MD21 Co-Processor Conversion Details

This Application Note is pertinent to Mentor I and Quantum II Drives

MD21 Co-Processor

One of the strong points of the Mentor I and Quantum II was the ability of these drives to accommodate a Co-Processor we called the MD21.

When considering a Mentor I to Mentor II or Quantum II to Quantum III conversion one must ask:

Does your drive contain an MD21?

The photo below shows an MD21 plugged into the MD200 board of the drive.
If there is an MD21 and it was executing either one of our Standard Application programs or a custom BASIC program, the MD29 with our Mentor II or Quantum III can achieve the equivalent or better functionality.

Most of the time when the MD21 was employed, it ran one of Control Techniques “Standard Application Programs” to solve of of several common applications such as:

### Standard Application Programs

- **PID Control** – for Dancer or Load Cell Tension Control sections
- **S-Ramp Accel/Decel** – for vertical applications typically
- **Shaft Orientation** – for stopping the motor shaft to line up with a specified point
- **Digital Position Lock** – for precise speed control (motor would have encoder)
- **CTCW** – for Constant Tension CenterWind applications

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<tr>
<th>Application Function</th>
<th>IC # Designation</th>
<th>Notes</th>
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<tr>
<td>Communication Only – RS485 ANSI</td>
<td>9300-9901</td>
<td>Not required typically</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Updated Drive has built-in serial port</td>
</tr>
<tr>
<td>Digital Position Lock</td>
<td>9300-9902</td>
<td>May not be required – Updated Drive has built-in Digital Lock</td>
</tr>
<tr>
<td>May have external thumbwheels for adjustable ratio – not used w/Mentor II MD22 typically below/under MD21</td>
<td></td>
<td>Requires 9729-9002 MD29 for Adjustable Ratio</td>
</tr>
<tr>
<td>Spindle Orientation</td>
<td>9300-9903</td>
<td>Requires 9729-9003 MD29</td>
</tr>
<tr>
<td>Centerwind Tension Control</td>
<td>9300-9904</td>
<td>Requires 9729-9004 MD29</td>
</tr>
<tr>
<td>PID Loop Control</td>
<td>9300-9905</td>
<td>Requires 9729-9005 MD29</td>
</tr>
<tr>
<td>S-Ramp Accel/Decel Control</td>
<td>9300-9906</td>
<td>Requires 9729-9001 MD29</td>
</tr>
<tr>
<td>Kilowatt Calculator</td>
<td>9300-9908</td>
<td>Requires 9729-9006 MD29</td>
</tr>
<tr>
<td>Adjustable Current vs Time Overload</td>
<td>9300-9910</td>
<td>May not be required w/Updated Drive</td>
</tr>
</tbody>
</table>
If the Mentor I or Quantum II contains an MD21 one must ask:

Does the MD21 contain a "Standard Application Program"?
   If so which one?

Taking a closer look at the MD21, we notice that there is an IC (EPROM) in the left large socket. This IC should have a label/sticker on it that identifies the program it contains.

This chip is identified as 9300-9904
Custom BASIC Programs

The MD21 was fairly unique in its’ day as it would allow End Users to create their own custom programmed applications using Intel Basic for the 8032/8052 microprocessor. The MD21 coprocessor could contain just a User Program created in BASIC or could contain both a Standard Application and a BASIC program. This made the coprocessor quite flexible- it was a good thing but …. the MD21 is also obsolete. To make matters a little worse, if there is a BASIC program written, it does not convert directly over to the MD29. We do have the ability however to extract the BASIC program and possibly decipher what the author was doing and re-create it using our newer DPL Language.

Does the MD21 contain a “custom BASIC program”? If so which one?

Taking a closer look at the MD21, we notice that there is an IC (EPROM) in the right large socket. This IC should have a label/sticker on it that identifies the program it contains. There were a wide variety of these created by Control Techniques, OEM, System Integrators and even End Users.
Does the MD21 contain a “custom BASIC program”? If so which one?

Taking a closer look at the MD21, we notice that there is an IC (EPROM) in the right large socket. This IC should have a label/sticker on it that identifies the program it contains. There were a wide variety of these created by Control Techniques, OEM, System Integrators and even End Users. In this case there is no sticker any longer.

One may need to extract the BASIC program from the MD21 in order to determine what it was doing so that an appropriate evaluation can be performed concerning the conversion.

Click on the attached link for that information: **CTAN133**

or via web at:  [http://www.emersonct.com/download_usa/appNotes/ctan133.pdf](http://www.emersonct.com/download_usa/appNotes/ctan133.pdf)
Digital Lock

When the Digital Lock application was used (9300-9902) the MD21 would employ a sister board called MD22. The MD22 was merely a hardware up/down counter that would count incoming encoder feedback so that position lock could be achieved.

In addition, sometimes there would be a header coming off the upper right header pins that would go to a Transceiver Interface Board that would go to a Remote Operator Thumbwheel module that would permit the Ratio to be adjusted.

Today with the MD29 Digital Lock, thumbwheels are no longer accommodated. Ratio adjustment with MD29 is typically accomplished using a remote mounted HMI such as our CTIU keypad/display unit.

MD22 would connect via ribbon to this connector (see MD22 on next page)
MD22 Encoder Up/Down Counter/Accumulator

Questions ?? Ask the Author:

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