## Commodore Disk Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>8250</th>
<th>8050</th>
<th>4040</th>
<th>2031</th>
<th>1541</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drives per Head</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Heads per Drive</td>
<td>6</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

### Formatted Storage
- **Capacity per Unit:**
  - D9090: 7.47 MB
  - D9060: 4.98 MB
  - 8250: 2.12 MB
  - 8050: 1.05 MB
  - 4040: 521 KB
  - 2031: 168 KB
  - 1541: 167 KB
- **Max Sequential Files/Drive:**
  - D9090: 7.41 MB
  - D9060: 4.94 MB
  - 8250: 1.05 MB
  - 8050: 183 KB
  - 4040: 168 KB
  - 2031: 167 KB
  - 1541: 167 KB
- **Max Relative Files/Drive:**
  - D9090: 7.35 MB
  - D9060: 4.90 MB
  - 8250: 1.04 MB
  - 8050: 4 KB
  - 4040: 4 KB
  - 2031: 4 KB
  - 1541: 2 KB
- **Disk System Buffer:**
  - 4 KB

### Disk Formats
- **Cylinders (Tracks):**
  - D9090: 153
  - D9060: 153
  - 8250: 77
  - 8050: 77
  - 4040: 35
  - 2031: 35
  - 1541: 35

- **Sectors per Cylinder:**
  - D9090: 128
  - D9060: 192
  - 8250: 23-29
  - 8050: 23-29
  - 4040: 17-21
  - 2031: 17-21
  - 1541: 17-21

- **Sectors per Track:**
  - D9090: 32
  - D9060: 32
  - 8250: 256
  - 8050: 256
  - 4040: 256
  - 2031: 256
  - 1541: 256

- **Bytes per Sector:**
  - D9090: 256
  - D9060: 256
  - 8250: 256
  - 8050: 256
  - 4040: 256
  - 2031: 256
  - 1541: 256

- **Blocks Free:**
  - D9090: 29162
  - D9060: 19442
  - 8250: 8266
  - 8050: 4104
  - 4040: 1328
  - 2031: 664
  - 1541: 664

### Transfer Rates (bytes per second)
- **Internal to Unit:**
  - 5 MB: 1.2 KB
  - 5 MB: 1.2 KB
  - 40 KB: 1.2 KB
  - 40 KB: 1.2 KB
  - 40 KB: 1.2 KB
  - 40 KB: 1.2 KB

- **IEEE-488 Bus:**
  - 1.2 KB
  - 1.2 KB
  - 1.2 KB
  - 1.2 KB
  - 1.2 KB

### Access Times (milliseconds)
- **Track-To-Track:**
  - 3
  - 3
  - 5
  - *
  - 30
  - 30
  - 30

- **Average Track:**
  - 153
  - 153
  - 125
  - **
  - 360
  - 360
  - 360

- **Head Settling Time:**
  - 15
  - 15
  - *
  - *
  - *
  - *
  - *

- **Average Latency:**
  - 8.34
  - 8.34
  - 100
  - 100
  - 100
  - 100
  - 100

- **RPM:**
  - 3600
  - 3600
  - 300
  - 300
  - 300
  - 300

### Physical Dimensions
- **Height (inches):**
  - 5.75
  - 5.75
  - 7.0
  - 7.0
  - 7.0
  - 5.5
  - 3.0

- **Width (inches):**
  - 8.25
  - 8.25
  - 15.0
  - 15.0
  - 15.0
  - 8.0
  - 7.0

- **Depth (inches):**
  - 15.25
  - 15.25
  - 13.75
  - 13.75
  - 13.75
  - 14.25
  - 13.0

- **Weight (pounds):**
  - 21
  - 21
  - 28
  - 28
  - 28
  - 20
  - 10

### Electrical
- **Power (Watts):**
  - 200
  - 200
  - 60
  - 50
  - 50
  - 40
  - 35

- **Voltage (all models):**
  - 110 – 120 VAC. 60 Hz

## Disk Utility-Command Set

<table>
<thead>
<tr>
<th>Command</th>
<th>Abbreviation</th>
<th>Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>Block-Read</td>
<td>B-R</td>
<td><code>B-R: ch:dr(ts)</code></td>
</tr>
<tr>
<td>Block-Write</td>
<td>B-W</td>
<td><code>B-W: ch:dr(ts)</code></td>
</tr>
<tr>
<td>Block-Execute</td>
<td>B-E</td>
<td><code>B-E: ch:dr(ts)</code></td>
</tr>
<tr>
<td>Buffer-Pointer</td>
<td>B-P</td>
<td><code>B-P: ch:p</code></td>
</tr>
<tr>
<td>Block-Allocate</td>
<td>B-A</td>
<td><code>B-A: dr(ts)</code></td>
</tr>
<tr>
<td>Block-Free</td>
<td>B-F</td>
<td><code>B-F: dr(ts)</code></td>
</tr>
<tr>
<td>Memory-Write</td>
<td>M-W</td>
<td><code>M-W: adl/adc/nadl</code></td>
</tr>
<tr>
<td>Memory-Read</td>
<td>M-R</td>
<td><code>M-R: adl/adc</code></td>
</tr>
<tr>
<td>Memory-Execute</td>
<td>M-E</td>
<td><code>M-E: adl/adc</code></td>
</tr>
<tr>
<td>User Command</td>
<td>U</td>
<td><code>u:ch:dr(ts)</code></td>
</tr>
</tbody>
</table>

### Sector Distribution By Track

<table>
<thead>
<tr>
<th>Track Number</th>
<th>4040</th>
<th>2031</th>
<th>1541</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 – 17</td>
<td>21</td>
<td>21</td>
<td>21</td>
</tr>
<tr>
<td>18 – 24</td>
<td>19</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>25 – 30</td>
<td>18</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>31 – 35</td>
<td>17</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td>1 – 39</td>
<td>29</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>40 – 53</td>
<td>27</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>54 – 64</td>
<td>25</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>65 – 77</td>
<td>23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>78 – 116</td>
<td>29</td>
<td></td>
<td></td>
</tr>
<tr>
<td>117 – 130</td>
<td>27</td>
<td></td>
<td></td>
</tr>
<tr>
<td>131 – 141</td>
<td>25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>142 – 154</td>
<td>25</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### User Command Jump Table

<table>
<thead>
<tr>
<th>Standard Syntax</th>
<th>Alternate Syntax</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>U1</td>
<td>UA</td>
<td>Block-Read replacement</td>
</tr>
<tr>
<td>U2</td>
<td>UB</td>
<td>Block-Write replacement</td>
</tr>
<tr>
<td>U3</td>
<td>UC</td>
<td>Jump to $1300</td>
</tr>
<tr>
<td>U4</td>
<td>UD</td>
<td>Jump to $1303</td>
</tr>
<tr>
<td>U5</td>
<td>UE</td>
<td>Jump to $1306</td>
</tr>
<tr>
<td>U6</td>
<td>UF</td>
<td>Jump to $1309</td>
</tr>
<tr>
<td>U7</td>
<td>UG</td>
<td>Jump to $130C</td>
</tr>
<tr>
<td>U8</td>
<td>UH</td>
<td>Jump to $130F</td>
</tr>
<tr>
<td>U9</td>
<td>UI</td>
<td>Jump to $160F (NM)</td>
</tr>
<tr>
<td>U;</td>
<td>UI</td>
<td>Power-Up vector (reset)</td>
</tr>
</tbody>
</table>
## BAM (Block Allocation Map) Formats

### 4040, 2031, and 1541 BAM Format – Track 18 Sector 00

<table>
<thead>
<tr>
<th>Byte*</th>
<th>Description</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1</td>
<td>Track–Sector of first Directory block</td>
<td>18–00</td>
</tr>
<tr>
<td>2</td>
<td>ASCII 'a' Identifies DOS 2.6 format</td>
<td>65</td>
</tr>
<tr>
<td>3</td>
<td>Reserved for future DOS use</td>
<td>00</td>
</tr>
<tr>
<td>4-143</td>
<td>Bit map of available blocks</td>
<td>tracks 1–35</td>
</tr>
</tbody>
</table>

### 8050 BAM Format

<table>
<thead>
<tr>
<th>Byte*</th>
<th>Description</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–1</td>
<td>Track–Sector of next BAM block</td>
<td>38–03</td>
</tr>
<tr>
<td>2</td>
<td>ASCII 'c' Identifies DOS 2.5 format</td>
<td>67</td>
</tr>
<tr>
<td>3</td>
<td>Reserved for future DOS use</td>
<td>00</td>
</tr>
<tr>
<td>4</td>
<td>Lowest track * mapped in this BAM block</td>
<td>01</td>
</tr>
<tr>
<td>5</td>
<td>Highest track * (+1) mapped in this BAM block</td>
<td>51</td>
</tr>
<tr>
<td>6</td>
<td>Number of unused blocks on track:</td>
<td>1</td>
</tr>
<tr>
<td>7–10</td>
<td>Bit map of available blocks on track:</td>
<td>1</td>
</tr>
<tr>
<td>11–255</td>
<td>(BAM 2: 11–140) Bit map of available blocks on tracks:</td>
<td>2–50</td>
</tr>
</tbody>
</table>

### 8250 BAM Format

<table>
<thead>
<tr>
<th>Byte*</th>
<th>Description</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–1</td>
<td>Track–Sector of next BAM block</td>
<td>38–03</td>
</tr>
<tr>
<td>2</td>
<td>ASCII 'c' Identifies DOS 2.7 format</td>
<td>67</td>
</tr>
<tr>
<td>3</td>
<td>Reserved for future DOS use</td>
<td>00</td>
</tr>
<tr>
<td>4</td>
<td>Lowest track * mapped in first BAM block</td>
<td>01</td>
</tr>
<tr>
<td>5</td>
<td>Highest track * (+1) mapped in first BAM block</td>
<td>51</td>
</tr>
<tr>
<td>6</td>
<td>Number of unused blocks on track:</td>
<td>1</td>
</tr>
<tr>
<td>7–10</td>
<td>bit map of available blocks on track:</td>
<td>1</td>
</tr>
<tr>
<td>11–255</td>
<td>(BAM 4: 11–25) Bit map of available blocks on tracks:</td>
<td>2–50</td>
</tr>
</tbody>
</table>

### D9060 / D9090 BAM Format – Track 1 Sector 0 (normal location)

<table>
<thead>
<tr>
<th>Byte*</th>
<th>Description</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–1</td>
<td>Track–Sector pointer to next BAM block</td>
<td>$FFFFFF = last</td>
</tr>
<tr>
<td>2–3</td>
<td>Track–Sector pointer to previous BAM block</td>
<td>$FFFFFF = first</td>
</tr>
<tr>
<td>4</td>
<td>Lowest track * mapped in this BAM block</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Highest track * (+1) mapped in this BAM block</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Number of blocks unused on this track</td>
<td></td>
</tr>
<tr>
<td>7–10</td>
<td>Bit map of available blocks on this track</td>
<td></td>
</tr>
<tr>
<td>11–255</td>
<td>Bit map of the next 49 tracks</td>
<td></td>
</tr>
</tbody>
</table>

## Directory Format

### 2031, 4040, 1541 Directory Header – Track 18 Sector 00

<table>
<thead>
<tr>
<th>Byte*</th>
<th>Description</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>1–143</td>
<td>Reserved for 2031 BAM</td>
<td></td>
</tr>
<tr>
<td>144–161</td>
<td>Diskette name, padded with shifted spaces</td>
<td></td>
</tr>
<tr>
<td>162–163</td>
<td>Diskette ID number</td>
<td></td>
</tr>
<tr>
<td>164</td>
<td>Shifted space</td>
<td></td>
</tr>
<tr>
<td>165–166</td>
<td>ASCII '2' Identifies DOS version and format</td>
<td></td>
</tr>
<tr>
<td>167–170</td>
<td>Shifted spaces</td>
<td></td>
</tr>
<tr>
<td>171–255</td>
<td>Not used</td>
<td></td>
</tr>
</tbody>
</table>

### 8050, 8250 Directory Header – Track 39 Sector 00

<table>
<thead>
<tr>
<th>Byte*</th>
<th>Description</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–1</td>
<td>Track–Sector to first BAM block</td>
<td>38, 00</td>
</tr>
<tr>
<td>2</td>
<td>ASCII 'c' Identifies DOS 2.5 format</td>
<td>67</td>
</tr>
<tr>
<td>3</td>
<td>reserved for future DOS use</td>
<td>00</td>
</tr>
<tr>
<td>4–5</td>
<td>Not used</td>
<td></td>
</tr>
<tr>
<td>6–21</td>
<td>Diskette name, padded with shifted spaces</td>
<td></td>
</tr>
<tr>
<td>22–23</td>
<td>Shifted spaces</td>
<td></td>
</tr>
<tr>
<td>24–25</td>
<td>Diskette ID number</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>Shifted space</td>
<td></td>
</tr>
<tr>
<td>27–28</td>
<td>ASCII '2' Identifies DOS version and format</td>
<td></td>
</tr>
<tr>
<td>29–32</td>
<td>Shifted spaces</td>
<td></td>
</tr>
<tr>
<td>33–255</td>
<td>Not used</td>
<td></td>
</tr>
</tbody>
</table>

### D9060 / D9090 Directory Header – Track 0 Sector 0

<table>
<thead>
<tr>
<th>Byte*</th>
<th>Description</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–1</td>
<td>Track–Sector pointer to bad track and sector list</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Identifies DOS 3.0 format</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Track–Sector of first directory block</td>
<td></td>
</tr>
<tr>
<td>4–5</td>
<td>Not used</td>
<td></td>
</tr>
<tr>
<td>6–7</td>
<td>Track–Sector of first BAM block</td>
<td></td>
</tr>
<tr>
<td>8–9</td>
<td>Track–Sector of first BAM block</td>
<td></td>
</tr>
</tbody>
</table>

### Additional Notes

- 2031 Directory Blocks - Track 18 Sector 01 through 18
- 4040 Directory Blocks - Track 18 Sector 01 through 18
- 8050 Directory Blocks - Track 39 Sector 01 through 20
- 8250 Directory Blocks - Track 39 Sector 01 through 20
- D9060 / D9090 Directory Blocks - Starting on cylinder 76, uses all Tracks - Sectors 00 through 31, then expands to additional blocks as required, providing 'unlimited' directory size.

<table>
<thead>
<tr>
<th>Byte*</th>
<th>Description</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–1</td>
<td>Track–sector pointer to next directory block</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>File type</td>
<td></td>
</tr>
<tr>
<td>4–5</td>
<td>Track–sector pointer to first file block</td>
<td></td>
</tr>
<tr>
<td>5–20</td>
<td>File name, padded with shifted spaces</td>
<td></td>
</tr>
<tr>
<td>21–22</td>
<td>Track–sector of first side sector if RELATIVE file</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Record length if relative file</td>
<td></td>
</tr>
<tr>
<td>24–27</td>
<td>Reserved for future file information</td>
<td></td>
</tr>
<tr>
<td>28–29</td>
<td>Track–sector pointer for replacement</td>
<td></td>
</tr>
<tr>
<td>30–31</td>
<td>Number of blocks used by the file</td>
<td></td>
</tr>
<tr>
<td>32–255</td>
<td>Seven more 32-byte file entries (same as 2–31 above, plus two additional unused bytes)</td>
<td></td>
</tr>
</tbody>
</table>

- 32 bytes per file entry; except the first entry is 30 bytes
- Total of eight (8) file entries per directory block
- File types are: Scratched Files $00
- Sequential Files $01
- Program Files $02
- User-Defined $03
- Relative Record $04
- File type codes are OR ed with 880 when file is properly closed
- Track value of 00 in byte zero indicates the last used block in the directory. Sector value then shows next byte to use