Tracker 4See™

A Suite of Hardware and Software Products that Allow for Remote Diagnostics and Maintenance of LCD Monitors
Tracker 4See™ Key Features

◊ General Digital-Designed Proprietary Tracker 4See™ Hardware/Software

◊ View Hardware Status
  - Monitor hardware performance in real time
    o View current fan speed, inverter current, power supply output voltage, DC-DC voltage, backlight brightness and various temperatures (inverter current and voltages require optional Power Management PCB)
    o View video controller settings and input video modes of operation

◊ Command and Control Video Features
  - Allows pass-through RS-232 commands to the video controller, locally or remotely
    o Status, query commands
    o Calibration commands
    o Image commands
    o Control commands
    o PIP commands
  - Upgrade/refresh video controller firmware (custom or standard) in the field
Tracker 4See™ Key Features

- General Digital-Designed Proprietary Tracker 4See™ Hardware/Software

- Manages/Controls Administrative Features
  - Perform initial calibration using a GD-trained expert
  - Set temperature limits for “fan speed vs. temperature” (e.g., 25% @ 25° C, 50% @ 30° C, etc.)
  - Defines operating parameters for automatic over-temperature soft failure algorithm (e.g., 90% brightness @ 50° C, 80% brightness @ 52° C, etc.)
  - Set other trim table values
  - Administration of service/failure alert e-mails
    - Define personnel to be notified in the event of monitor failures
  - Calibrate and optimize video controller performance
  - Troubleshoot and diagnose failures
  - Train field operatives remotely

- Records Failure & Performance History
  - Provides technicians with complete log of performance and failure history

Power Management PCB (Optional)
## Tracker 4See™ Interface – Environmental Data

### Tracker Board Environmental Data

<table>
<thead>
<tr>
<th>Environmental Data</th>
<th>Trim Data</th>
<th>Video Data</th>
<th>Event Log</th>
</tr>
</thead>
</table>

#### General

<table>
<thead>
<tr>
<th>Video Control Bios</th>
<th>V0.29.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mac Address</td>
<td>0004A3000201</td>
</tr>
<tr>
<td>Runtime Hours</td>
<td>798.50</td>
</tr>
<tr>
<td>Tracker Firmware</td>
<td>1.0.0</td>
</tr>
</tbody>
</table>

#### Temperature

- **Temp #1 (Top Left Inverter):** 29.50°C
- **Temp #3 (Misc. Electronics):** 28.31°C
- **Temp #5 (Bottom Right Inver.):** 30.19°C

#### Fans

<table>
<thead>
<tr>
<th>Fan #1 (Top Left)</th>
<th>10800 RPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fan #2 (Top Right)</td>
<td>10740 RPM</td>
</tr>
<tr>
<td>Fan #3 (Bottom Left)</td>
<td>0 RPM</td>
</tr>
<tr>
<td>Fan #4 (Top Right)</td>
<td>10980 RPM</td>
</tr>
<tr>
<td>Fan #7 (Bottom Right)</td>
<td>10950 RPM</td>
</tr>
<tr>
<td>Fan Command</td>
<td>405 (0 to 511)</td>
</tr>
</tbody>
</table>

#### Brightness

- **Current Brightness:** 1553 Lux
- **Ambient Brightness:** 447 Lux
- **B/L Brightness Command:** 511 Volts (0 to 3.3)
- **Backlight (On/Off):** 1

#### Inverters/Power Supply

- **Current (Inv. Top Left):** 2.58 Amps
- **Current (Inv. Top Right):** 3.08 Amps
- **Current (Inv. Bottom Left):** 2.61 Amps
- **Current (Inv. Bottom Right):** 3.18 Amps
- **Power Supply Output:** 23.89 Volts
- **DC-DC Output:** 12.02 Volts

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# Tracker 4See™ Interface – Trim Data: Thermal

## Tracker Board Trim Data

<table>
<thead>
<tr>
<th>Environmental Data</th>
<th>Trim Data</th>
<th>Video Data</th>
<th>Event Log</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fans</td>
<td>Brightness</td>
<td>Thermal</td>
<td>Current / Voltage</td>
</tr>
</tbody>
</table>

### Thermal

#### Temperature Trims

<table>
<thead>
<tr>
<th>Install Flags</th>
<th>Sensor #1 Offset</th>
<th>Sensor #2 Offset</th>
<th>Sensor #3 Offset</th>
<th>Sensor #4 Offset</th>
<th>Sensor #5 Offset</th>
<th>Sensor #6 Offset</th>
<th>Sensor #7 Offset</th>
<th>Sensor #8 Offset</th>
<th>Thermal Fan Range, Low</th>
<th>Thermal Fan Range, High</th>
<th>Thermal Fan Range, Deadband</th>
<th>Thermal Fault Range, Low</th>
<th>Thermal Fault Range, High</th>
<th>Thermal Fault Range, Shutdown</th>
<th>Password</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1.2.3.4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>240</td>
<td>640</td>
<td>40</td>
<td>-40</td>
<td>1280</td>
<td>40</td>
<td></td>
</tr>
</tbody>
</table>

#### Password

Submit
Tracker 4See™ Interface – Video Data: Utilities 1

TRACKER BOARD VIDEO SETTINGS

<table>
<thead>
<tr>
<th>Environmental Data</th>
<th>Trim Data</th>
<th>Video Data</th>
<th>Event Log</th>
<th>Picture</th>
<th>Source</th>
<th>Utilities 1</th>
<th>Utilities 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

UTILITIES 1

SETUP

- Auto Picture Setup
- Auto Color Gain
- Wide Screen Mode Detection
- Manual Clock: 2578
- Manual Phase: 42
- Auto Source Seek: Adjust
- De-Interlacing Mode: Unused
- Auto Power: 1
- Video Standard: 0
- Gamma: 0
- Color Temperature: Adjust

OSD

- OSD Position Horizontal: 128
- OSD Position Vertical: 128
- OSD Timeout: 60
- 5-60 seconds, 0 = Continuous
- OSD Screen Marker
  - Screen Marker
  - Center Marker
  - Safe Area Marker: 0
  - Aspect Marker
  - Transparency: 0
  - 0-95% [4 steps]
- OSD Language: English, Chinese
- OSD Transparency: 0

Submit

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## Tracker 4See™ Board Hardware/Software

Tracker Board Features and Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitor and diagnose the health of the monitor and its internal electronic subassemblies via the Internet.</td>
<td>Allows a customer appointed administrator or General Digital (GD) technician to establish a direct communication with the monitors over a LAN connection for the express purpose of monitoring the health of the monitors, and/or troubleshooting/diagnosing in-the-field malfunctions. Remote operators are able to query operational status of the major electronics (fans, video controller, backlights, inverters, power supplies), verify and configure calibration settings, and issue control commands. Enables GD the ability to provide worldwide service anywhere our monitors are installed, provided Internet service and Internet security access is provided. Allows GD to cost effectively engage and deploy a network of independent third party service providers globally to implement field replacement of defective electronics based on remote diagnosis by trained GD personnel. Prevents unnecessary downtime of the monitors; i.e., returning to a GD Service Depot. Saves customer extraordinary expense of shipping large and heavy monitors back and forth to Connecticut for diagnosis and repair. Additional time and shipment savings by avoiding customs inspections/delays and shipping charges for international shipments. Minimize damage due to shipment and handling.</td>
</tr>
</tbody>
</table>
## Tracker 4See™ Board Hardware/Software

Tracker Board Features and Benefits

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<tr>
<td>Monitors temperature from 5 temperature sensors located strategically throughout the monitor.</td>
<td>Temperature data is used by microprocessor to control fan speed and/or backlight brightness (indirectly reduces power consumption and heat dissipation) to prevent critical failures due to over-temperature conditions.</td>
</tr>
<tr>
<td>Monitors the speed (RPMs) of each of the 8 cooling fans.</td>
<td>Technician can identify if any of the fans have failed permanently, or intermittently. Individual fan failures are reported in real time to facilitate pro-active repair that, in turn, prevents critical hardware failures and unscheduled downtime.</td>
</tr>
<tr>
<td>Controls the speed of the cooling fans in response to the temperature conditions reported by the temperature sensors.</td>
<td>Fan speed is optimized to provide proper level of cooling while maintaining minimal audible noise.</td>
</tr>
<tr>
<td>Monitors the brightness provided by an optical sensor located on the LCD backlight.</td>
<td>Allows technician to determine if the backlights are functional. Also allows determination of amount of brightness decay that has resulted from usage.</td>
</tr>
<tr>
<td>Monitors the current from each of the LCD’s 3 inverters.</td>
<td>Provides an indication of a faulty inverter. Specifically identifies the offending inverter so that it can be replaced by third party service personnel.</td>
</tr>
<tr>
<td>Monitors the output voltage from the integrated power supply.</td>
<td>Provides indication of power supply failure or “dirty” AC power.</td>
</tr>
<tr>
<td>Record individual failures and failure history in non-volatile memory.</td>
<td>Provides technicians with a complete log of the monitor’s performance and failure history.</td>
</tr>
</tbody>
</table>
## Tracker 4See™ Board
### Hardware/Software

**Tracker Board Features and Benefits**

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
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<tr>
<td>Provides remote service technician or administrator with the ability to issue status/query, calibration and control commands to the integrated video controller. Nearly all of the video controller commands that can be issued locally can also be issued remotely:</td>
<td>Allows the administrator or service technician to perform the following functions:</td>
</tr>
<tr>
<td><strong>Status/Query Commands</strong></td>
<td>Monitor the health of the monitor and its individual electro-mechanical subassemblies.</td>
</tr>
<tr>
<td>Runtime hours</td>
<td></td>
</tr>
<tr>
<td>Video mode</td>
<td></td>
</tr>
<tr>
<td>Resolution inquiry</td>
<td></td>
</tr>
<tr>
<td>Sync frequency inquiry</td>
<td></td>
</tr>
<tr>
<td>Color settings</td>
<td></td>
</tr>
<tr>
<td>Calibration settings</td>
<td></td>
</tr>
<tr>
<td>Image settings</td>
<td></td>
</tr>
<tr>
<td>Source settings</td>
<td></td>
</tr>
<tr>
<td>BIOS version</td>
<td></td>
</tr>
<tr>
<td><strong>Calibration Commands</strong></td>
<td>Properly calibrate and optimize the performance of the monitor.</td>
</tr>
<tr>
<td>Auto calibrate</td>
<td></td>
</tr>
<tr>
<td>Load default values</td>
<td></td>
</tr>
<tr>
<td>Frequency</td>
<td></td>
</tr>
<tr>
<td>Phase</td>
<td></td>
</tr>
<tr>
<td>Scaling mode</td>
<td></td>
</tr>
<tr>
<td>OSD (position, transparency, language, timeout)</td>
<td></td>
</tr>
</tbody>
</table>
## Tracker Board Features and Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
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<tbody>
<tr>
<td>Provides remote service technician or administrator with the ability to issue status/query, calibration and control commands to the integrated video controller. Nearly all of the video controller commands that can be issued locally can also be issued remotely (continued):</td>
<td>Allows the administrator or service technician to perform the following functions:</td>
</tr>
<tr>
<td><img src="image.png" alt="Feature Image" /></td>
<td><img src="image.png" alt="Benefit Image" /></td>
</tr>
</tbody>
</table>

### Features

#### Image Commands
- Red, green and blue levels
- Gamma level
- Color temperature
- Saturation, hue, sharpness
- Zoom level and position

#### Control Commands
- Power on/off
- Backlight on/off
- Backlight brightness control
- Volume control
- Scaling mode
- Input main
- Auto source seek
- Source layout

#### PIP Commands
- Brightness, contrast, position, window size, source select, swap, transparency, auto off

### Benefits
- Optimize the performance of the monitors.
- Troubleshoot and diagnose failures while the monitor is still deployed in the field.
- Train field operatives remotely.
Tracker Board Hardware/Software

Tracker Board Features and Benefits

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<tr>
<th>FEATURES</th>
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</tr>
</thead>
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<tr>
<td>Text over graphics</td>
<td>Provides local failure reporting on the display using the text-over-graphics feature. Remote technicians can also communicate with local operators via the text-over-graphics interface to provide instructions or status.</td>
</tr>
<tr>
<td>Upgrade video controller in the field.</td>
<td>Standard or custom firmware upgrades can be uploaded in the field without requiring the monitor be returned to a Service Depot.</td>
</tr>
<tr>
<td>Future/Optional Capabilities</td>
<td>Increased flexibility, convenience and control.</td>
</tr>
<tr>
<td>Automatic failure alerts via email to administrators and/or GD service personnel upon failure generation</td>
<td></td>
</tr>
<tr>
<td>Support for serial interface</td>
<td></td>
</tr>
<tr>
<td>Support for USB interface</td>
<td></td>
</tr>
<tr>
<td>Support for IR remote operation</td>
<td></td>
</tr>
<tr>
<td>Support for RF remote operation</td>
<td></td>
</tr>
<tr>
<td>Automatic over-temperature shutdown</td>
<td></td>
</tr>
</tbody>
</table>
What Does Tracker 4See™ Offer?

- **Reduced Cost of Ownership**
  - **Remotely monitor health via the Internet**
    - Detect performance anomalies and address them before they lead to critical failures
    - Offer 24/7 GD monitoring service (fee based)
  - **Remotely diagnose failures via the Internet**
    - Replacement of defective components in the field
      - GD identifies defective components and sends replacement parts and “pro-process” procedures directly to local third party technicians
    - Minimize operational downtime by reducing the need to return defective monitors to a GD service depot
  - **Training via the Internet (fee based)**
Why Buy from General Digital?

- Mature QC Department and Acceptance Testing
  - Extensive Burn-in Testing for a Minimum of 72 Hours
  - Documented Procedures and Acceptance Criteria
Why Buy from General Digital?

- Superior Documentation and Configuration Control
  - “Blue Books” with Complete Documentation
  - Pro-Process Drawings
  - Allows Easily Scalable Workforce for High Volume Programs

“Blue Book” Library  Pro-Process Drawing
Why Buy from General Digital?

- First-Class Production Facility
  - 30,000 sq. ft. (Expandable to 125,000 sq. ft.)
  - Clean and Open Work Space
  - Antistatic Acrylic Floors
  - Laminar Flow Benches
Why Buy from General Digital?

- Mature Engineering Company with Extensive Capital Resources
  - Ovens
  - Colorimeters
  - Power Meters
  - EMI Antenna and Related Equipment
  - Spectrometer
  - Reflectometer
  - Class 10 Clean Booth
  - Class 100 Laminar Flow Benches
  - High Speed Lamination Equipment

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Why Buy from General Digital?

- Mature Engineering Company with Extensive Capital Resources
  - Temperature / Humidity Chamber
  - Vacuum Chambers
  - Hipot Testers
  - Data Loggers
  - Thermal Sensors
  - Current Probes
  - Oscilloscopes
  - Photometers

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