PCJr Combocard

A Serial or MIDI Port/XT Keyboard/2nd & 3rd Disk Drive/JR1000

Multi-function Adapter Card for Your PCJr

Version 2.3

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The PCJr Combocard integrates five PC/PCJr hardware modifications on a single printed circuit board.

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1.0 1. Introduction

The PCJr Combocard is a Serial or MIDI Port/XT Keyboard/2nd & 3rd Disk Drive/JR1000 Adaptor Card.

Heathkit fans, you should feel right at home with this one!

This five-function card includes the serial port modification defined by Michael Hackett in his JRSERIAL package, the XT keyboard modification defined by Bill Kirke in his JRXTKEY package, the 2nd & 3rd disk drive modifications defined by Paul Crumley in his 2NDDISK and 3RDDISK packages, the JR1000 modification defined by Glenn Buskirk in his Making Jr More Compatible package, and the RS232 to MIDI port conversion defined by Claude Bordeaux in his RS232MDI package. These modifications are all provided on one card that is plugged into the modem slot (J8) on the PCJr system board. Ribbon cables are used to supply the additional signals required from the system board and disk drive card.

Each of the first three of these added functions is entirely independent of the others, so that any combination of the three can be used. For example, if the second and third disk drive modifications have already been applied to the disk drive card there is no need to add the circuit components for these functions to the PCJr Combocard. The JR1000 function can only be added with the JRXTKEY and the 2nd & 3rd Disk Drive functions since it requires unused wires in the ribbon cables added as part of these features. The MIDI port modifiction converts the added serial port to a MIDI port so this function must be added with the serial port function.

1.1.1 The Original Packages

There is much technical information in the original packages which will not be duplicated in this package. I do recommend that you request these packages for review and future reference.

These packages are:

```
JRSERIAL   from HACKETT   at PK705VMG
JRXTKEY    from KIRKE     at RCHVMX
2NDDISK    from HAMMOND   at RCHVMP3
3RDDISK    from HAMMOND   at RCHVMP3
MODEMMOD   from HKENNEDY  at AUSVMV
JR1000     from MUSTANG   at YKTVMH3
RS232MDI   available on the PCTOOLSC disk
```

1.1.2 Silkscreen Artwork File and the Input File for Wintek's smARTWORK

The two files included with this package are:

```
COMBOSK PRTBIN   the silkscreen artwork file
JRCOMBO PCBBIN   the smARTWORK input file
```

To print the silkscreen file after it has been downloaded to a disk, use: copy /b
COMBOSK.PRT prn.

It will be helpful to refer to the silkscreen plot for component and connector
locations as you read section 3 of this package.

The JRCOMBO PCBBIN file is included so that you can modify the design using
Wintek's smARTWORK program if you wish.

Let's begin our adventure with a review of the components required for each func-
tion.

2.0 2. Parts List

Price references are from JDR Microdevices 1991 Catalog #11A

2.1.1 Serial Port Function

1 8250A	IC	$ 6.95	or use one from modem
1 74LS245	IC	$ .69	
1 75188	IC	$ 1.19	
1 75189	IC	$ 1.19	
1 75189	IC	$ 1.19	optional for ring indicate
1 OSC1.8432		$ 5.95	optional
2 14 Pin sockets		$ .22	
1 14 pin socket		$ .11	modified for OSC1.8432
1 20 pin socket		$ .18	
1 40 pin socket		$ .30	
1 4.7K 1/4w		$ .05	R1
2 10K 1/4w		$ .10	R2, R3
5 0.1 uF monolithic caps		$ .60	C1-C5
2 micro-clips		$ 1.19	RS 270-336 or eq.
2 2-pin male headers		$ .NC	cut from 40 pin header
2 shorting blocks		$ .40	
1 DB09 connector		$ .45	J3, JDR DB09PRS, or use I/O cable
1 box connector strip		$.??	J6, if available, or use wire and micro-clip

Serial Port total	$20.76	or $6.67 w/o 8250A IC and optional items

2.1.2 Optional Serial Port & Keyboard I/O Cable

This cable replaces the DIN keyboard and DB09 serial port connectors on the rear
edge of the card and eliminates the requirement to modify the case for access to
these connectors.

1 2x10 header	$ 2.49	J Option
1 20 IDC socket	$ .65	
1 cable mounted DIN	$ 1.69	RS274-006 or eq
1 IDB09P	$ 1.39	
1 ft 20 ribbon cable	$ .38	

Cable total	$ 6.60

2.1.3 XT Keyboard Adapter Function

20 1	74LS322	IC	$ 1.49	
16 1	74LS175	IC	$ .39	
14 1	74LS04	IC *74504*	$ .25	
14 1	74LS20	IC	$ .25	
14 1	74S74	IC *74LS74 also*	$ .49	
14 1	7407	IC *7406*	$ .35	
1	8255A-5	IC	$ 2.95	or use original from Jr
2 4	14 pin sockets		$ .44	
1 1	16 pin socket		$ .12	
1	20 pin socket		$ .18	
2	40 pin sockets		$ .60	
2	40 pin IDC dip plugs		$ 2.38	
1	ft 40 ribbon cable		$ .60	
2	LED's		$ .20	
2	micro-clips		$ 1.19	RS 270-336 or eq.
2 2	150, 1/4w *1/2w*		$ .10	R10, R11
5 5	4.7K, 1/4w *+ 1/2w*		$ .10	R5, R6, R7, R8, R9
4	47 pF caps		$ .20	cl's
4	.01 uF monolithic caps		$ .42	c's
4	.1 uf monolithic caps		$ .54	C's
1	DIN connector *cable mounted*		$ .59	J4, JDR DIN-5S, or use I/O cable

XT Keyboard total $13.83 or $10.88 w/o 8255A-5 IC
plus keyboard of your choice

2.1.4 2nd & 3rd Disk Drive Functions

1	74LS15	IC	$ .39	
1	7437 *7438*	IC	$ .49	
2	8 pin sockets		$ .22	J1 and Diskette card connector
1	14 pin socket		$ .11	
1	16 pin socket		$ .12	
1	.1 uF monolithic cap		$ .18	C
1	2x40 header		$ 2.49	J2 *use 2x10*
2	8 pin IDC dip plugs		$ .98	
2	34 IDC sockets		$ 1.50	
1	20 IDC socket		$ .65	
3	34 IDC edge card		$ 2.67	for three drives
4	ft 34 ribbon cable		$ 2.04	
1	ft 8 ribbon cable		$ .15	

2nd & 3rd Disk Drive total $11.99 plus drives, power supply
& enclosure of your choice

2.1.5 JR1000 Function

```
                    1 74F86    IC        $ .49
                    1 16 pin socket      $ .12
                    4 micro-clips        $ 2.38  RS 270-336 or eq.
                    1 1.0K, 1/4w resistor $ .05
                    1 SPST switch        $ 1.25  toggle or
                                                 push on/push off

                        JR1000 total $ 4.29  plus keyboard and disk
                                             drive functions added
```

2.1.6 MIDI Function

```
                    1 7407     IC        $ .49
                    1 74123    IC        $ .49
                    1 MCT-6              $ 1.29
                    1 OSC2.0             $ 5.95
                    2 IN4148 Diodes      $ .10   D1, D2
                    2 LED's, green       $ .28   D3, D4
                    1 LED, red           $ .10   D5
                    1  8 pin socket      $ .11
                    2 14 pin sockets     $ .22
                    2 16 pin sockets     $ .24
                    4 .1 uF monolithic caps $ .40  C1, C2, C4, C5
                    1 100 uF electro cap $ .19   C3
                    6 DIN jacks          $10.14  I/O cable, RS 274-006 or eq.
                    1 2x10 header        $ 2.49  I/O cable connection
                    1 20 IDC socket      $ .65   I/O cable connector
                    2 ft 20 ribbon cable $ .60   I/O cable
                    1 220, resistor network $ 1.09  R1-R8
                    4 220,  1/4w resistors $ .20  R12, R13, R16, R17
                    6 4.7K, 1/4w resistors $ .30  R9-R11, R14, R15, R18
                    1 330,  1/4w resistor $ .05  R19
                    1 SPDT switch        $ 1.50  toggle

                        MIDI total $26.88  plus JrSerial function
                                           added
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```
           Total project cost is cost of above components plus

                1 empty PCJr Combocard    $xx.xx  TBD
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3.0 3. The PCJr Combocard Design

The original printed circuit card for this project was designed to be an exact physical replacement for the IBM internal modem card. The area of this card provided ample room for four of the modifications noted above. Taken together, these provided much additional PC compatibility to the PCJr. These modifications had been built and verified by many PCJr owners, so they made good candidates for integration on a single printed circuit card. At design level 2.0 the card was expanded slightly to accomidate the circuits necessary to convert the serial port to a MIDI port, a reversible conversion.

This is a two-sided card design with plated through holes required for pass through connections. The metal pads for all IC socket pins, except pin 1, all connector pins, and all pass through connections, are round. The pin-1 pads, and all pads where resistors or capacitors will be connected are square.

The components and wiring for Mike Hackett's serial port modification are located just above the card's edge connector. Seven lines run to a DB09 connector on the top rear corner of the card at J3. These lines are wired to the nine-pin connector as shown in Hank Kennedy's instructions for converting the internal modem to serial port 1. The -12 volt line is wired external to the card. Bill Kirke suggested adding a 1.8 MHz oscillator to the serial port circuits so that this new port will be XT compatible at the hardware level. Bill provided schematics for an optional 1.8 MHz oscillator and I have incorporated his circuit in the PCJr Combocard layout. I have also added the wiring necessary to support a ring indicate function for this serial port.

Bill Kirke's XT keyboard interface circuits are located on the rear half of the card. All connections between these circuits and the system board are made using a 40 wire ribbon cable with 40 pin IDC dip plugs at each end. One end plugs into the 40 pin IC socket at J5 and the other end is mounted piggyback on the 8255A-5 IC at location ZM22 on the system board. The 8255A-5 must be removed from the system board and a 40 pin socket installed in it's place. Hank Kennedy suggested that system units with daughter cards installed under the disk drive may not have room for this piggyback connection at the 8255A-5 IC. We will deal with this complication during construction of the 40 wire ribbon cable. Wires 34 and 36 of the ribbon cable extend beyond the piggybacked dip plug and are used to connect pclk and IRQ1 from the system board to this interface. These are the only signals required by Bill's modification that are not available at the pins of the 8255A-5 IC. Wires 35, 37, 38, and 39 will be used in a similiar manner to provide signals to the JR1000 modification if that is also added. A standard five-pin DIN keyboard connector is located on the bottom rear corner of the card at J4.

The components and most of the wiring for Paul Crumley's 2nd & 3rd disk drive modifications are located near the lower edge of the card just to the rear of the edge connector. Paul's 2nd & 3rd disk drive modifications require adding two dip sockets, a capacitor and twelve wires to the disk drive card. This PCJr Combocard implementation of his circuits requires the addition of only three wires and an 8 pin dip socket to the disk drive card. An 8 wire ribbon cable brings three signals from

the disk drive card to J1, and an extension of the 34 wire disk drive cable is connected to the header at J2 to pick up the four new signals required for the added drives.

Because extra space was available, I chose to add the 74F86 IC and the wiring for Glenn Buskirk's JR1000 modification to this card. +5, ground and the signal from pin 20 of the 8255A-5 are already available on the card. Fo ur wires in the 40 wire ribbon cable are used to bring the required signals from ZM30, ZM31, and a system board via to the card, and two wires in the 8 wire ribbon cable are used to wire a switch on the front of the Jr cabinet to the JR1000 circuits.

To provide access for the keyboard and serial port cables to their respective connectors, the existing phone line opening in the rear of the PCJr cabinet must be modified. Using the optional I/O ribbon cable, originally suggested by Hank Kennedy, eliminates the need for this cabinet modification.

The circuits defined by Claude Bordeaux to convert an RS232 port to a MIDI port are located at the very front of the card. LED's D3, D4, and D5 can be mounted so that they are visible through the slots at the front of the Jr case. Use of this circuit requires that a 2.00 MHz oscillator be provided in place of the 1.8432 MHz oscillator normally used in the OSC1.8 socket of the serial port section of the card. A 20 wire ribbon cable connects the MIDI signals from six MIDI DIN connectors to a 2x10 header on the Combocard. At this time, I do not know of anyone who has successfully built and verified this modification to an RS232 port.

Do not let the length of this document intimidate you. I have tried to provide exact detail for each work item which has to be accomplished so that a PC novice can learn by building this project. The cost is relatively low and there is much to be learned so jump right in.

4.0 4. Serial Port Construction Details

At this point I recommend that you spend a few minutes to review the remainder of these instructions and decide which functions you wish to add to your PCJr before you add any components to your card. I also recommend that you complete the PCJr cabinet modifications described in section 5 and test fit the card with the DB09 and DIN connectors attached into the modified cabinet before you add the IC's to the sockets on the card.

4.1.1 Install Components on the PCJr Combocard

Let the fun begin!

( ) Position the card on your work bench, solder side down with the edge connector on the right.

( ) Check your card with an ohmmeter between +5VTP and GNDTP to insure that there are no Vdd to ground shorts on the card.

( ) Check the physical fit of your card in Jr by installing it in the modem position. The edge connector should fit properly in the modem (J8) connector on the system board and the rear edge of the card should not bind on the inside of the Jr cabinet. My Texion cards required sanding of the rear edge of the card back to the edge of the wide shield line on the solder side of the card so that they would fit without binding.

( ) With the card in place, Jr should power-up normally.

( ) Remove the card from Jr and return it to the work bench.

( ) Place a copy of the silk screen plot on your bench. You will need the silk screen plot to locate component positions.

( ) Position a 40 pin IC socket on the card at the 8250A location.

( ) Insure that pin 1 is in the hole with the square pad and solder 40 pins in place.

( ) Position a 20 pin IC socket on the card at the 74LS245 location, insure that pin 1 is in the hole with the square pad and solder 20 pins in place.

( ) Position 14 pin sockets at the 75188 and 75189 locations, check the pin 1 positions, and solder the 28 pins in place.

( ) Take a 14 pin socket and remove pins 2, 3, 4, 5, 6, 9, 10, 11, 12, and 13. Push the pins out the top or cut then flush with the bottom of the socket.

( ) Position this modified 14 pin socket at the OSC1.8 location, check the pin 1 position, space the socket above the card so that cut pins do not contact traces under the socket, and solder the 4 pins in place.

( ) Place a 4.7K ohm resistor at the R1 location. Check to insure that the resistor leads are in holes with square pads and solder the resistor in place.

( )   Place 10K ohm resistors at locations R2 and R3. Check to insure that the resistor leads are in holes with square pads and solder the resistors in place.

( )   Place 0.1 uF capacitors at the locations marked C1, C2, C3, C4, and C5. Check to insure that the capacitor leads are in holes with square pads and solder the capacitors in place.

( ) Cut two 2x1 headers from a 2x40 header.

( ) Place one 2x1 header at the location marked SB1 directly above the A12 edge connector land. Check to insure that the two pins are in holes with square pads and solder in place.

( ) Place one 2x1 header at the location marked SB2 directly below R1. Check to insure that the two pins are in holes with square pads and solder in place.

( ) If you have chosen to use the optional I/O cable, cut a 2x10 header from a 2x40 header. Count five pins in from one end and cut the #5 and #4 pins out of each row both above and below the plastic. This will leave one group of 2x5 pins and one group of 2x3 pins.

( ) Place the modified 2x10 header at the J OPTION location and solder in place.

( ) If you are using the I/O cable, skip the following three steps.

( ) Place the DB09 connector at the J3 location and mark the centers of the two mounting screws.

( ) Remove the DB09 connector and drill two .110″ holes for the mounting screws.

( ) Place the DB09 connector at the J3 location, secure it with two 4-40 screws, and solder nine pins in place.

( ) Place the box connector strip at the J6 location and solder in place.

( ) If the box connector is not available, solder a micro clip to a 4 inch piece of insulated wire, and solder the free end of the wire into the hole marked S > near the J6 location.

( ) Solder a micro clip to a 7.25 inch piece of insulated wire, and solder the free end of the wire into the hole marked < -12 at the top front of the card.

( ) Inspect all of the solder joints you have just made for shorts to adjacent wires.

( ) Check you card with an ohmmeter between + 5VTP and GNDTP to insure that there are no + 5 to Gnd shorts on the card now.

( ) Place the card in the PCJr modem slot, Jr should power-up normally.

This completes the soldering required for the Serial Port Function.

I recommend that you now proceed to install the sockets and components required for the other functions you plan to include before you add any IC's to your card.

4.1.2 Install IC's and Check Out

( ) Install the 75188 IC in it's socket.

( ) Install the 75189 IC in it's socket.

( ) Install the 8250A IC in it's socket.

( ) Install the 74LS245 IC in it's socket.

( ) Check each IC for proper orientation, the end of the IC with the notch or small round dot over pin 1 must be located at the end of the socket with the notch.

( ) Place a shorting block over the two pins of SB1.

( ) If you are going to use the Jr's internal oscillator place a shorting block over the two pins of SB2.

( ) If you are going to use the optional 1.8432 oscillator, DO NOT place a shorting block at SB2, instead install the OSC1.8432 in the OSC1.8 socket.

( ) Using an ohmmeter measure the resistance from +5VTP to GNDVTP. For the IC's I used this resistance measured about 25 ohms. The purpose of this test is to insure that there are no +5 to GND shorts before installing the card in your system.

( ) If you are using the optional I/O cable place the 20 pin IDC socket on the 2x10 header at the J OPTION location. The #1 wire is closest to the top of the card with the cable pointing toward the front of the card.

( ) Install the Combocard in the modem slot. If your card uses the box connector at J6 carefully align this with the 2 pin header on the system board.

( ) Position the I/O cable in the slot cut in the lip of the Jr case and out the rear of Jr if you are using the I/O cable.

( ) If you used a wire and micro-clip instead of the box connector, attach the microclip to one of the pins of the 2 pin header at the rear of the system board.

( ) Connect the micro-clip on the wire from the <-12 point on the top front of the card to pin 10 of the power supply card. Pin 10 in the rearmost contact of the card's edge connector. I cut a single pin from a 2x40 header and soldered it into the through hole at this pad then attached the micro-clip to this pin.

( ) Attach a serial device, which you have verified works properly on the original Jr serial port, to the DB09 connector of your new serial port.

( ) Your Jr should now boot normally and the serial device attached to the new serial port should function properly. This new port is COM1 addressed at 3F8 and the system board serial port is COM2 addressed at 2F8.

4.1.3 Install the Ring Indicate Option

Ring indicate is not supported by the PCJr serial port. Hank Kennedy suggested that the Combocard provide a ring indicate option for the added serial port. If you desire to add this option, a second 75189 IC will be piggybacked on the first 75189 IC and two jumper wires will connect two pins of this second IC to adjacent wiring on the Combocard.

( ) Remove the first 75189 from it's socket.

( ) Take the second 75189 and cut off the following pins which will not be used: 2, 4, 5, 6, 8, 9, 10, 11, 12, and 13.

( ) Bend pins 1 and 3 so they point straight up from the sides of the IC.

( ) Bend pins 7 and 14 out slightly so that this IC will sit squarely on top of the first IC.

( ) Place the modified IC on top of the first IC, check the notch or dimple at the ends of the IC's to insure they are aligned properly.

( ) Carefully align pin 7 to pin 7 and solder the two pins together. Also align pin 14 to pin 14 and solder these two pins together.

( ) Install this 75189 assembly in the socket for the 75189.

( ) Solder a 1″ insulated wire in the hole with the square pad adjacent to the 75189 socket and midway between the #1 and # 2 pins.

( ) Solder the free end of the 1″ wire to pin 3 of the top 75189 IC.

( ) Solder a 1″ insulated wire in the hole with the square pad adjacent to the 75189 socket and midway between the #2 and # 3 pins.

( ) Solder the free end of the second 1″ wire to pin 1 of the top 75189 IC.

This completes the addition of the ring indicate option to the new serial port.

5.0 5. XT Keyboard Adapter Construction Details

5.1.1 Install Components on the PCJr Combocard

( ) Position a 40 pin IC socket on the card at the J5 location, insure that pin 1 is in the hole with the square pad and solder 40 pins in place.

( ) Position a 20 pin IC socket on the card at the 74LS322 location, insure that pin 1 is in the hole with the square pad and solder 20 pins in place.

( ) Position a 16 pin socket at the 74LS175 location, check the pin 1 position, and solder 16 pins in place.

( ) Position a 14 pin socket at the 74S74 location, check the pin 1 position, and solder 14 pins in place.

( ) Position 14 pin sockets at the 74LS04, 74LS20, and 7407 locations; check each pin 1 position, and solder the sockets in place.

( ) Place 4.7K ohm resistors at the R5, R6, R7, R8, and R9 locations. Check to insure that the resistor leads are in holes with square pads and solder the resistors in place.

( ) Place 150 ohm resistors at locations R10 and R11. Check to insure that the resistor leads are in the holes with square pads and solder the resistors in place.

( ) Place LED's at locations D1 and D2 with the positive leads AWAY from the two 150 ohm resistors. Check to insure that the LED leads are in the holes with square pads and solder the LED's in place.

( ) Place the four 0.01 uF capacitors at the locations marked c. Check to insure that the capacitor leads are in holes with square pads and solder the capacitors in place.

( ) Place the four 0.1 uF capacitors at the locations marked C. Check to insure that the capacitor leads are in holes with square pads and solder the capacitors in place.

( ) Place 47 pF capacitors at the locations marked c1, c2, c3, c4. Capacitors c1, c2, and c3 will NOT be parallel to either card edge. Check to insure that the capacitor leads are in holes with square pads and solder the capacitors in place.

( ) If you soldered a modified 2x10 header in the J OPTION location during construction of the serial port skip the following two steps.

( ) If you have chosen to use the optional I/O cable, cut a 2x10 header from a 2x40 header. Count five pins in from one end and cut the #5 and #4 pins out of each row both above and below the plastic. This will leave one group of 2x5 pins and one group of 2x3 pins.

( ) Place the modified 2x10 header at the J OPTION location and solder in place.

( )   If you are using the I/O cable, skip the following step.

( )   Place the DIN connector in place at J4 and solder the eight pins in place. I
      have received two types of DIN conectors with different shield connectons
      from JDR. You may have to modify the three holes provided in the card
      layout for the shield connections. File the edge of the DIN connector slightly
      if it strikes the edge of the DB09 connector.

( )   Inspect all of the solder joints you have just made for shorts to adjacent wires.

( )   Check you card with an ohmmeter between + 5VTP and GNDTP to insure
      that there are no + 5 to Gnd shorts on the card now.

( )   Place the card in the PCJr modem slot, Jr should power-up normally.

5.1.2 Modify the System Board and Cabinet

Bill Kirke's XT keyboard adaptor requires 15 signals from the 8255A-5 chip on the
system board. The JrCombo card receives these signals via a 40 wire ribbon cable
which uses an IDC dip plug piggybacked on a socketed 8255A-5. If your system
unit has a daughter card installed under the disk drive you must check during the
following steps to determine if there is enough room for the piggybacked connection
at the 8255A-5 IC.

( )   Remove the 64K memory card from Jr, also remove any sidecars which are
      attached to Jr.

( )   Slide the 34 wire disk drive signal cable off the card edge connector at the rear
      of the disk drive and remove the disk drive card from the system board con-
      nector.

( )   Disconnect the 4 wire disk drive power cable and the two wire fan power
      cable from the front edge of the power supply card.

( )   The disk drive is held in place with two mounting pins which extend through
      holes in the system board and the bottom of the Jr case. Stand Jr on the end
      nearest the power supply card and locate these two mointing pins.

( )   Find a small socket which will fit into the opening in the bottom of the case
      around the mounting pins. Use the socket to compress the four fingers on
      one of the pins while you gently pull up on the disk drive above this pin to
      release the pin from the Jr case. Repeat the same procedure for the other pin.
      The drive will lift free from the case once both pins are disengaged from the
      bottom of the Jr case.

( )   I have found that slightly rounding the two sharp corners on each of the four
      fingers of the mounting pins with a file makes future installation and removal
      of the disk drive much easier.

( )   Some Jr expansion features like the PCE jrExcellerator card are daughter cards
      which plug into the 8088 socket. If your Jr has a daughter card under the disk
      drive, check to determine if there is room for the piggyback conncetion at the
      8255A-5 IC.

( ) I recommend powering up Jr at this point, you should see POST count to 64 KB *and then the BASIC screen.*

( ) Turn Jr off and remove the power supply card from it's connector.

( ) Pull the keyboard IR receiver straight up and remove it from the system board.

( ) Remove four screws found at the rear edge of the system board and one screw found at the left cartridge connector.

( ) *Gently bend the two tabs on the left side of the system board to release the* board and lift the board from the case. Don't worry if the tabs break, the screws will hold the system board in place when Jr is reassembled; however, it will be necessary to hold the system board down with your fingers when lifting the power supply card from it's connector.

( ) If there is NO room in your system unit to piggyback the dip plug on the 8255A-5 IC, you now can choose one of two solutions. You must solder the appropriate wires from the 40 wire ribbon cable to the 8255A-5 pins as described by Bill Kirke in his package. You can complete the following steps to socket the IC and then solder to an IC removed from the system board, or you can solder to the IC pins without removing it from the system board. Skip the following three steps if you do not wish to remove the 8255A-5 from the system board.

( ) Using the best desoldering tool you have access to, remove the 8255A-5 from the system board. This is the 40 pin chip under the left rear corner of the disk drive in the ZM22 location. Do this with extreme care so as not to pull any of the plated through holes or damage any of the traces on the system board. Find someone with experience removing IC's from printed circuit boards if you have never done this before and ask for their help.

( ) Inspect the 8255A-5 pin locations and remove any remaining solder. Now inspect each through hole and all traces under the 8255A-5 on both sides of the system board for damage. Repair any damage found.

( ) Place a 40 pin dip socket in the 8255A-5 location, check for proper pin 1 orientation, solder the socket in place, and install the 8255A-5 chip in the new socket.

( ) If you plan to use the optional I/O cable, skip the following four steps.

( ) Take the empty Jr cabinet and identify the modem card support at the rear of the cabinet. Cut 3/16″ from the left finger of this support so that the DIN conector will not rest on this finger when the card is installed.

( ) Hold the JrCombo card in place in the empty cabinet to see if the card edge rests in the card support before the DIN connector strikes the finger.

( ) With the card held in place, mark the area on the rear of the cabinet which must be removed for access to the DIN and DB09 connectors.

( ) Cut the new openings and test fit the card in the modified cabinet. Make these openings as small as possible so that the cable connectors will rest on the side of the openings and provide some degree of strain relief.

( ) If you are using the optional I/O cable, remove a section of the lip on the top of the case 1″ wide directly above the ″D″ connector position. This produces an opening for the I/O cable just like the opening provided on the right side of the original case.

( ) If you are going to install the MIDI section, remove a second section of the lip on the top of the case 1″ wide starting .2″ to the left of the I/O cable opening to provide an opening for the MIDI cable.

( ) If you plan to install the JR1000 function, drill a hole in the front of the cabinet to accept the switch you will be using. For my JrSprint modifications I have found that the narrow recessed area to the left of the disk drive is a convenient place to mount switches with narrow bodies.

( ) If you plan to install the MIDI section, drill a second hole for the MIDI input-selection switch in the front of the cabinet.

( ) Reassemble the cabinet, system board, power supply card, keyboard and cable, and display. Jr should now powerup properly to the BASIC screen. If it does not, recheck all pins of the 8255A-5 socket to insure that they are soldered in place and check all wires that pass adjacent to the soldered pins for shorts to a soldered pin.

5.1.3 Build the Optional I/O Cable

The optional I/O cable is a twenty wire ribbon cable with three connectors as
shown in top view below:

```
        A              Top view:
        *          #1 wire with color stripe
        XX=======================================≈XXX B
        XX=======================================≈XXX
        XX=====================================≈
        XX=======================================≈XXX C
        XX=====================================≈XXX

        * #1 pin side of IDC socket.

                       Front view:
        XX=======================================≈XXX
        XX                                        XXX
        XX
```
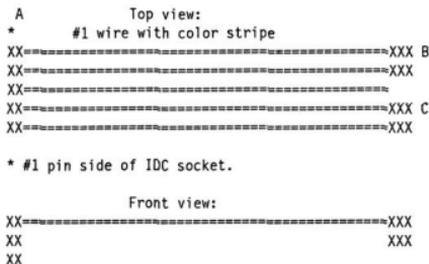
( ) Cut a piece of 20 wire ribbon cable 12 inches long and attach one 20 pin IDC
     dip socket at A as show above. Align the color stripe with pin one.

( ) Split the cable between wires 9 and 10 for a distance of 4″ from the end
     without the connector.

( ) Position the IDB09P connector, the *9 pin D shell connector from the I/O*
     cable parts list, at the location marked B so that the pin 1 contact is aligned
     with wire 1, the one with the color stripe, and attach the connector to wires 1
     through 9.

( ) Split the cable between wires 14 and 15 for a distance of 4″ from the end of
     the cable, and cut wires 10 to 14 off at this point.

( ) Seperate each of the wires from 15 through 20 for a distance of 1″ from the
     end of the cable.

( ) Remove the cover from the DIN connector, the RS 274-006 listed in the I/O
     cable parts list, and slide it over wires 15 through 20 at the C position shown
     above.

( ) Solder wire 15 to pin #3 of the DIN connector.

( ) Solder wire 16 to the shield pin of the DIN connector.

( ) Solder wire 17 to pin #2 of the DIN connector.

( ) Solder wire 18 to pin #4 of the DIN connector.

( ) Solder wire 19 to pin #1 of the DIN connector.

( ) Solder wire 20 to pin #5 of the DIN connector.

( ) Secure the cover on the DIN connector.

This completes construction of the optional I/O cable.

5.1.4 Build the 40-Wire Ribbon Cable

The keyboard adapter requires a 40-wire ribbon cable with a dip plug piggybacked on an 8255A-5 IC as shown below. Because of the very limited room below the Combocard and the disk drive card, and behind the disk drive shelf support pin, the fabrication and fitting of this cable is the most physically difficult part of this project.

```
                        Front View:


        b __ a
         |  |
         |  | .7"
         |  |
         |  XX--- pin 1
         |  XX   A
         |  XX--- pin 40
  2.3"   |
         |
         |                                                    B
         |              2.5"              d
         | -------------------------------XXXXXXXXXXXXXXXXXX
        c                          8244A-5 IC XXXXXXXXXXXXXXXXXX
                                             | | | | | | | | | | |
                                                              pins 1
                                                              & 40


                        Top View:



               A                          d
              _
           |  XX---_____
  Wires 21 |  XX---                        |.        |.
  to 40    |  XX---                        |   .     |    .
           |  XX---                        |      .  |       .
           |  XX---                        |         |
           |  XX---                        |2.1"  .  |    .
           |  XX---                        |         || |
  Wires 1  |  XX---                        |         || |
  to 20    |  XX---                      e |         || |
           |  XX---                        XXXXXXXXXXXXXXXX pin 1
           |_ XX--- pins 1 & 40            XXXXXXXXXXXXXXXX  B
          *                                XXXXXXXXXXXXXXXX pin 40
                                           !!!!!!!
                                           !!!!!!!
                                           wires 34-40

         * Side of cable with color stripe, #1 wire
```
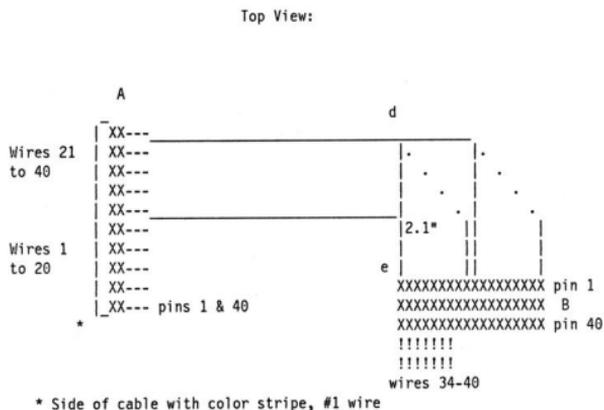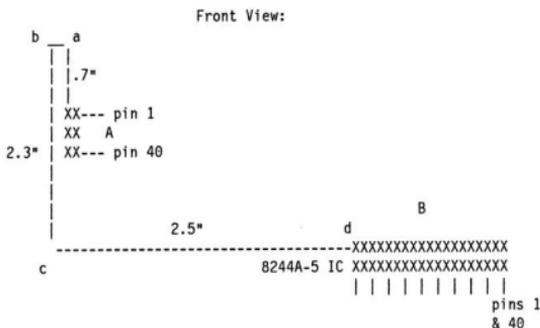
( ) Cut a piece of 40 conductor ribbon cable 17 inches long. This is slightly longer
     than needed, but it is better to have some extra to trim than to not have
     enough.

( ) Install a 40 pin IDC dip plug at the A end of the cable. IDC connectors can
     be installed using simple wooden blocks, with saw kerfs spaced to match the
     pin spacing, and a bench vise or "C" clamp if the $20.00 tool is not available.
     I use rubber cement to bond the cable in the proper position to the inside of
     the cover and then compress the whole assembly with a bench vise.

( ) Split the ribbon cable between wires 20 and 21 up to the IDC plug to produce
     two 20 wire ribbon cables. Wire 1 is the one with the color stripe on it, wires
     1 through 20 will be toward the front of Jr, see the top view of the cable.

( ) Form two bends in the two 20 wire cable parts as shown in the front view at points a and b.

( ) Form the cable with wires 1 to 20 between points b and c so that at point c the two 20 wire cable sections overlap and secure with tape. The section of the cable with wires 1 to 20 should be on the outside away from the IDC connector at point c. The cable then continues beyond point c as a cable twenty wires wide and two wires thick. This cable form is necessary so that the cable will fit behind the left rear support post of the disk drive tray.

( ) Form the bend at point c.

( ) Form the 45 degree bends in the two 20 wire cable sections as shown in the top view at point d.

( ) Test fit the cable and carefully determine the point e at which the second 40 pin IDC dip plug should be attached. The distance from point d to e on my cable is 2.1 inches so that the cable will pass behind the left disk drive post.

( ) Install a second 40 pin IDC dip plug at the B location. Do NOT install this dip plug if you have determined that there is not room in your system for a dip plug piggybacked on the 8255A-5 IC. Nineteen wires from this ribbon cable will be soldered directly to the 8255A-5 IC pins if you do not have room for the dip plug piggybacked on the IC.

( ) Using an ohmmeter, verify that pin one is connected to pin one, two to two, etc. through all 40 pins.

( ) Identify and seperate wires 34 through 40 that extend beyond the IDC dip plug at B.

( ) Cut wires 1 through 33 flush with the side of the IDC dip plug at B, or 2 inches beyond point e if you did not install the plug at B. Double check before you cut any wires to insure that you have seven wires extending beyond the plug at B.

( ) Identify wire 34, connected to pin #17 of the dip plug at point A, and label it: 8259, pin #19. This wire provides the IRQ1 signal.

( ) Identify wire 36, connected to pin #18 of the dip plug at point A, and label it: 74LS112, pin #13. This wire provides the Pclk signal.

( ) Solder micro-clips to the two wires identified above, or if you choose to solder these wires to the IC's on the system board you can eliminate the micro-clips.

( ) If you NEVER want to install the JR1000 modification, cut off all remaining wires which extend beyond the dip plug at B, and check off the following seven steps.

( ) If you plan to install the JR1000 modification now or at some time in the future, complete the following six steps.

( ) Identify wire 38, connected to pin #19 of the dip plug at A, and label it: VIA.

( ) Identify wire 39, connected to pin #21 of the dip plug at A, and label it: 74LS157, pin #2.

( ) Identify wire 37, connected to pin #22 of the dip plug at A, and label it: 74LS273, pin #9.

( ) Identify wire 35, connected to pin #23 of the dip plug at A, and label it: 74LS157, pin #3.

( ) Solder micro-clips to the four wires identified above, or if you choose to solder these wires to the IC's on the system board you can eliminate the micro-clips.

( ) Cut the one remaining wire #40, which is connected to pin 20, flush with the side of the dip plug at B, or 2 inches beyond point e if you did not install the plug at B.

( ) Cut the following unused pins from the B dip plug: 5, 11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 22, 23, 24, 27, 28, 29, 31, 32, 33, 34

( ) Bend the remaining 19 pins of the dip plug at B slightly outward so that you can piggyback this dip plug on the 8255A-5 IC.

( ) Get your 8255A-5 IC, either remove the one now in the socket on your system board, or a new one as noted in the parts list.

( ) Align pin 1 of the dip plug with pin 1 of the 8255A-5 and position the dip plug on the back of the IC with all pins aligned.

( ) Carefully inspect this assembly to insure that the pins are properly aligned and secure the IC to the dip plug using two wooden clothes pins! Yes clothes pins, the type with the spring work fine.

( ) Solder the 19 pins from the dip plug to the IC pins.

( ) Cut pin 10 off below the end of the dip plug pin which is soldered to it so that this pin will not enter the socket when the 8255A-5 and cable assembly is plugged into the 40 pin IC socket on the system board. The pin will then connect to the cable and not the system board.

5.1.5 Solder the 40-Wire Ribbon Cable to the 8255A-5 IC if necessary

If you do not have room for the piggyback dip plug on the 8255A-5 IC you will have to solder 19 wires to the 8255A-5 pins. Bill provided good instructions for soldering wires to IC pins in his package. After soldering, these wires will have to be formed as close to the top of the IC as possible to fit below the disk drive and daughter card in your system.

( ) Seperate all wires of the 40 wire ribbon cable back 2 inches from the end of the cable, this is back to point e.

( ) Identify each of the following wires and strip 1/8 inch of insulation from the end of each one: 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 14, 16, 18, 20, 21, 29, 31, and 40.

( ) Cut each of the remaining wires off at point e.

( ) Get the 8255A-5 that you will be using, either just the IC if you installed a socket for this IC on the system board, or the system board with the 8255A-5 soldered in place if you did not install the socket on the system board.

( ) Identify wire 2, connected to pin #1 of the dip plug at A, and solder it to pin 1 of the 8255A-5 IC.

( ) Identify wire 4, connected to pin #2 of the dip plug at A, and solder it to pin 2 *of the IC.*

( ) Identify wire 6, connected to pin #3 of the dip plug at A, and solder it to pin 3 of the IC.

( ) Identify wire 8, connected to pin #4 of the dip plug at A, and solder it to pin 4 of the IC.

( ) Identify wire 12, connected to pin #6 of the dip plug at A, and solder it to pin 6 of the IC.

( ) Identify wire 14, connected to pin #7 of the dip plug at A, and solder it to pin 7 of the IC.

( ) Identify wire 16, connected to pin #8 of the dip plug at A, and solder it to pin 8 of the IC.

( ) Identify wire 18, connected to pin #9 of the dip plug at A, and solder it to pin 9 of the IC.

( ) Identify wire 20, connected to pin #10 of the dip plug at A, and solder it to pin 10 of the IC.

( ) Identify wire 40, connected to pin #20 of the dip plug at A, and solder ti to pin 20 of the IC.

( ) Identify wire 1, connected to pin #40 of the dip plug at A, and solder it to pin 40 of the IC.

( ) *Identify wire 3, connected to pin #39 of the dip plug at A, and solder it to pin* 39 of the IC.

( ) Identify wire 5, connected to pin #38 of the dip plug at A, and solder it to pin 38 of the IC.

( ) Identify wire 7, connected to pin #37 of the dip plug at A, and solder it to pin 37 of the IC.

( ) Identify wire 9, connected to pin #36 of the dip plug at A, and solder it to pin 36 of the IC.

( ) Identify wire 11, connected to pin #35 of the dip plug at A, and solder it to pin 35 of the IC.

( ) Identify wire 21, connected to pin #30 of the dip plug at A, and solder it to pin 30 of the IC.

( ) Identify wire 29, connected to pin #26 of the dip plug at A, and solder it to pin 26 *of the IC.*

( ) Identify wire 31, connected to pin #25 of the dip plug at A, and solder it to pin 25 of the IC.

( ) Review the front and top view of the cable and IC assembly as shown above and form these wires as close to the top of the IC as possible to fit below the disk drive and daughter card in your system. The finished assembly should look like the two views above.
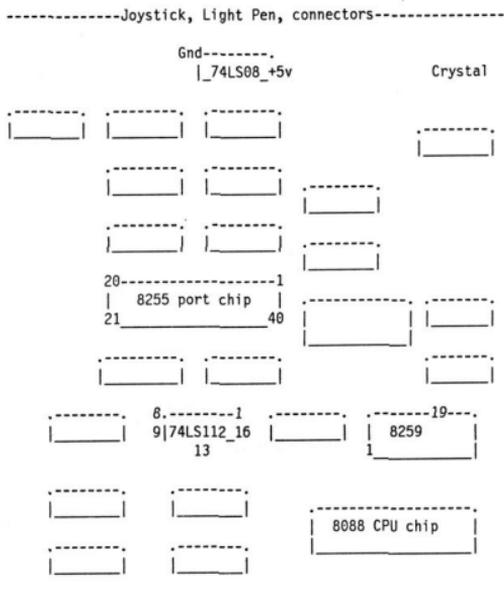
( )   Cut pin 10 off below the end of the wire which is soldered to it so that this pin will not enter the socket when the 8255A-5 and cable assembly is plugged into the 40 pin IC socket on the system board. The pin will then connect to the cable and not the system board.

5.1.6 PCJr System Board Layout

I have included the layout of the right rear corner of the system board from Bill Kirke's package to assist in locating the 8255 IC and the 8259 and 74LS122 IC's.

```
--------------Joystick, Light Pen, connectors----------------
                                                             |
          Gnd--------.                                       |
              |_74LS08_+5v                       Crystal     |
                                                             |
.---------. .---------. .---------.                          |
|_____| |_____| |_____|           .---------.         |
                                         |_____|           |
                                                             |
          .---------. .---------.                            |
          |_____| |_____|                               |
                              .---------.                    |
                              |_____|                      |
          .---------. .---------.                            |
          |_____| |_____|   .---------.                  |
                                 |_____|                   |
          20-------------------1                             |
          |   8255 port chip  |  .---------. .---------.     |
          21_____40  |_____| |_____|        |
                                                             |
          .---------. .---------.                            |
          |_____| |_____|             .---------.        |
                                           |_____|         |
.---------. 8.---------1 .---------. .-------19---.           |
|_____|  9|74LS112_16 |_____| | 8259     |               |
               13                 1_____|                |
                                                             |
.---------.   .---------.                                    |
|_____|     |_____|          .-----------------.         |
                                 | 8088 CPU chip   |         |
.---------.   .---------.        |_____|          |
|_____|     |_____|                                     |
                                                             |
```

5.1.7 Install IC's and Check Out

Much of this check out proceedure is taken directly from Bill Kirke's JRXTKEY package. To complete this testing you will have to request Bill's package to get his JRXTTEST.EXE and I9.COM test programs.

( )   Begin this check out with the disk drive card and the disk drive removed from Jr.

( )   Install the 8255A-5 IC and cable assembly by pluging the IC into it's socket on the system board. Carefully route the cable over the system board into it's final position.

( ) Attach the wire labeled 8259, pin #19 to pin #19 of the 8259 IC using the micro-clip or other connector, or by soldering directly to the pin.

( ) Attach the wire labeled 74LS112, pin #13 to pin #13 of the 74LS112 IC using one of the methods noted above.

( ) Install the Combocard in the modem slot. If your card uses the box connector at J6 carefully align this with the 2 pin header on the system board.

( ) If you used a wire and micro-clip instead of the box connector, attach the microclip to one of the pins of the 2 pin header at the rear of the system board. One of the above two methods to connect the keyboard shield ground is necessary to protect your system from static shock upsets.

( ) Plug the 40 pin dip plug on the cable from the 8255A-5 IC into the socket on the Combocard at J5.

( ) Your Jr should now power-up normaly to the BASIC screen. I received an Error B message; however, after pressing enter, Jr operated normally with the Jr keyboard and cable attached. The error B message can be ignored at this time.

( ) Disconnect the cable from the Combocard at J5.

( ) Remove the Combocard from the system.

( ) Install the 7407 IC in it's socket.

( ) Install the 74LS20 IC in it's socket.

( ) Install the 74LS04 IC in it's socket.

( ) Install the 74LS175 IC in it's socket.

( ) Install the 74S74 IC in it's socket.

( ) DO NOT install the 74LS322 at this time.

( ) Check each IC for proper orientation, the end of the IC with the notch or small round dot over pin 1 must be located at the end of the socket with the notch.

( ) Using an ohmmeter measure the resistance from +5VTP to GNDVTP. For the IC's I used this resistance measured about 100 ohms. The purpose of this test is to insure that there are no +5 to GND shorts before installing the card in your system.

( ) Return the Combocard to the modem slot and again attach the 40 wire ribbon cable to the dip socket at J5 on the card.

( ) Install the disk drive card and one disk drive.

( ) With a DOS disk in the drive, your Jr should now power up to the normal DOS command line and operate properly with the Jr keyboard. Check the five IC's for overheating with your fingers. If any IC's overheat they may be installed backwards, power the system off quickly and ckeck IC orientation.

( ) Run Bill's JRXTTEST.EXE program with a Joystick plugged into either J port and follow the test instructions displayed on the monitor.

( ) Run Bill's JRXTTEST.EXE program again and veify that pin #8 of the 74LS322 socket is low when the Keyboard Selected LED, the front LED, is on, and high when this LED is off.

( ) Turn off Jr and remove the Combocard one last time.

( ) Install the 74LS322 IC into it's socket.

( ) If you are using the optional I/O cable place the 20 pin IDC socket on the 2x10 header at the J OPTION location. The #1 wire is closest to the top of the card with the cable pointing toward the front of the card.

( ) Return the Combocard to the modem slot and again attach the 40 wire ribbon cable to the dip socket at J5 on the card.

( ) If you used a wire and micro-clip instead of the box connector, attach the microclip to one of the pins of the 2 pin header at the rear of the system board. Again, this is important for static shock protection.

( ) Position the I/O cable in the slot cut in the lip of the Jr case and out the rear of Jr if you are using the I/O cable.

( ) Power up Jr with a DOS disk in the drive and run Bill's I9.com program with no keyboard plugged in. The program should blink the keyboard selected LED and say something like: "No Keyboard Interrupt Occurred, keyboard received code = oo" three times and then NOT install.

( ) Plug in your XT keyboard and run I9.COM again. You should see "AA" received on the first or second try. You may now test your working keyboard.

I recommend that you request a copy of Gary Strait's NOBEEP.SYS program and use that on your normal boot disks to enable the XT keyboard. Gary and Bill have worked together to add this feature to Gary's NOBEEP code so NOBEEP now provides all the original neat stuff plus support for this keyboard upgrade.

6.0 6. 2nd & 3rd Disk Drive Construction Details

6.1.1 Install Components on the PCJr Combocard

( ) Position a 16 pin IC socket on the card at the 74LS175 location, insure that pin 1 is in the hole with the square pad and solder 16 pins in place.

( ) Position a 14 pin IC socket on the card at the 7437 location, insure that pin 1 is in the hole with the square pad and solder 14 pins in place.

( ) Position an 8 pin IC socket at the J1 location, insure that pin 1 is in the hole with the square pad and solder the 8 pins in place.

( ) Position the 0.1 uF capacitor in the C location, insure that the leads are in holes with square pads and solder the capacitor in place.

( ) Cut a 2x10 header from the 2x40 header, position the 2x10 header at the J2 location and solder the 20 pins in place.

( ) Inspect all of the solder joints you have just made for shorts to adjacent wires.

( ) Check you card with an ohmmeter between +5VTP and GNDTP to insure that there are no +5 to Gnd shorts on the card now.

( ) Place the card in the PCJr modem slot, Jr should power-up normally.

6.1.2 Modify the Disk Drive Card

You must add one 8 pin dip socket and three wires to the disk drive card. Because Paul Crumley described the procedure for this in his packages very thoroughly, our description here will be somewhat abbreviated.

( ) Remove solder from 8 holes at the front of the drive card. There are two vertical rows of unused holes at the front of the card. Count up from the edge of the card which plugs into the system board and remove solder from holes 7 through 10 in each column.

( ) Position an 8 pin dip socket in the 8 holes just opened with pin 1 closest to the top rear of the card and solder the 8 pins in place.

( ) Solder an insulated wire between pin 9 of the 74LS175 at ZM1 on the disk drive card, Paul's instructions call this IC5, and pin 1 of the 8 pin dip socket added above.

( ) Solder an insulated wire between pin 16 of the 74LS245 at ZM6 on the disk drive card, Paul's instructions call this IC3, and pin 2 of the 8 pin dip socket added above.

( ) Solder an insulated wire between pin 17 of the 74LS245 at ZM6 on the disk drive card, Paul's instructions call this IC3, and pin 3 of the 8 pin dip socket added above.

( ) Use an ohmmeter to check for continuity between pin 9 of the 74SL175 and pin 1 of the 8 pin dip socket.

( ) Use an ohmmeter to check for continuity between pin 16 of the 74SL245 and pin 2 of the 8 pin dip socket.

( ) Use an ohmmeter to check for continuity between pin 17 of the 74SL245 and pin 3 of the 8 pin dip socket.

This completes the modifications to the disk drive card required for the 2nd & 3rd Disk Drive Function.

6.1.3 Build the 8 Wire Ribbon Cable

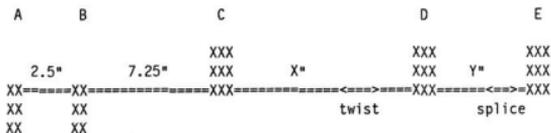We will build an eight wire ribbon cable as shown below:

```
          A                               B
                                        JR1000 only
                        5.75"              1.5"
        XXXX=========================XXXX============
        * |  |                        * |  |  wires 7 & 8

        In this front view, wire 1 is away from the viewer.

        * #1 pin side of connectors.
```

( ) Cut a piece of 8 wire ribbon cable 8 inches long and attach two 8 pin IDC dip
     plugs as show above.

( ) Cut ONLY wires 1 through 6 flush with the right side of the dip plug at B IF
     *the JR1000 option is being added now or will be added at some time in the
     future,* otherwise cut all 8 wires at the right side of the dip plug at B.

( ) Check for electrical continuity from pin one to pin one, pin two to pin two,
     etc. on the finished cable.

6.1.4 Build the 34-Wire Disk Drive Ribbon Cable

Again, Paul's descriptions are very complete so our description here will be some-
what abreviated. We will build a 34 wire cable as shown below:

```
    A       B                C                   D           E

                            XXX                 XXX         XXX
        2.5"       7.25"     XXX     X"          XXX   Y"    XXX
    XX====XX=================XXX========<===>====XXX=====<==>=XXX
    XX     XX                            twist         splice
    XX     XX
      In this front view, wire 1 is closest to the viewer.
```

The IDC sockets at A and B connect to the Combocard and original disk drive
cards respectively. The IDC edge card connector at C connects to the original disk
drive in Jr. Connectors D and E are for the added second and third drives. If you
are adding only a second drive, end the cable with the D connector.

( ) Determine dimensions X and Y for the drive enclosures you will be using and
     calculate the total cable length required.

( ) *Cut a 34 wire ribbon cable to the proper length.*

( ) Install a 34 IDC socket at B, insure that pin 1 is alined to the side of the cable
     with the color stripe.

( ) Split the ribbon cable between wires 20 and 21 between connectors A and B,
     and cut wires 21 through 34 off flush with the left side of the B connector.

( ) Install a 20 IDC socket at A, insure that pin 1 is alined to the side of the cable with the color stripe.

( ) Paul's instructions detail construction of the cable with connectors B, C, D, and E. Follow his instrucions for construction of the remainder of this cable.

6.1.5 Install IC's and Check Out

( ) Install the 7437 IC in it's socket.

( ) Install the 74LS175 IC in it's socket.

( ) Check each IC for proper orientation, the end of the IC with the notch or small round dot over pin 1 must be located at the end of the socket with the notch.

( ) Using an ohmmeter measure the resistance from + 5VTP to GNDVTP. For the IC's I used this resistance measured about 100 ohms. The purpose of this test is to insure that there are no + 5 to GND shorts before installing the card in your system.

( ) Remove the original 34 wire disk drive cable from the disk drive and disk drive card. Install connector B of the new 34 wire disk drive cable on the disk drive card at the 2x17 header.

( ) Fold the cable between connectors B and C like the original cable and install connector C at the original disk drive.

( ) Install the Combocard in the modem slot. If your card uses the box connector at J6 carefully align this with the 2 pin header on the system boa rd.

( ) If you used a wire and micro-clip instead of the box connector, attach the microclip to one of the pins of the 2 pin header at the rear of the system board.

( ) Install connector A of the 34 wire disk drive cable on the 2x10 pin header at J2 of the Combocard.

( ) Install the 8 wire cable between the J1 connector on the Combocard and the 8 pin IC socket added to the front edge of the disk drive card.

( ) Jr should now power up and operate normally with the single disk drive.

( ) Install your second disk drive in the enclosure you have chosen.

( ) Attach a four wire power cable and connector D of the 34 wire signal cable to the second disk drive.

( ) *Boot your system using Gary Strait's NOBEEP.SYS using the /D2 option. Jr should now operate with the original disk drive as drive A and your added disk drive as drive B.*

If your Jr uses the 11″ power supply card you can purchase a "Y" power adapter and power your second disk drive from Jr without an added power supply.

7.0 7. JR1000 Construction Details

7.1.1 Install Components on the PCJr Combocard

( ) Position a 14 pin IC socket on the card at the 74F86 location, insure that pin 1 is in the hole with the square pad and solder 14 pins in place.

( ) Position the 1.0K ohm resistor in the R4 location, insure that the leads are in holes with the square pads and solder the resistor in place. R4 is located adjacent to J1 in the center of the card.

( ) Inspect all of the solder joints you have just made for shorts to adjacent wires.

( ) Check you card with an ohmmeter between + 5VTP and GNDTP to insure that there are no + 5 to Gnd shorts on the card now.

( ) Place the card in the PCJr modem slot, Jr should power-up normally.

This completes the soldering required for the JR1000 Function.

7.1.2 Install IC's and Check Out

TBD

8.0 8. MIDI Port Construction Details
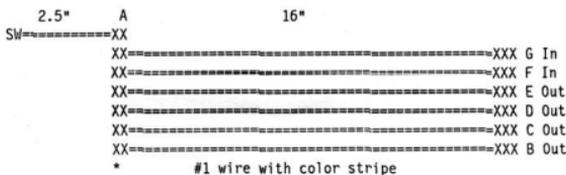
8.1.1 Install Components on the PCjr Combocard

( ) Position a 14 pin IC socket on the card at the 7407 location, insure that pin 1 is in the hole with the square pad and solder 14 pins in place.

( ) Position a 16 pin IC socket on the card at the R1-R8 location, insure that pin 1 is in the hole with the square pad and solder 16 pins in place.

( ) Position a 16 pin IC socket on the card at the 74123 location, insure that pin 1 is in the hole with the square pad and solder 16 pins in place.

( ) *Position a 8 pin IC socket on the card at the O/C location, insure that pin 1 is in the hole with the square pad and solder 8 pins in place.*

( ) Position a 4.7K ohm resistor in the R9 location, insure that the leads are in holes with the square pads and solder the resistor in place.

( ) *Position a 4.7K ohm resistor in the R10 location, insure that the leads are in holes with the square pad and solder the resistor in place.*

( ) Position 220 ohm resistors in the R16 & R17 locations, insure that the leads are in holes with the square pads and solder the resistors in place.

( ) Position a 330 ohm resistor in the R19 location, insure that the leads are in holes with the square pads and solder the resistor in place.

( ) Position 220 ohm resistors in the R12 & R13 locations, insure that the leads are in holes with the square pads and solder the resistors in place.

( ) Position 4.7K ohm resistors in the R11, R14, R15 & R18 locations, insure that the leads are in holes with the square pads and solder the resistors in place.

( ) Position the 100 uF capacitor in the C3 location, insure that the leads are in holes with the square pads and that the + lead is in the hole adjacent to the +, toward the rear of the card, and solder the capacitor in place.

( ) Position a .1uF capacitor in the C1 location, insure that the leads are in holes with the square pads and solder the capacitor in place.

( ) Position a .1uF capacitor in the C4 location, insure that the leads are in holes with the square pads and solder the capacitor in place.

( ) Position .1uF capacitors in the C2 & C5 locations, insure that the leads are in holes with the square pads and solder the capacitors in place.

( ) Cut a 2x10 header from a 2x40 header, position the 2x10 header at the J1 location and solder the 20 pins in place.

( ) Position a Red LED in the D5 location .8″ above the card surface with the positive lead nearest the top of the card. Check to insure that the LED leads are in holes with square pads and solder in place.

( ) Position a Green LED in the D3 location .8″ above the card surface with the positive lead nearest the top of the card. Solder the LED in place.

( ) Position a Green LED in the D4 location .8″ above the card surface with the positive lead nearest the top of the card. Solder the LED in place.

( ) Inspect all of the solder joints you have just made for shorts to adjacent wires.

( ) Check you card with an ohmmeter between + 5VTP and GNDTP to insure that there are no + 5 to Gnd shorts on the card now. You will now be measuring either the forward or reverse resistance of the Red diode added above depending upon the polarity of your measurement.

( ) Place the card in the PCJr modem slot, Jr should power-up normally. The Red LED at D5 should now light when Jr has power applied.

This completes the soldering required for the MIDI Port Function.

8.1.2 Build the MIDI Signal Cable

The MIDI signal cable is a twenty wire ribbon cable with seven connectors as shown in top view below:

```
    2.5"      A                        16"
 SW=========XX
            XX=====================================XXX G In
            XX=====================================XXX F In
            XX=====================================XXX E Out
            XX=====================================XXX D Out
            XX=====================================XXX C Out
            XX=====================================XXX B Out
            *           #1 wire with color stripe

         * #1 pin side of IDC socket.
```

( ) Cut a piece of 20 wire ribbon cable 18.5 inches long and attach one 20 p in IDC dip socket at A as show above.

( ) Split the cable between wires 3 and 4, 6 and 7, 9 and 10, and 12 and 13 for a distance of 4″ from the end without the connector.

( ) Seperate each of the adjacent wires from 1 through 12 for a distance of 1″ from the end of the cable.

( ) Remove the cover from a DIN connector and slide it over wires 1 through 3. The B position shown above.

( ) Solder wire 1 to pin #5 of the DIN connector.

( ) Solder wire 2 to pin #4 of the DIN connector.

( ) Solder wire 3 to pin #2 of the DIN connector.

( ) Remove the cover from a DIN connector and slide it over wires 4 through 6. The C position shown above.

( ) Solder wire 4 to pin #2 of the DIN connector.

( ) Solder wire 5 to pin #5 of the DIN connector.

( ) Solder wire 6 to pin #4 of the DIN connector.

( ) Remove the cover from a DIN connector and slide it over wires 7 through 9. The D position shown above.

( ) Solder wire 7 to pin #5 of the DIN connector.

( ) Solder wire 8 to pin #4 of the DIN connector.

( ) Solder wire 9 to pin #2 of the DIN connector.

( ) Remove the cover from a DIN connector and slide it over wires 10 through 12. The E position shown above.

( ) Solder wire 10 to pin #2 of the DIN connector.

( ) Solder wire 11 to pin #5 of the DIN connector.

( ) Solder wire 12 to pin #4 of the DIN connector.

( ) *Secure the DIN covers to the four DIN sockets just installed.*

( ) Split the cable between wires 14 and 15, and 16 and 17 for a distance of 4″ from the end without the connector.

( ) Seperate wires 13 and 14, and 15 and 16 for a distance of 1″ from the end of the cable.

( ) Remove the cover from a DIN connector and slide it over wires 13 and 14. The F position shown above.

( ) Solder wire 13 to pin #5 of the DIN connector.

( ) Solder wire 14 to pin #4 of the DIN connector.

( ) Remove the cover from a DIN connector and slide it over wires 15 and 16. The G position shown above.

( ) Solder wire 15 to pin #5 of the DIN connector.

( ) Solder wire 16 to pin #4 of the DIN connector.

( ) Secure the DIN covers to the two DIN sockets just installed.

( ) Split the cable between wires 16 and 17 back to connector A and cut wires 17 through 20 off at the right side of connector A.

( ) Split the cable between wires 19 and 20 from the SW end back to connector A and cut wire 20 off at the left side of connector A.

( ) Seperate wires 17, 18, and 19 for a distance of 1″ from the SW end of the cable.

( ) Solder wire 19 to the common terminal of a SPDT switch.

( ) Solder wire 18 to one of the remaining terminals of the SPDT switch.

( ) Solder wire 17 to the remaining terminal of the SPDT switch.

This completes construction of the MIDI signal cable.

8.1.3 Install IC's and Check Out

TBD

9.0 9. Supporting Cast and Document History

9.1.1 Acknowledgements

The work of Paul Tardif and Patrick Lau on their JrSprint and Bus Interface Adapter cards, Hank Kennedy on his Harddisk Adapter card, and Bill Kirke on his JRXTKEY Package provided the inspiration for the design of this card. I wish to thank Paul, Hank, and Bill for their encouragement and for many helpful conversations. I also wish to thank the designers of the other circuits that have been incorporated into this card; Mike Hackett, Paul Crumley, Glenn Buskirk, and Claude Bordeaux. I would also like to thank Gary Strait for his work to update NOBEEP to support the keyboard section of this card.

9.1.2 Document History

Version 1.0 March 6, 1991. Design and construction details available as a package. No hardware yet!

Version 1.1 March 12, 1991. Corrected JRSERIAL location in section 1, and modified power supply card removal sequence in section 5.

Version 1.2 June 18, 1991. Corrected Pat Hammond's node ID in section 1. As of 23:55 yesterday the serial port, disk drive, and keyboard sections were verified as functional. Happy 13th Birthday Erica!

Version 2.0 October 10, 1991. General package update. Completed many TBD's from construction experience. Added the ring indicate option to the RS232 port and MIDI circuits to card design.

Version 2.1 October 14, 1991. Added Bill Kirke's system board layout and corrected some spelling and editing errors.

Version 2.2 December 31, 1991. Made a few minor updates based upon experience building first board from the Texion order. Serial port, keyboard, and disk drive sections of the Texion card all function properly. MIDI and JR1000 sections not built as of this time.

Version 2.3 January 2, 1992. Identified serial port .1 uF caps as monolithic, and added statement about sanding rear edge of Texion cards.

J2 JrXTKEY bY BK <-12 JrSERIAL bY MH C3+R9 MIDI bY CB

JT1000
74LS86
Cc 74LS175 74S74 74LS367
R6

R1 C5 C2 R2 R3
C3 75189 8250A or 16550 C4 7407
75188

J5 74LS245 R1 OSC1.8 D/C
R4 SB2

R8 R5 283DISK bY PC C4 SB1
7407 74LS20 74LS04 74LS175 74123

J OPTION
74LS245