# DAVID JUNIOR II REFERENCE MANUAL

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Subject to the conditions set forth below, KONAN will repair or replace, at its option, defective controllers and printed circuit board products (hereinafter referred to as "Product") manufactured by KONAN for one year following the date of shipment from KONAN Corporation. A product shall be deemed defective only if it fails to perform to KONAN's published specifications.

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|-------|--------------|--------------------------------------|
|       |              | Revision Sheet                       |
| Rev.  | Release Date | Description of Revision              |
| A     | 29 August 83 | Initial Release                      |

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## Section 1.8 Introduction

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- 1.2 To the User
- 1.3 Specifications
- 1.4 References

This manual provides you with the information necessary to answer your questions about the David Junior II disk controller, and to integrate the David Junior II into your system.

This manual has Hardware and Software Theory of Operations sections to provide you with an understanding of how the David Junior II works.

The installation section discusses essential information that you must know to correctly install the David Junior II. The installation section also contains a table for your future reference when strapping your controller.

The maintenance section discusses the procedures to be followed in the event that your David Junior II should require maintenance.

The appendix provides supplementary information concerning subsystems.

# 1.2 To the User

The Konan David Junior II is an intelligent 5-1/4" Winchester disk controller. It connects to the host com-puter via an 8-bit parallel port. Three control lines and one status line are part of the host interface as well. The controller has been designed to be compatible with the Konan David interface. This standard will be used (and is currently being implemented) on other peripheral controllers that Konan will be manufacturing. This allows the OEM to connect to larger disks or other devices without modifying the hardware or software except for low level drivers. The David Junior II can control up to two disk drives, with up to eight heads and 4096 tracks. The David Junior II is dimensionally compatible with the 5-1/4" Winchester drives. The command set for the David Junior II provides all of the required functions to interface the host to the disk.

#### DAVID JUNIOR II REPERENCE MANUAL - A KONAN CORPORATION INTRODUCTION

### 1.3 Specifications

Host Data Transfer-

8-bit parallel 625 K bytes per second maximum data rate

Disk Data Transfer-

Modified Frequency Modulation Pre-compensation 12 nsec 5 MHz data rate

Disk Control Capabilities-

2 - units

8 - heads

4096 - tracks standard. The David Junior II will optionally address up to 32,000 tracks.

#### Cabling-

26 - pin host interface cable

34 - pin disk control cable

20 - pin disk data cable (drive 0) 20 - pin disk data cable (drive 1)

4 - pin power (female connector provided with controller)

The state of the state of

#### Power Requirements-

+5 volts at 2.0 amps +12 volts at 0.15 amps

Board Dimensions-

5.7" X 7.8"

#### Cooling-

Porced cooling is suggested if the David Junior II is enclosed in a restricted space.

#### Table 1-1 Default Drive Configurations Seagate ST-586 Hard Disk Heads per Drive Tracks per Head 153 Sectors per Track 16 Step Rate (msec) Bytes per Sector Cylinder mode 512 no Reduced Write Current Track Number 128 Precompensation Track Number 32 Spare Tracks per Head

\*\*All numbers in decimal

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# 1.4 References

See operating manual of the particular disk to be interfaced to the David Junior II.

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# Section 2.5 Hardware Theory of Operation

- 2.1 Host/David Jr. II Interface
- 2.2 Host/David Jr. II Schematic
- 2.3 Host/David Jr. II Pin Out List
- 2.4 Host/David Jr. II Timing
- 2.5 Disk/David Jr. II Pin Out List

# 2.1 Bost/David Jr. II Interface

Below is a description of the host interface data and control lines:

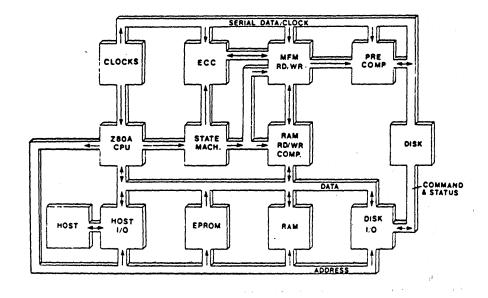
| SIGNAL NAME | DIR         | DESCRIPTION  |
|-------------|-------------|--|
| DWR         | >           | David Jr. II. The low to high transistion of this signal latches   |
| DRD         | >           | This is the read line to the David Jr. II. When low, it enables data from the David Jr. II onto the bidirectional data bus. See Timing on Page 2-6.  |
| DD0-DD7     | <>          | Bi-directional data bus. Allows<br>transfer of data to and from the<br>David Jr. II.   |
| DRST        | >           | Resets the David Jr. II. DRST must be low for a minimum of 2 micro-seconds. It is suggested that this line be software controllable so the David Jr. II can be reset from the host system without the need to reset the entire system. |
| DRDY C      | <b>&lt;</b> | Signals the host processor that the David Jr. II has completed its current operation. This line can be used to generate interrupts.  |

NOTE: DWR and DRD are exclusive operations, and therefore should not be activated simultaneously.

All data signals must be driven with line drivers capable of providing a sink (LOW) current of 24 MA, and a source (HIGH) current of 2.6 MA.

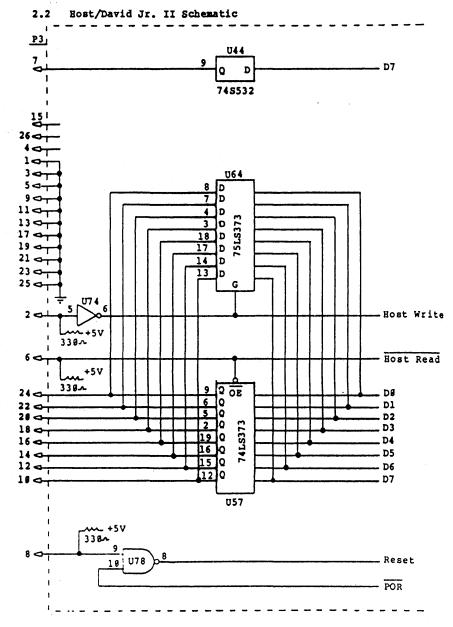
All control lines must be driven with line drivers capable of providing a sink current of 24 MA, and a source current of 12 MA.

Maximum Host cable length is 5 feet.



Pigure 2.1 Block Diagram

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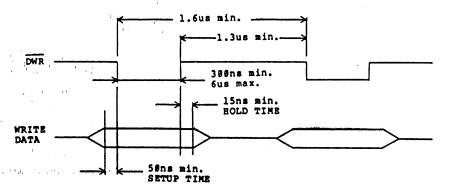
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2.3 Host/David Jr. II Pin Out List
Below is a pin out list for the Host Interface cable:

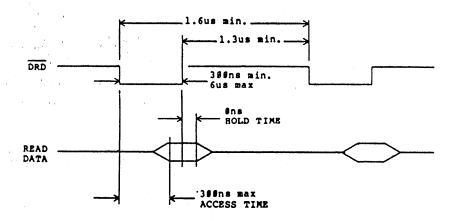
| 1GND       | 2          |
|------------|------------|
| 3GND       | 4SPARE     |
| 5GND       | 6DRD       |
| 7DRDY      | 8DRST      |
| 9GND       | 10DD7      |
| 11GND      | 12DD6      |
| 13GND      | 14DD5      |
| 15 KEY PIN | 16DD4      |
| 17GND      | 18DD3      |
| 19GND      | 20DD2      |
| 21GND      | 22DD1      |
| 23GND      | 24DDØ      |
| 25GND      | 26RESERVED |

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# 2.4 Host/David Jr. II Timing



WRITE



READ

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# 2.5 Disk/David Jr. II Pin Out List

| 1    | GND | 2  | Reduced Write Current |
|------|-----|----|-----------------------|
| 3    | GND | 4  | Head Select Bit 2     |
| 5    | GND | 6  | Write Gate            |
| 7    | GND | 8  | Seek Complete         |
| ģ    | GND | 10 | Track 0               |
| 11   | GND | 12 | Write Fault           |
| 13   |     | 14 | Head Select Bit 0     |
| 15   |     | 16 | not connected         |
| . 17 |     | 18 |                       |
| 19   |     | 28 | Index                 |
| 21   | GND | 22 | Ready                 |
| 23   | GND | 24 | Step                  |
| 25   |     | 26 | Drive Select 0        |
| 27   |     | 28 | Drive Select 1        |
| 29   |     | 30 | not connected         |
| 31   | GND | 32 | not connected         |
| 33   | GND | 34 | Direction In          |

David Jr. II J# Disk Control Cable (Daisy)

| 1  | Drive Selected  | 2  | GND             |
|----|-----------------|----|-----------------|
| 3  | not connected   | 4  | GND             |
| 5  | not connected   | 6  | GND             |
| 7  | not connected   | 8  | GND             |
| ġ  | not connected   | 10 | not connected   |
| 11 | GND             | 12 | GND             |
| 13 | +MFM Write Data | 14 | -MFM Write Data |
| 15 | GND             | 16 | GND             |
| 17 | +MFM Read Data  | 18 | -MFM Read Data  |
| 19 | GND             | 20 | GND             |

David Jr. II Jl, J2 Disk Data Cable (Radial)

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# 3.9 Software Theory of Operation

- 3.1 Command Format
- 3.1.2 Address Format
- 3.2 Command Sequence
- 3.3 Status Byte
- 3.4 Abort
- 3.5 Read Buffer
- 3.6 Write Buffer
- 3.7 Format
- 3.8 Read Disk
- 3.9 Write Disk
- 3.10 Format Spare
- 3.11 Drive Status
- 3.12 Seek
- 3.13 Read ID
- 3.14 Status
- 3.15 Append Map
- 3.16 INIT
- 3.17 INIT1

# 3.1 Command Format

The commands have been divided into three major types which are described below. The high order nibble of the command byte contains the command type.

TYPE 0 COMMANDS - Require only the command byte to be issued.

TYPE 2 COMMANDS - Require 8 bytes to be transferred.

TYPE 4 COMMANDS - Require sector (256/512) bytes to be transferred.

| 1            |         |           |                                       |
|--------------|---------|-----------|---------------------------------------|
| PUNCTION     | COMMAND | DIRECTION | TRANSFER                              |
| ABORT        | 01 HEX  |           | NONE                                  |
| INIT         | 82 *    |           | NONE                                  |
| INIT1        | 87 *    |           | NONE                                  |
| READ DISK    | 21 *    | TO CNTRLR | 8 BYTES                               |
| WRITE DISK   | 22 •    | TO CNTRLR | 8 BYTES                               |
| READ ID      | 23 •    | TO HOST   | 8 BYTES                               |
| STATUS       | 24 *    | TO HOST   | 8 BYTES                               |
| DRIVE STATUS | 25 "    | TO HOST   | 8 BYTES                               |
| FORMAT SPARE | 26 *    | TO CNTRLR | 8 BYTES                               |
| FORMAT       | 27 •    | TO CNTRLR | 8 BYTES                               |
| SEEK         | 28 •    | TO CNTRLR | 8 BYTES                               |
| APPEND MAP   | 2A *    | TO CNTRLR | 8 BYTES                               |
| READ BUFFER  | 41 *    | TO HOST   | EQUAL TO # OF<br>BYTES IN SEC-<br>TOR |
| WRITE BUFFER | 42 *    | TO CNTRLR | EQUAL TO # OF<br>BYTES IN SEC-<br>TOR |

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3.1.2 Address Format
In commands which include an 8 byte transfer from the host
to the controller, unless otherwise specified follow the
format below:

#### 

#### 3.2 Command Sequence

In a typical command sequence, the command is issued using a simple handshake routine. Data/parameters are then transferred without any handshaking, making commands simple and fast. At the end of the transfer, a single byte of status is transmitted to the host. Following is a description of the flow chart of the command sequence. (Please refer to Figure 3.1 Command Sequence).

On power up, the host should output a 88 to the David Jr. II. When a command is to be sent to the David Jr. II, a subroutine with this sequence should be called.

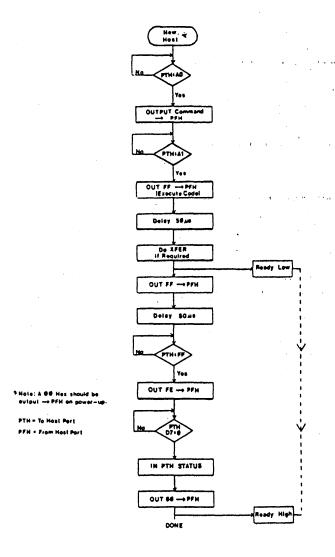
- Read the David Jr. II port and wait for an "A0" hex byte. This indicates that the David Jr. II is ready to receive a command.
- 2. Write the command byte to the David Jr. II.
- Read the David Jr. II port and wait for an "Al" hex byte. This indicates that the David Jr. II has received the command which was just issued.
- Write an "FF" hex byte to the David Jr. II to allow it to execute the command.
- Delay 50 micro-seconds. This allows the David Jr. II time to set up in its internal DMA (Direct Memory Access) mode.
- 6. Do a transfer to/from the David Jr. II if required.
- 7. Write an "FF" hex byte to the David Jr. II.

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- 8. Delay 50us.
- Read the David Jr. II and wait for an "FF" her byte. This indicates the David Jr. II is no longer in its internal DMA mode.
- 18. Write an "FE" hex byte to the David Jr. II to indicate the host is ready for status.
- 11. Read the David Jr. II and wait for data bit 7 (highest bit) to go low. When this occurs, the next byte read from the David Jr. II will be the status byte.
- 12. Read the David Jr. II to get the status byte.
- 13. Write a "88" hex byte to the David Jr. II to indicate the status has been received, or the interrupt has been acknowledged.

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Figure 3.1 Command Sequence



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The preceeding sequence is shown in two generalized routines, COMOUT (Command Out) and EXEC (Execute), written in 8080 code below.

```
PTH EQU 87DH ;DAVID JR II READ PORT ADDRESS
PFH EQU 87DH ;DAVID JR II WRITE PORT ADDRESS
```

ITHIS ROUTINE SENDS THE COMMAND IN REGISTER 'A' TO THE IDAVID JR II

```
COMOUT: MOV
                B,A
                         ;SAVE COMMAND (WAS IN 'A')
        XRA
                         CLEAR DAVID JR II PORT (IN CASE IT
        OUT
                PFH
                         ; WASN'T ALREADY) .
RDY1:
        IN
                PTH
                         WAIT FOR THE DAVID JR II TO GO
        CPI
                BASH
                         READY.
        JNZ
                RDY1
        MOV
                A,B
        OUT
                         SEND COMMAND
                PFH
RDY2:
        IN
                PTH
                        WAIT UNTIL THE DAVID JR II HAS IT
        CPI
                BALH
        JNZ
                RDY2
        MVI
                A, OPFH
        OUT
                PFH
                         SEND EXECUTE CODE
        MVI
                A,18
RDY3:
       DCR
                A
                        ;DELAY 50 MICRO-SECONDS
        JNZ
                RDY3
        RET
```

; IF A DATA/PARAMETER TRANSFER IS REQUIRED FOR THIS ; COMMAND, DO IT NOW

```
EXEC:
        MVI
                A, OFFH ;TRANSFER DONE
        OUT
                PFH
        MVI
                A,18
EXO:
        DCR
                A
        JNZ
                EXO
EX1:
       IN
                PTH
                        ;WAIT FOR DAVID JR II TO GET OUT OF
       CPI
                        ; INTERNAL DMA MODE
                ØFFH
       JNZ
               , EX1
       MVI
                A, ØFEH
                        ;SIGNAL THAT WE ARE READY FOR
       OUT
                PFH
                        ;STATUS
EX2:
       IN
                        WAIT FOR STATUS BYTE TO GO READY
                PTH
       ANI
                8ØH
       JNZ
                EX2
       IN
                PTH
                        GET STATUS
       MOV
                B,A
                        ;SAVE IT IN 'B'
       XRA
       OUT
             . PFH
                        CLEAR THE DAVID JR II PORT
       RET
```

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To show how to execute a simple series of commands with the David Jr. II disk controller, the following routine reads Unit 0, Head 0, Track 0, Sector 0 from the disk and into the host's buffer. It uses the COMOUT and EXEC routines described above.

|         | MVI<br>CALL<br>XRA<br>OUT   | A,21H<br>COMOUT<br>A<br>PFH   | ;READ DISK COMMAND ;UNIT # 8  |       |
|---------|---|---|---|-------|
| •       | OUT   | PPH   | ;HEAD # 0   |       |
|         | OUT<br>OUT  | PFH<br>PFH  | TRACK LOW = 0<br>TRACK HIGH = 0   |       |
|         | OUT   | PPH   | SECTOR # 8  | . * 1 |
|         | OUT   | PPH   | RESERVED = 0  |       |
|         | OUT   | PFH   | RESERVED = 0  |       |
|         | OUT   | PPH   | RESERVED = 0  |       |
|         | CALL  | EXEC  | END COMMAND SEQUENCE  |       |
| RDDATA: | LXI<br>MVI<br>CALL<br>LXI<br>IN<br>MOV<br>DCR<br>JNZ<br>DCR<br>JNZ<br>CALL<br>JMP | H,1000H<br>A,41H<br>COMOUT<br>B,200H<br>PTH<br>M,A<br>HL<br>C<br>RDDATA<br>B<br>RDDATA<br>EXEC<br>1000H | ;LOAD ADDRESS;TO BOST DMA ;SEND IT ;BC=NO.OF BYTES TO RETRIEVE ;GET DATA BYTE ;SAVE IN MEMORY ;INCREMENT MEMORY POINTER ;DECREMENT COUNT TILL DONE ;DONE? ;DECREMENT LOW ORDER CNT ;DONE? ;END COMMAND SEQUENCE ;JUMP TO PROGRAM JUST ;LOADED FROM DISK | (512) |

#### 3.3 Status Byte

A single byte of status is provided by the David Jr. II at the completion of each operation. If data bit six is low on status return, the operation was completed properly. If data bit six is high, a hard error occurred. The error codes are listed below.

| CODE | TYPE   | OPERATION   |  |  |
|------|--|---|--|--|
| SOPT | HEADER                                       | READ  |  |  |
| SOPT | HEADER                                       | WRITE   |  |  |
| SOPT | DATA   | READ  |  |  |
| SOFT | DATA (CORRECTED)                             | READ  |  |  |
| HARD | HEADER                                       | READ  |  |  |
| HARD | HEADER                                       | READ ID   |  |  |
| HARD | HEADER                                       | WRITE   |  |  |
| HARD | SEEK   | SEEK  |  |  |
| HARD | DATA   | READ  |  |  |
|      | WRITE PROTECTED                              | WRITE   |  |  |
|      |  | DRIVE SELECT  |  |  |
|      |  | DRIVE SELECT  |  |  |
|      |  | PORMAT  |  |  |
|      |  | COMMAND   |  |  |
|      | ACCESSED SPARE TRACK                         | READ/WRITE  |  |  |
|      | SOPT<br>SOPT<br>SOPT<br>SOFT<br>HARD<br>HARD | SOPT HEADER SOPT HEADER SOPT HEADER SOFT DATA SOFT DATA (CORRECTED) HARD HEADER HARD HEADER HARD HEADER HARD SEEK HARD DATA HARD WRITE PROTECTED HARD WRITE FAULT HARD NOT READY HARD OUT OF SPARES ILLEGAL COMMAND |  |  |

| D7 | D6 | D5 | D4 | D3 | D2 | D1 | DØ<br>1 |                             |
|----|----|----|----|----|----|----|---------|-----------------------------|
| i  | i  | i  | i  | i  | i  | i  | i       |                             |
| 1  | i  | 1  | i  | -i | -1 | -1 | -       | ERROR CODE                  |
| 1  | 1  | 1  |    |    |    |    |         | •                           |
| 1  | 1  | 1  |    |    |    |    |         | CORRECTED DATA              |
| Į  | 1  |    |    |    |    |    |         |                             |
| 1  | 1  |    |    |    |    |    |         | ## OK 1=HARD ERROR          |
| 1  |    |    |    |    |    |    |         |                             |
| 1  |    |    |    |    |    |    |         | 9 INDICATES STATUS<br>READY |

#### 3.4 Abort

Resets the controller to a power up state.

#### 3.5 Read Buffer

The entire contents of the sector buffer (512/256 bytes) are transferred to the host.

#### 3.6 Write Buffer

The entire contents of the sector buffer (512/256 bytes) are filled with the data transferred from the host.

#### 3.7 Pormat

The format command can be used to format the entire disk. a complete surface, or a single track. Before sending a format command, the host system must first send a sector interlace list. NOTE: Pormat also assumes an Init command has been executed with the proper values. This is done with the write buffer command. The list begins with the first byte in the buffer data. The list's length is equal to the number of sectors on a track. The remainder of the write buffer data is zero filled. After transferring the interlace list using the write buffer command, the actual format command may be issued. The first parameter selects the unit . The unit number is followed by the head number. Valid head numbers are 9 - 7. To format more than one head with a single command, the head parameter byte can be modified to signal the head byte as a maximum value by setting the high order bit (D7) to a one. When D7 is a one for the head byte, the controller will format head zero through the maximum head number received from the host (starting with the max head). The third parameter byte in the format command is the track low byte. This is the low order portion of the track address. If it is desired to format more than one track (i.e., a surface or complete drive), this byte should equal the low order byte of the maximum track address. The fourth parameter byte is the high order track address. As in the low order track address byte, if a format drive or surface function is desired, this should be a maximum value. Valid high order track bytes are zero or one. If it is desired to format a complete surface, D7 of the high order track address (fourth parameter byte) should be set to a one. The fifth parameter byte is the number of sectors on a track - 1. The last three parameter bytes are zero. A typical format sequence follows.

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#### Pormat Specifications:

4 - Heads

153 - Tracks

16 - Sectors @ 512 bytes/sector

1 - sector increment value

Fill 512 byte buffer area in host with data. 16 sector numbers followed by 496 bytes of zero's.

Issue a write buffer command - 42 HEX

Transfer 512 bytes

Issue a format command - 27 HEX

# Send 8 parameter bytes

|    | DEA . | Format unit zero                       |
|----|-------|--|
| 83 | HEX   | Format head zero through 3             |
| 98 | HEX   | Maximum track number (LOW ORDER BYTE)  |
| 08 | HEX   | Maximum track number (HIGH ORDER BYTE) |
| ØP | HEX   | Number of sectors per track - 1        |
| 88 | HEX   | Reserved                               |
| 00 | HEX   | Reserved                               |
| 00 | REX   | Reserved                               |
|    |       | ·                                      |

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|                               | HEADER FORMAT       |                     |                     |                |                |                |                     |  |  |  |  |
|-------------------------------|---------------------|---------------------|---------------------|----------------|----------------|----------------|---------------------|--|--|--|--|
| т7                            | т <sub>6</sub>      | T <sub>5</sub>      | Т4                  | т3             | т2             | Tl             | Tø                  |  |  |  |  |
| H <sub>2</sub>                | н1                  | Нø                  | S4                  | S3             | s <sub>2</sub> | sı             | Sø                  |  |  |  |  |
| $\overline{\overline{T}}_{7}$ | T <sub>6</sub>      | T <sub>5</sub>      | T4                  | Ŧ3             | Ŧ2             | Ŧ <sub>1</sub> | Ŧø                  |  |  |  |  |
| T <sub>8</sub>                | -<br>H <sub>1</sub> | -<br>н <sub>Ø</sub> | -<br>s <sub>4</sub> | s <sub>3</sub> | s <sub>2</sub> | ₅<br>s₁        | -<br>s <sub>0</sub> |  |  |  |  |

If the currently selected head of the currently selected unit is positioned over a user track, the first four bytes returned from a Read ID command will be in the above form.

Pigure 3.2A User Track Format

|                |                |                | HEAL           | DER F | ORMAT          |                     | •              |   |
|----------------|----------------|----------------|----------------|-------|----------------|---------------------|----------------|---|
| Т7             | <sup>Т</sup> 6 | T <sub>5</sub> | Т4             | Т3    | T2             | T <sub>1</sub>      | Tg             | Physical Track<br>Low                       |
| Tg             | 1              | Ø              | 1              | 1     | H <sub>2</sub> | н1                  | Hg             | Physical T $_8$ , $B_{ m H}$ and Head       |
| T <sub>7</sub> | T <sub>A</sub> | T <sub>5</sub> | T <sub>4</sub> | Ŧ3    | Ŧ2             | Ŧ <sub>1</sub>      | Ŧø             | Physical Track<br>Low Not                   |
| Ī <sub>8</sub> | 1              | 8              | 1              | 1     | H <sub>2</sub> | -<br>H <sub>1</sub> | H <sub>Ø</sub> | Physical Ta, B <sub>H</sub><br>and Head Not |

If the currently selected head of the currently selected unit is positioned over a spare track, the first four bytes returned from a Read ID command will be in the above form.

Figure 3.2B Spare Track 58

\* Bit values following the slash are for tracks  $\geq$  51218

#### HEADER PORMAT

| <b>T</b> 7     | T <sub>6</sub> | T <sub>5</sub> | T4                  | т3             | T <sub>2</sub>      | Tl                            | Tø      | New Track Low   |
|----------------|----------------|----------------|---------------------|----------------|---------------------|-------------------------------|---------|---|
| Tg             | 1              | 1              | Ø                   | 1              | H <sub>2</sub>      | н                             | Hg      | New T <sub>8</sub> , D <sub>H</sub> and<br>New Head                   |
| Ŧ <sub>B</sub> | T   T          | 1 F5   1F9     | F                   | -<br>T3        | T <sub>2</sub>      | T <sub>1</sub>                | Tø      | New Track Low<br>Not  |
| Ŧ8             | 1              | 1              | g                   | 1              | -<br>н <sub>2</sub> | -<br>H <sub>1</sub>           | Hg      | New T <sub>8</sub> , D <sub>H</sub> and<br>New Head Not               |
| <b>T</b> 7     | т6             | <b>T</b> 5     | T4                  | Т3             | т2                  | Tl                            | Tø      | Current Track<br>Low  |
| H <sub>2</sub> | н1             | Нg             | s <sub>4</sub>      | S3             | s <sub>2</sub>      | sı                            | Sø      | Current Head/<br>Sector   |
| T <sub>7</sub> | T <sub>6</sub> | T <sub>5</sub> | T <sub>4</sub>      | Ŧ3             | Ŧ <sub>2</sub>      | $ar{	ilde{	ilde{	ilde{T}}}_1$ | Ŧø      | Current Track<br>Low Not  |
| Tg             | <del>й</del> 1 | H <sub>Ø</sub> | -<br>s <sub>4</sub> | s <sub>3</sub> | s <sub>2</sub>      | $\bar{s}_1$                   | -<br>Sø | Current T <sub>8</sub> ,H <sub>1</sub> ,H <sub>9</sub> and Sector Not |

If the currently selected head of the currently selected unit is positioned over a bad track, the eight bytes returned from a Read ID command will be in the above form.

Figure 3.2C Bad Track Format 68

#### 3.8 Read Disk

The read disk command causes the data in the sector addressed by the parameters following the command to be transferred to the sector buffer onboard the David Jr. II. The data may then be transferred to the host by using the read buffer command. The eight-byte transfer follows the address format described in Section 3.1.2.

## 3.9 Write Disk

The write disk command causes the data in the sector buffer to be transferred to the sector on the disk addressed by the parameters from the host. The eight-byte transfer follows the address format described in Section 3.1.2.

## 3.19 Pormat Spare

The format spare command follows the address format described in Section 3.1.2. The track of the specified unit and head will be formatted as a spare. The track address should be greater than the maximum user track address. This command need not be used if a format command is used with D7 of the head byte or D7 of the high order track byte set to a one.

#### 3.11 Drive Status

The drive status command returns to the host the eight bytes below:

| Byte !                     | Description                            |
|----------------------------|--|
| 9<br>1<br>2<br>3<br>4<br>5 | Drive 8 Status Drive 1 Status 88 88 88 |
| 7                          | 00                                     |

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The drive status bytes are defined below:

| DØ. | Dl   | D2       | D3 | D4  | D5  | D6 | D7 |                   |
|-----|------|----------|----|-----|-----|----|----|-------------------|
| i   | . !  | i        | i  |     | į   | 1  | i  | WRITE PROTECT     |
| į   | 1    | !        |    |     | 1   | i  |    | DRIVE SELECTED    |
| !   | 1 1  |          |    | 1   | . i |    |    | _ USED INTERNALLY |
|     |      |          | i  | · 1 |     |    |    | _ DRIVE READY     |
| 1   |      |          | i  |     |     |    |    | INDEX             |
| į   |      | Ì        |    |     |     | ·  |    | WRITE FAULT       |
| i   | _ i_ | •        |    |     |     |    |    | TRACK Ø           |
| i_  |      | <u> </u> |    |     |     |    |    | SEEK COMPLETE     |

#### 3.12 Seek.

Causes the heads on the specified unit to be moved to the track addressed in the eight-byte transfer. See Section 3.1.2.

#### 3.13 Read ID

Reads the first header found on the current track of the last selected unit and head, and transfers this header data to the host. (See HEADER FORMAT, Figure 3.2 A,B and C on pages 3-11 and 3-12).

3.14 Status - To be defined.

# 3.15 Append Map

A sector interlace pattern must be sent before append map (see Format, Section 3.7). The append map command requires an eight-byte transfer from the host, and follows the address format described in Section 3.1.2. The sector number is ignored. Upon receiving this command, the controller will search the addressed unit and head for a spare track. If none exists, an error code 48 will be returned to the host. If a spare is found, it will be reformatted as a user track. The bad track which was addressed in the eight-byte transfer will then be reformatted as bad with a pointer to the new user track. This command requires that the disk was previously formatted with mapping enabled, and a specified number of spares allotted at that time.

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#### 3.16 INIT

Upon power up, the David Jr. II defaults to a standard set of drive control parameters. These parameters are listed below, along with the default values for power up. To change these parameters, the host must first do a write buffer command to the David Jr. II with the list of bytes below starting at buffer address zero. The first 16 bytes transferred to the David Jr. II are then the new parameter bytes with the remaining bytes zero filled. After the write buffer command, the parameters will now be in the David Jr. II's ram buffer. Now an INIT command (single byte) must be issued to signal the David Jr. II to move these values into the parameter area.

| PRE-COMP SWITCH *                        | FFE                                     |
|--|---|
| PRE-COMP LOW ORDER ADDRESS               | 2 Ø B                                   |
| PRE-COMP HIGH ORDER ADDRESS              | 9 9 H                                   |
| REDUCE WRITE CURRENT SWITCH *            | PPH                                     |
| REDUCE WRITE CURRENT LOW ORDER ADDRESS   | . 86H                                   |
| REDUCE WRITE CURRENT HIGH ORDER ADDRESS  | 8 8 H                                   |
| STEP MODE (8=3ms,1=68us,3=288us,4=12us). | 0 GH                                    |
| MAX TRACK LOW ORDER ADDRESS              | 98H                                     |
| MAX TRACK HIGH ORDER ADDRESS             | 0 6 H                                   |
| SPARE-1 LOW ORDER ADDRESS                | 98H                                     |
| SPARE-1 HIGH ORDER ADDRESS               | 00H                                     |
| MAP SWITCH                               | PPH                                     |
| DRIVE TYPE (0=DEFAULT, 1=WESTERN DYNEX)  | 00H                                     |
| RESERVED                                 | 00R                                     |
| RESERVED                                 | 0 0 H                                   |
| RESERVED                                 | 00H                                     |
|  | • |

\* ALL SWITCHES: ON = 0FFH, OFF = 00H PRECOMP SWITCH: Byte \$
If this byte is \$\$\$, then all data is written to the disk with no pre-compensation added to the data. If this byte is \$\$\$P\$ Ber, all data to be written to the disk on track numbers less than the precomp address (see below) is written with no precompensation added to the data. All data to be written on track numbers greater than or equal to the precomp address will be written with ±12ns of shift in the data.

PRECOMP ADDRESS: Bytes 1 & 2
This is the two-byte address at which precompensation, if
switched on, will start to be applied to data written to
the disk. Track addresses less than precomp address will
not receive precompensated data. Track addresses greater
than or equal to precomp address will receive precompensated data if the precomp switch equals PP Hex. The low
order precomp address byte is before the high order precomp address byte.

REDUCE WRITE CURRENT SWITCH: Byte 3
If this byte is 00, the reduce write current control line from the controller to the disk will never go active. If this byte is PP Hex, when accessing track number greater than or equal to the reduce write current address the reduce write current control line will be active to the disk.

REDUCE WRITE CURRENT ADDRESS: Bytes 4 & 5
This is the two-byte address at which the reduce write current control line, if switched on, will go active. Access to track numbers less than this address will result in the reduce write current control line going inactive.

STEP MODE: Byte 6
This byte sets the internal step mode of the controller.
There are currently four step modes available. These are
listed below, with their corresponding codes:

- Standard 3ms Step Pulses
  68us Step Pulses
  288us Step Pulses
- 12us

MAXIMUM TRACK ADDRESS: Bytes 7 & 8
This two-byte address is equal to the value of the last track on the disk.

MAXIMUM USER TRACK ADDRESS: Bytes 9 & 18
This two-byte address is equal to the value of the last
user track on the disk (also equal to the address of the
first spare track minus one).

MAP SWITCH: Byte 11
If this byte is \$6, then the generation of spares, auto testing of the disk, and mapping of bad tracks during formatting of a unit are disabled. If this byte is FF Hex, and a format command is issued with D7 of the head byte set to a one, then an automatic process of formatting user tracks, spare tracks, testing all user tracks and mapping any bad tracks to spare tracks is done. If D7 of head is not set and D7 of the High order track byte is set, then the spare tracks will be generated but no mapping will be done.

RESERVED: Bytes 12 Thru 15: These bytes are reserved and their values (as well as the remainder of the buffer) should be 88.

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## 3.17 INIT1

The INIT command loads the desired parameters into the parameter area for both units. If the two units being controlled by the David Junior II are different, they may require different parameters. The INITL command is identical with the INIT command, except the parameters are loaded only into the unit #1 parameter area.

# KONAN CORPORATION DAVID JUNIOR II REPERENCE MANUAL - A

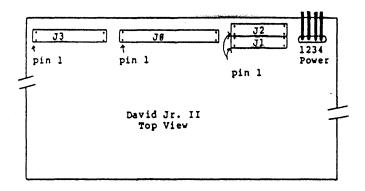
# Section 4.8 Installation

- 4.1 Cables
- 4.2 Jumper Description
- 4.3 Mounting

To install the David Junior II into a system, a minimum of four cables are required. These cables are:

- Host Interface Cable 26 pin, cable connector 3M# 3399-6026
- 2. Disk Control (daisy) cable 34 pin dual connector
  - Socket connector 3M# 3414-6989
  - Edge card connector 3M# 3463-8881
- Disk Data (radial) cable for drive #8 28 pin dual connector
  - Socket connector 3M# 3421-6000
  - Edge card connector 3M# 3461-0001
- Power cabling- 4 pin (male/female provided with the David Jr.II)

The proper placement of these connectors is shown in the pictoral diagram below (David Jr. II Cable Hookup, Figure 4.1). Be sure to observe correct polarity on the connectors.



| JØ    | 34 | pin | Daisy chain cable to drive(s)               |
|-------|----|-----|---|
| J1    | 2₿ | pin | Radial cable to drive #0                    |
| J2    | 20 | pin | Radial cable to drive #1                    |
| J3    | 26 | pin | Host cable                                  |
| Power | 4  | pin | Pin 1 Pin 2 Pin 3 Pin 4<br>Gnd +5V +12V GND |

# KONAN CORPORATION DAVID JUNIOR II REPERENCE MANUAL - A

# 4.2 Jumper Description

The following is a description of jumper locations. Refer to Figure 4.2 Jumper Locations.

- 1. CDM: C=clock delay, D=delay, M=MPM delay
- 2. Delay jumper: 1=delay 1, 2=delay 2, 3=delay 3
- 3. Write protect from drive jumper Unit 0
- 4. Write protect from drive jumper Unit 1
- 5. DMA/506 jumper
- 512/256 jumper: selects 256 or 512 byte sectors (U69 must also be changed)
- 7. 16/32 jumper: not used
- 8. WA WB: WA=standard, WB=write protect option
- 9. Write protect status to controller

NOTE: The trimmer potentiometers are set at the factory and should not be re-adjusted.

# S X S select 256/512 byte sectors (U69 must also be changed) **300**

Figure 4.2 Jumper Locations

# Page 4-4

#### 4.3 Mounting

If the David Jr. II is to be mounted on the disk drive, care must be taken since some drives are very sensitive to noise being induced into the heads or amplifier circuitry. To prevent this, the David Jr. II should be placed on the side of the drive opposite the circuit board. Also, a piece of MU metal should be mounted between the David Junior II and the disk drive.

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# KONAN CORPORATION DAVID JUNIOR II REFERENCE MANUAL - A

# 5.8 Maintenance/Service

# 5.1 Maintenance Procedure

# KONAN CORPORATION DAVID JUNIOR II REFERENCE MANUAL - A MAINTENANCE/SERVICE

## 5.1 Maintenance Philosophy

The David Junior II requires no preventative maintenance. Ronan's suggested method of repair is board replacement. If a board failure or any other board problem occurs, replace the faulty board with a good board and return board to Konan for repair

To help Konan provide you with prompt, high quality service, please follow these procedures when returning a board.

- Call Konan Corporation (602) 257-1355 to get a RMA (Return Material Authorization) number. The RMA number indentifies your board while it is at Konan for repair.
- Record your hardware strapping (if you haven't already done so) by using the convenient table in the installation section of this manual. You will need your strapping information to restrap your board when Konan returns it to you. (Konan tests the David Junior II with the default strapping).
- Enclose a copy of your strapping with the board being returned.
- 4. Copy and enclose the Problem Description Form, and describe all the information about the problem. If the problem applies to a specific situation, be sure to give as much information as possible about the situation.

# KONAN CORPORATION DAVID JUNIOR IT REFERENCE MANUAL - A MAINTENANCE/SERVICE

# PROBLEM DESCRIPTION FORM

| RMA Number  | •     |
|---|-------|
|   |       |
| Company Name                                      |       |
| Person to Contact                                 |       |
| Phone Area Code Number                            |       |
| Address   |       |
|   |       |
|   | 77    |
| Bill Attention of                                 |       |
| umber of Boards enclosed                          |       |
| ist Serial Number of each board                   | . •   |
|   | /     |
| Describe the Problem (use back of sheet if necess | sarv) |

| KONAN CORPORAT | ON DAVID | JUNIOR I | II REF | PERENCE | MANUAL - | - 2 |
|----------------|----------|----------|--------|---------|----------|-----|
|----------------|----------|----------|--------|---------|----------|-----|

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6.8 Diagnostics

KONAN CORPORATION DAVID JUNIOR II REFERENCE MANUAL - A DIAGNOSTICS

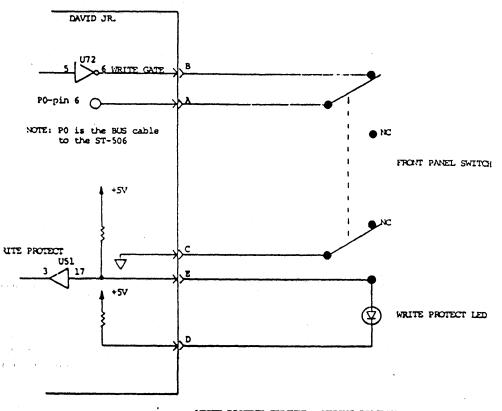
# 6.9 Diagnostics

A CP/M floppy is available with diagnostics for the David Jr. II. It tests the David Jr. II for correct data transfers, disk read, disk write, format, and header read functions.

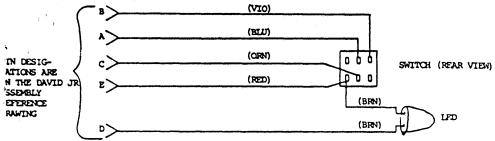
# KONAN CORPORATION DAVID JUNIOR II REPERENCE MANUAL - A

Section 7.8 Appendix

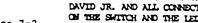
# Write Protect Circuit Schematic

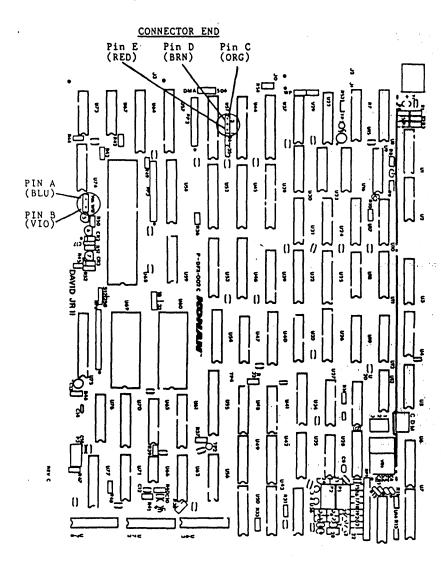


# WRITE PROTECT CIRCUIT - WIRING DIAGRAM



ADD SHRINK TUBING TO COVER, ALL PINS CONNECTING TO THE DAVID JR. AND ALL CONNECTIONS ON THE SAITCH AND THE LED





Page 7-3