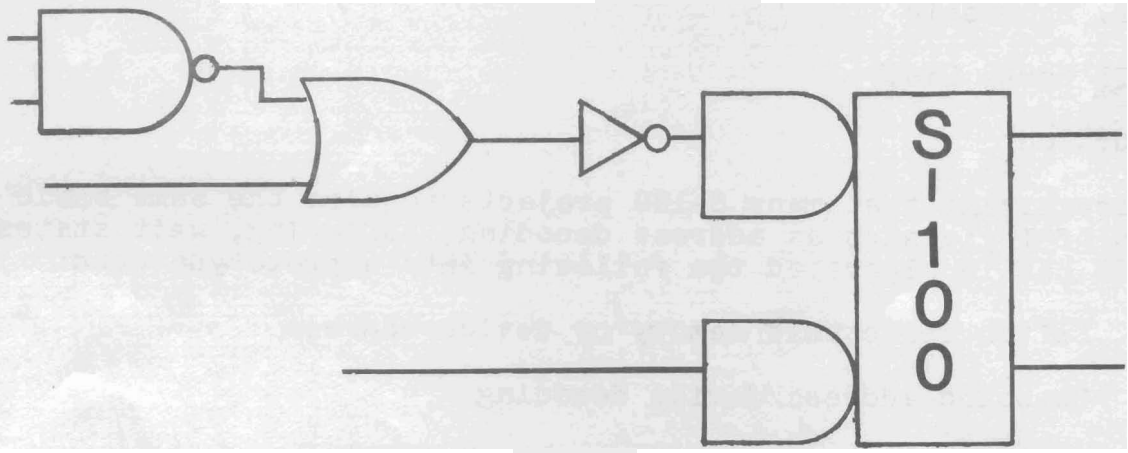
KLUGE CARD

User's Manual



ackerman digital systems, inc.

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Introduction

Recognizing that many S-100 projects require the same basic section of logic such as address decoding, buffering, wait states, etc. ADS has incorporated the following into a prototype card:

* Switch selectable memory or device address
* On-board address/device decoding
* Bi-directional address/data bus buffering
* Extended address decoding switch selectable

II Board Construction

1. Begin construction of the ads Kluge Card by first examining it for obvious shorts. If an ohmeter is available measure between address lines, data lines, and the +5 volt and ground for shorts.

2. Noting the orientation against the silk screen, install and solder the I/C sockets. No socket should be used for the dip switches S1, S2 and S3.

3. Carefully observing the polarized capacitors orientation against the silk screen, install and solder the capacitors.

4. Now install the Berg mini jump pins in all locations marked Jn where n is a number from 1 to 17. Because of default traces already on the P.C. board do not install Berg mini jump pins in locations J10 & J11. These traces enable U5 & U4 respectively from the On-board logic for 8 bit unidirectional data transfer. Now install three double mini jump pins in the area labeled "WAIT STATES". Next install a double row of mini jumps in the area labeled "DEVICE SELECT" and a second set in the area marked

"ADDRESS SELECT". Lastly install 16 triple mini jump pins in the holes with circular pads just to the left of the area labeled "BUFFERED ADDRESS".

5. The dip switches S1, S2, and S3 and resistor should be installed next. (Note the orientation of dip switches against the silk screen before soldering).

6. Now install the regulators and their heat sinks. Note that regulators UR3 & UR4 are for user applications only and may be omitted if you do not require the additional positive or negative supply. Heat sink compound should be used sparingly. The regulator fasten to the heat sinks and board with 6-32 x 3/8 screws and nuts.

7. Apply power to the board and verify that between 4.8 and 5.2 volts are available to the I/C sockets on the board, i.e. U1 thru U7, pin 20.

8. Remove power and install the I/C's (taking care not to bend any pins and/or reverse the I/C's in their sockets).

III. Configuring the Kluge Card

The ads Kluge Card was designed incorporating many jumper configurations to allow maximum flexibility. All jumpers labeled Jn where n is a number from 1 to 17 have tenth inch hole spacing to accommodate Berg style mini jumps. These were chosen in areas where the user may wish to alter configurations during bread boarding for testing purposes or future expansion. All jumpers marked JWn where n is a number from 1 to 7 are for hard wire configurations either by wire wrap or soldering. Also seven default traces have been added in copper on the P.C. board and indicated by an arrow on the silk screen. These are the least used jumpers and are further described below.

1. As mentioned above, there are seven arrow on the P.C. board silk screen pointing to copper default traces. The arrow by J10 & J11 connect the enable lines of U5 & U4 respectively to the on-board logic for 8 bit unidirectional data transfer. Pads and jumpers are available if you with to set up the board for 16 bit bidirectional data transfer. Simply cut the traces on the component side of the board and connect to your bread board logic for the correct enable signals. Note that the upper pad on J10 & J11 connects to the enable pin #19 on U5 & U4 respectively.

2. Next locate the two arrow near the top of U1 & U2. These arrow connect pin #1 of both I/C's to +5 volts fixing the direction of the address lines from the bus on to the board for use of the Kluge Card as a slave. Simply cutting these copper traces by the tip of the arrow and connecting them to ground or your appropriate logic will allow you to use the Kluge Card as a bus master or DMA controller. Note, pin #1 of U1 is not connected to pin #1 of U2, therefore two connections must be made if both traces are cut. A pad is located on the solder side of the board next to pin #1 of both U1 & U2 for your convenience.

3. Now locate the arrow near the bottom of U1 & U2. The tip of this arrow points to a default trace connecting the enable line pin #19 of both U1 & U2 to ground. This trace keeps both address buffers enabled regardless of their direction. If this trace is cut, Pin #19 of U1 or U2 must be connected to the appropriate bread board logic to enable these buffers when required.

4. A sixth arrow is located in the upper left corner of the Kluge Card near the WAIT STATE jumpers. This trace will default to zero wait states if uncut. If you feel that wait states might be required it is best to cut that trace and install a Berg mini jump over the zero wait state position or the position you feel you require. NOTE: only one mini jump should be installed at a time over the appropriate number of wait states. Installation of more than one Berg mini jump could result in damage to the board.

5. The seventh arrow is located on the left bottom edge of the board near J9. This default trace connects finger #53 to ground per the IEEE standard. Some systems such as the Northstar Horizon, use this finger on the S-100 bus for functions other than ground. If this is the case with your system simply cut the trace near the arrow head and that will remove ground from that finger. For future changes convenient pads are available on tenth inch centers for installation of a Berg mini jump to reconnect finger #53 to ground.

6. The seven jumpers labeled JWn on the schematic & silk screen are for hard wire connections either by soldering or wire wrapping. These are for specific user options and are indicated on the P.C. board by the use of rectangular pads on the P.C. board with the exception of JW6 & JW7. The purpose of these jumpers are listed below.

JW1--User option for use of on-board IRQ buffer to pINT finger #73 on S-100 bus.

JW2--User option for use of on-board IRQ buffer to NMI finger #12 on S-100 bus.

JW3--User option for use of on-board HOLD buffer to HOLD finger #74 on S-100 bus.

JW4--User option for use of on-board HOLD buffer to ERROR finger #98 on S-100 bus.

JW5--User option used in conjunction with J13 to bring mWRITE on-board.

JW6--User option to bring #16 volts to regulator VR3 when using a 7812 + 12 volt device.

JW7--User option to bring +8 volts to regulator VR3 when using a 7805 +5 volt device.

7. There are seventeen Berg mini jump connections labeled Jn where n is a number from 1 to 17 on the board silk screen and schematic. The description of these jumpers listed below used in conjunction with the schematic will explain how to configure the ads Kluge Card to your requirements.

J1---Disable A8 thru A15 address select logic allowing the board to be enabled with any address within the 64K address space.

J2---Enable A8 thru A15 address select allowing the user to select 256 byte blocks of memory within the 64K address range.

J3---Allows the user to bring in the AUX SELECT line to the address decode logic. This jumper is installed only if the user has on board logic for his specific address decode.

J4---Disable A8 thru A15 extended device slect. Installed when the user is using the board as an I/O port within the normal 256 port range.

J5---Enable A8 thru A15 extended device select. Installed when the user is using the board as an I/O port beyond the 256 port range.

J6---Disable A16 thru A23 extended address select. Installed when the user is using the board as a memory mapped board within the 64K boundry.

J7---Enable A16 thru A23 extended address select. Installed when the user is using the board as a memory mapped board beyond the 64K boundry.

J8---User option to bring on-board wait logic to pRDY finger #72 on the S-100 bus.

J9---User option to bring on-board wait logic to xRDY finger #12 on the S-100 bus.

J10--Default trace jumper as described in section 1 under this heading.

J11--Default trace jumper as described in section 1 under this heading.

J12--User option to bring pWR to on-board write enable logic.

J13--Used in conjunction with JW5 to bring mWRITE to on-board write enable logic.

J14--Configures direction of data out bus buffer U4 to transfer data from the S-100 bus to on-board pads labeled BDO. Used for normal 8 bit unidirectional data transfer.

J15--Configures direction of data out bus buffer U4 to transfer data from the on-board pads to the S-100 bus.

J16--Configures direction of data in bus buffer U5 to transfer data from the S-100 bus to the on-board pads labeled BDI.

J17--Configures direction of data in bus buffer U5 to transfer data from the on board pads to the S-100 bus. Used for normal 8 bit unidirectional data transfer.

IV. Address Decode and Defeat Logic

To allow even further flexibility the ADS Kluge card incorporates three dip switches for address and I/O select as well as 16 defeat jumpers allowing you to further decode address for your specific requirements.

1. Buffered address lines A0 thru A15 are available and labeled on the silk screen and can be easily identified by rectangular pads on the P.C. Board.

2. Located directly to the left of each set of buffered address lines are defeat jumpers which allow the user to use the on-board address decode logic. When these jumpers are installed such that they connect the center pad to the right most pad then that particular address line will be directed to the input of its comparator. The second input to the comparator will be the dip switch position. Dip switch S1 and the buffered address lines 0 thru 7 use U7 as their comparator. Dip switch S2 and the buffered address lines 8 thru 15 use U6 as their comparator. Moving the jumper so they connect the center pad with the left most pad of that address bit, will defeat, or prevent that address bit from affecting the comparison. NOTE: If you use the defeat jumpers you must switch the corresponding dip switch for that address bit to the zero or close position. One reason for including the defeat jumpers for instance is if your on board circuitry requires say four consecutive I/O ports, then you would defeat addresses A0 and A1 so the board will only respond to address lines A2 thru A7 regardless of the condition of A0 and A1. The same follows through if you use the board as a memory mapped card and defeat address line A8 thru A15 to generate address blocks.

3. To configure the Kluge Card as an I/O port install a mini jump between the two pads marked DEVICE SELECT on the P.C. board silk screen. Pads for DEVICE SELECT* are available for user applications but are not required for use of the on board Kluge Card circuitry. Next install jumper J4 if you are not using extended device select, or install jumper J5 if you will require the extended device select. Dip switch S2 controls the extended device slect. NOTE: jumpers J1 thru J3 and J6 & J7 are not used if the Kluge Card is configured as an I/O port.

4. To configure the Kluge Card as a memory mapped board install a mini jump between the two pads marked ADDRESS SELECT on the P.C. board silk screen. Pads for ADDRESS SELECT* are available for user applications but are not required for use of the on-board Kluge Card circuitry. Next install jumper J2 for address block select if you plan to use dip switch S2, or if you plan to use your own address decode, jumper J3 will allow input to the Kluge Card circuitry through the AUX SELECT pad on the P.C. board. Next jumper J6 should be installed if you are not using A16 thru A23 extended address select or install jumper J7 if you plan to use the extended address select.

5. If the three dip switches have been installed according to the silk screen egend, then switch position #1 will correspond to the least significant bit of that address range, and swich position #8 will correspond to the most significant bit of that address range. For instance switch #1 on S1 will correspond to address line A0 and Switch #8 on S2 will correspond to address line A15. Note that a closed switch represents logic "0" and an open switch represents logic "1.

V. Helpful Hints

To further enhance the flexibility of the Kluge card, many of the S-100 signals are brought out to pads for user applications and are described below.

1. Numerous buffered S-100 signals are brought out to pads labeled on the silk screen parts legend and preceded by the letter B to indicate they are buffered. These signals are used by the on-board logic as well as being available for user breadboarding.

2. Other S-100 signals which are not used by the on board logic are brought out to a pad near their S-100 finger. They can be easily identified by following the copper trace from the finger you are interested in using to the open pad.

3. Three additional buffered lines are available which are not defined S-100 signals though they can be useful. They are RESET*, BsMEMW* and MEMORY CYCLE*, which are best described by the logic on the schematic.

4. The following jumpers are used if you would like to configure the Kluge card as a 4K RAM card with zero wait states, set up for 8 bit unidirectional data transfer within the standard 64K address space.

a. No copper trace cuts are required as indicated by silk screen arrow.

b. No wire jumpers are required as indicated by JWn on the silk screen.

c. Use Berg mini jump for J2.

d. Use Berg mini jump for J6.

e. Install Berg mini jumps from center terminal to left terminal (Defeat) for address A8, A9, A10 & A11.

f. Install Berg mini jump from center terminal to right terminal for address A12, A13, A14 & A15.

g. Install Berg mini jump for "ADDR SELECT".'

h. Install Berg mini jump for J12 (pWR* option).

i. Install Berg mini jump for J14.

j. Install Berg mini jump for J 17.

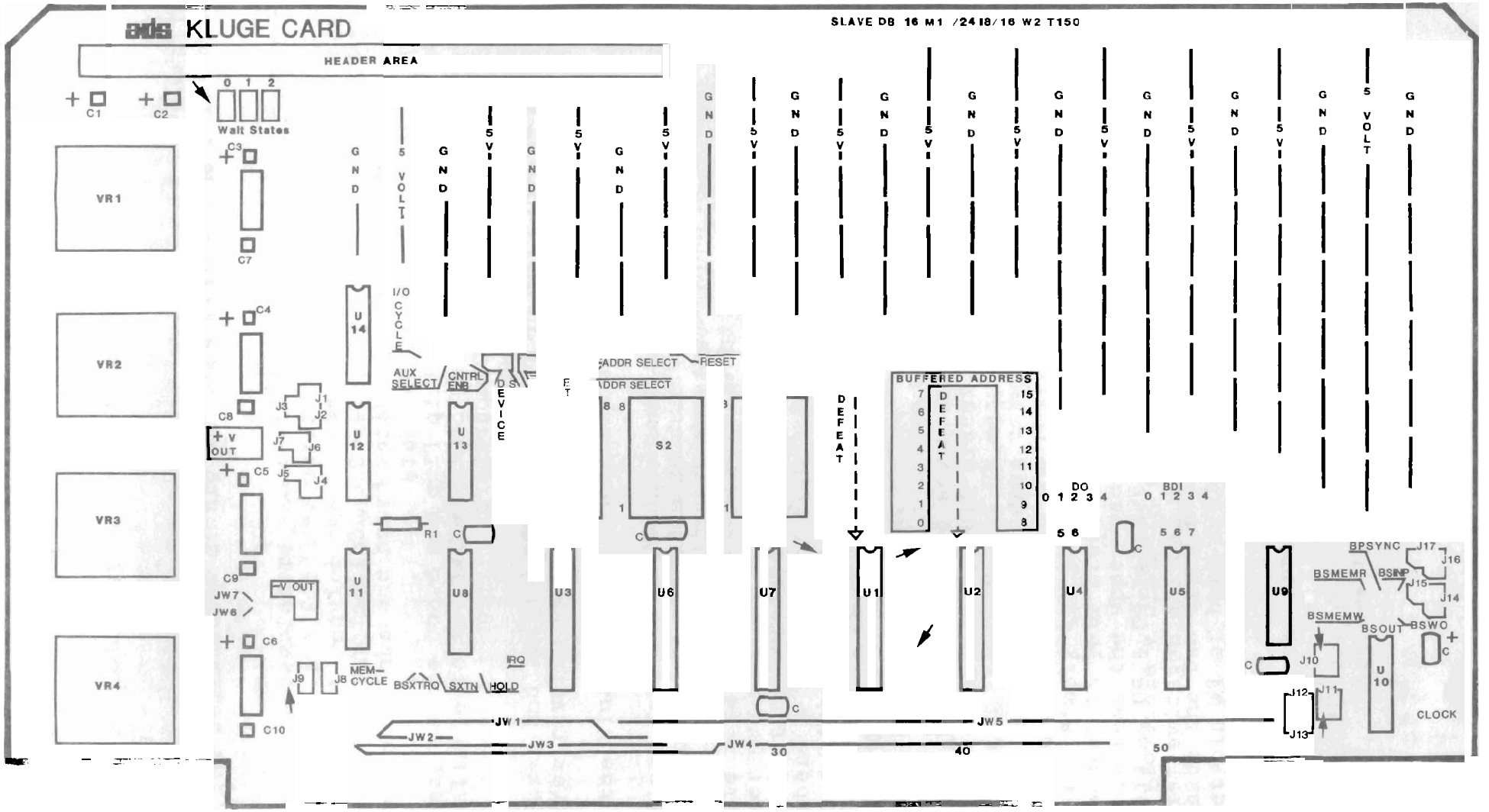
k. Use "BUFFERED ADDRESS" lines A0 through A9 for lower 1K select.

l. Use "BUFFERED ADDRESS" lines A10 & A11 for 1K block slect.

m. Use dip switch S2 positions #5 thrugh #8 for 4K board select.

n. Be sure dip switch S2 positions #1 thru #4 are in their closed position.

o. Dip switch S1 is not used when the board is configured in this manner.



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SCALE:

APPROVED BY

DRAWN BY D.H.S.

DATE: 5/5/81

REVISED

ads KLUGE CARD

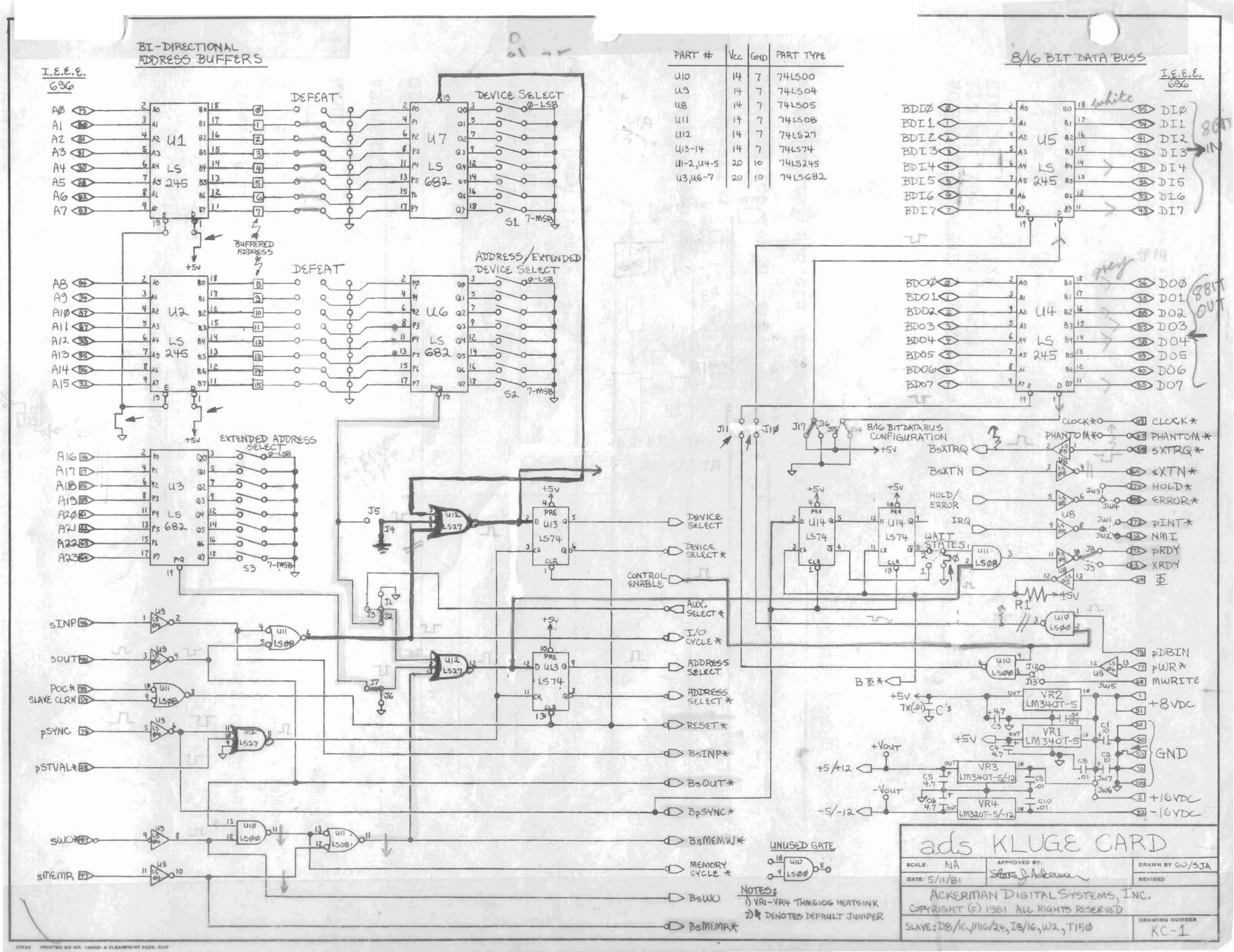
DRAWING NUMBER

ADS KLUGE CARD

PART LIST

PART	DESCRIPTION	QUANTITY	DESIGNATION
74LS00	Quad Nand Gate	1	U10
74LS04	Hex Inverter	1	U9
74LS05	Hex Inverter Open Collector	1	U8
74LS08	Quad and Gate	1	U11
74LS27	Triple Nor Gate	1	U12
74LS74	Dual D Flip Flop	2	U13 & U14
74LS245	Octal Tri State Buffer	4	U1,U2,U4 & U5
74LS682	Octal Comparaters	3	U3,U6 and &7
LM340T-5	5V 1A regulator	2	VR1 & VR2
LM340T	5V or 12 volt 1A reg.	1	VR3
LM320T	-5V or -12 volt 1A reg.	1	VR4
1K OHM	1/4 watt resistor	1	R1
.01 uf 25v	Ceramic disc capacitor	7	C's
.01 uf 25V	Ceramic disc capacitor	4	C7,C8,C9 & C10
4.7 uf 25V	Dip tantalum capacitor	4	C3,C4,C5 & C6
*10 uf 16v	Dip tantalum capacitor	2	C1 & C2
THM6106	Thermalloy Heat Sink	4	VR1,VR2,VR3 & VR4
14 pin I/C Sockets (solder tail)		7	U8,U9,U10,U11,U12 U13 & U14
20 Pin I/C sockets (solder tail)		7	U1,U2,U3,U4,U5,U6 & U7
BERG 65474001 Mini Jumpers		30	Consult manual
BERG 65507-136 Jumper Pins		3 rails	
8 position Dip Switch		3	S1, S2, & S3

* C1 & C2 may be substituted by one 33 uf 16 v electrolytic capacitor placing its positive terminal in C, + hole and the negative terminal in the C2- hole on the p.c. board



PART #	Vcc	GND	PART TYPE
U10	14	7	74LS00
U9	14	7	74LS04
U8	14	7	74LS05
U11	14	7	74LS08
U12	14	7	74LS27
U13-14	14	7	74LS74
U1-2,U4-5	20	10	74LS245
U3,U6-7	20	10	74LS682

NOTES:
1) VR1-VR4 THMG10G HEATSINK
2) ▮ DENOTED DEFAULT JUMPER