Honeywell

GelView Sensor

Troubleshooting and Preventative Maintenance Manual

6510020179

GelView Sensor Troubleshooting and Preventative Maintenance

October, 2003

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Introduction

The purpose of this manual is to describe troubleshooting and preventative maintenance of the Honeywell GelView Sensor.

Audience

This manual is intended for use by Honeywell field and factory personnel and assumes that the reader has some knowledge of the operator of a paper machine and a basic understanding of mechanical, electrical and computer software concepts.

About This Manual

This manual contains four chapters.

Chapter 1, **General Preventative Maintenance**, describes common GelView preventative maintenance procedures and recommended time intervals for performing them

Chapter 2, **Tools for Troubleshooting,** describes the necessary tools for troubleshooting.

Chapter 3, **Sensor Optics Troubleshooting,** describes the GelView system sensor optics and reviews sensor optic problems, causes, and solutions.

Chapter 4, **Electronics Interface Cabinet Troubleshooting,** describes the GelView system EIC component and reviews EIC problems, causes, and solutions.

Related Reading

The following documents contain related reading material.

Honeywell P/N	Document Title / Description
6510020176	*GelView Sensor Overview*
6510020178	*GelView Sensor Installation*
6510020179	*GelView Sensor Troubleshooting and Preventative Maintenance*
6510020180	*GelView Sensor Calibration Constants and Technical Specification*

Conventions

The following conventions are used in this manual:

NOTE: Unless otherwise specified, you may type all text in uppercase or lowercase.

`Boldface`
`Special Type` — Boldface characters in this special type indicate your input. Characters in this special type that are not boldfaced indicate system prompts, responses, messages, or characters that appear on displays, keypads, or as menu selections.

Italics — In a command line or error message, words and numbers shown in italics represent filenames, words, or numbers that can vary; for example, filename represents any filename.
In text, words shown in italics are manual titles, key terms, notes, cautions, or warnings.

Boldface — Boldface characters in this special type indicate button names, button menus, fields on a display, parameters, or commands that must be entered exactly as they appear.

lowercase	In an error message, words in lowercase are filenames or words that can vary. In a command line, words in lowercase indicate variable input.
Type	Type means to type the text on a keypad or keyboard.
Press	Press means to press a key or a button.
[ENTER] or **[RETURN]**	**[ENTER]** is the key you press to enter characters or commands into the system, or to accept a default option. In a command line, square brackets are included; for example: **SXDEF 1 [ENTER]**
[CTRL]	**[CTRL]** is the key you press simultaneously with another key. This key is called different names on different systems; for example, **[CONTROL]**, or **[CTL]**.
[KEY-1]-KEY-2	Connected keys indicate that you must press the keys simultaneously; for example, **[CTRL]-C**.
Click	Click means to position the mouse pointer on an item, then quickly depress and release the mouse button. This action highlights or "selects," the item clicked.
Double-click	Double-click means to position the mouse pointer on an item, then click the item twice in rapid succession. This action selects the item "double-clicked."
Drag X	Drag X means to move the mouse pointer to X, then press the mouse button and hold it down, while keeping the button down, move the mouse pointer.
Press X	Press X means to move the mouse pointer to the X button, then press the mouse button and hold it down.
	The information icon appears beside a note box containing information that is important.
	The caution icon appears beside a note box containing information that cautions you about potential equipment or material damage.
	The warning icon appears beside a note box containing information that warns you about potential bodily harm or catastrophic equipment damage.

Honeywell, Vancouver Operations Part Numbers

Honeywell, Vancouver Operations assigns a part number to every manual. Sample part numbers are as follows:

6510020004

6510020048 Rev 02

The first two digits of the part number are the same for all Honeywell, Vancouver Operations products. The next four digits identify part type. Technical publications are designated by type numbers 1002. The next four digits identify the manual. These digits remain the same for all rewrites and revision packages of the manual for a particular product. Revision numbers are indicated after the Rev.

1. General Preventative Maintenance

Periodically performed preventive maintenance avoids many failures and prevents small problems growing larger. The table presented here is an initial preventative maintenance schedule. Experienced users should make their own additions. These following preventive maintenance measures and their time intervals are recommended in order to keep the GelView sensor performing optimally.

Time Interval	Maintenance Measure
One week	1. Check cleanliness of the protective glass in the glass shield assembly. If necessary, clean the glass or replace it, if it's damaged. 2. Check air clamp cleanliness. 3. Clean coating build up from sensors' parts and shield.
One month	1. Calibration verification 2. Background voltage check. 3. Channels output voltage check
Three month	1. Optics verification: optical collimators, optical fibers and connections. 2. Check sensor's alignment.

2. Tools for Troubleshooting

The following tools are necessary for GelView sensor troubleshooting:

- Digital voltmeter (at least 3 1/2 digits i.e. 1.999)
- Oscilloscope
- Hex Drivers with ball ends (Imperial units i.e. inches)
- Calibration sample set
- Sample paddle
- Optical power meter
- Log-book
- *GelView Sensor Troubleshooting and Preventative Maintenance Manual*

3. Sensor Optics Troubleshooting

The GelView system consists of a set of independent sensors, which are connected to the Electronic Interface Cabinet (EIC) by fiber optic lines. Every sensor consists of an optical module, fiber optic cables and support electronics inside the EIC (see Figure 3-1 Normal and Temperature Resistant Fiber Optic Cable Arrangement). The light sources are extra bright visible LEDs, so caution should be used when looking at the light source to avoid damaging your eyes. A good method is to use a scrap of paper in the light path to scatter off of to see if the light source is there or not.

The optical system used between the EIC and sensor module are identical for the source, diffuse and specular channels. Because of this, we can swap cables for troubleshooting purposes, but take not to get confused as to which cable is connected to which channel and which position in the sensor module they are located. Always check to make sure that all connections are tight, and no dirt contaminates the ends of any optical component.

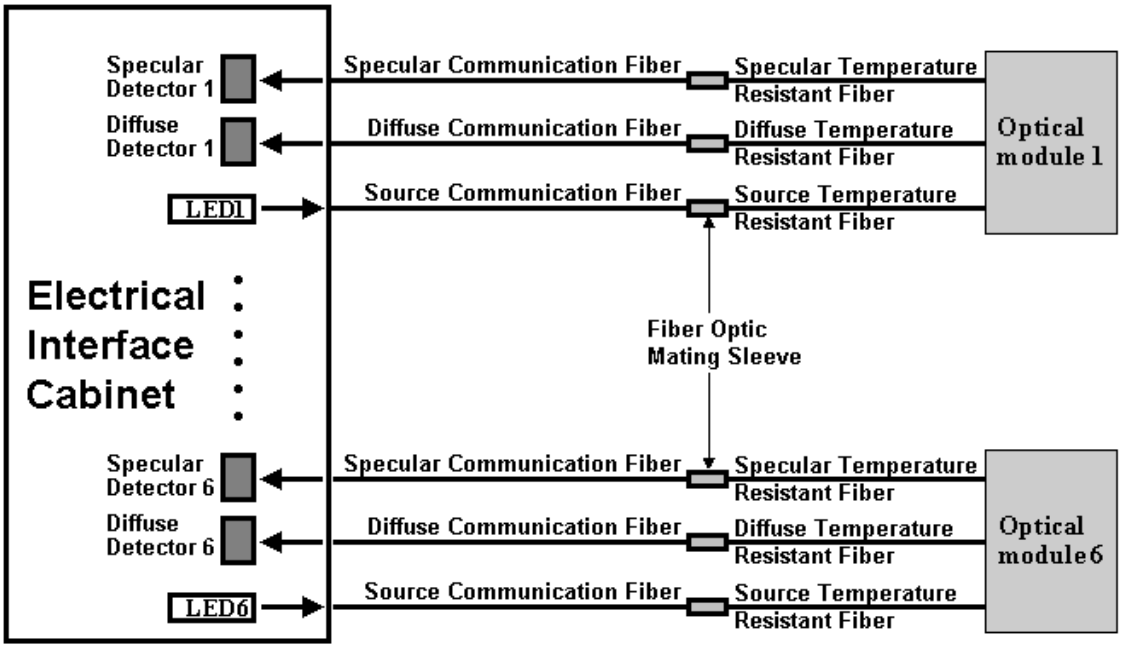

Figure 3-1 Normal and Temperature Resistant Fiber Optic Cable Arrangement

Table 3-1 Sensor Optics Troubleshooting

Symptom	Probable Causes	Possible Solutions
No specular or diffuse signals and no illumination spot.	1. Dirt in path of optics	1. Check optical ports of sensor module to ensure they are not blocked with dirt from coating. 2. Check protective window to ensure it is clean. 3. Clean as required.
	2. Source LED is not functioning	1. Verify that the LED is operational by disconnecting the source fiber optic cable from the EIC. 2. Ensure the optics are clean. 3. Check to see if an illumination spot is emitted from the EIC connector. 4. If not, Go to Table 4-1 Sensor Electronics Troubleshooting.
	3. Regular fiber optic cable damaged	1. With the regular fiber optic cable properly connected to the source in the EIC, disconnect the regular and temperature resistant fiber optic cables. 2. Ensure the optical connections at both ends of the fiber optic cable are clean. 3. Check to see if an illumination spot is emitted from the regular fiber optic cable. 4. Replace cable if required.

Symptom	Probable Causes	Possible Solutions
	4. Temperature resistant fiber optic cable damaged.	1. Remove the temperature resistant fiber optic cable with collimator from the sensor module by loosening the collimator clamp nut on the upstream side of the sensor module. 2. Ensure the optical connections at both ends of the fiber optic cable are clean. 3. With the regular fiber optic cable properly connected to the source connector of the EIC, and the temperature resistant fiber optic cable, disconnect it from the collimator. 4. Check to see if an illumination spot is emitted from the temperature resistant fiber optic cable. 5. Replace cable if required.
	5. Collimator problem	1. If all of the above checks have shown the illumination spot, yet the problem still persists, then the collimator will most likely be the problem. 2. Ensure the sensor optics are clean and that the collimator lens is not cracked, damaged or cloudy. 3. Replace the collimator if required.
Net value of a specular signal is very low or absent but the illumination spot is OK.	1. Optical path problem.	1. Verify the problem by attaching the calibration fixture with a 100 gel standard ceramic tile to the sensor housing. Disconnect the specular channel temperature resistant fiber optic cable from the regular fiber optic cable. With the optical power meter connected to the temperature resistant fiber optic cable, the output signal should be at least -32 to -33 dBm. 2. Reconnect the cables and remove the calibration fixture. 3. At the EIC connectors, switch the source fiber and the specular fiber. 4. Follow the troubleshooting techniques listed at the top of for the source fiber.
Net value of a diffuse signal is very low or absent but the illumination spot is OK	1. Optical path problem.	1. Release the diffuse and specular channel collimator clamp. Pull out the specular temperature resistant fiber optic cable and collimator assembly and interchange it with the diffuse temperature resistant fiber optic cable and collimator assembly. 2. Repeat the troubleshooting procedure for the specular channel presented above.

4. Electronics Interface Cabinet Troubleshooting

The Electronics Interface Cabinet (EIC) is one of the most important components of the GelView sensing system. It generates optical signals, couples them into optical fibers; receives, converts and amplifies optical signals from GelView sensors and sends them in a digital form to the PMP. The EIC contains a 24V power supply, an LED driver board with six LEDs, a detector board with twelve silicon photodiodes, up to twelve amplifiers, a 12-channel IR receiver back-plane, an SDAQ and an interconnect board (see Figure 4-1 Electronics Interface Cabinet Layout (Pictorial)).

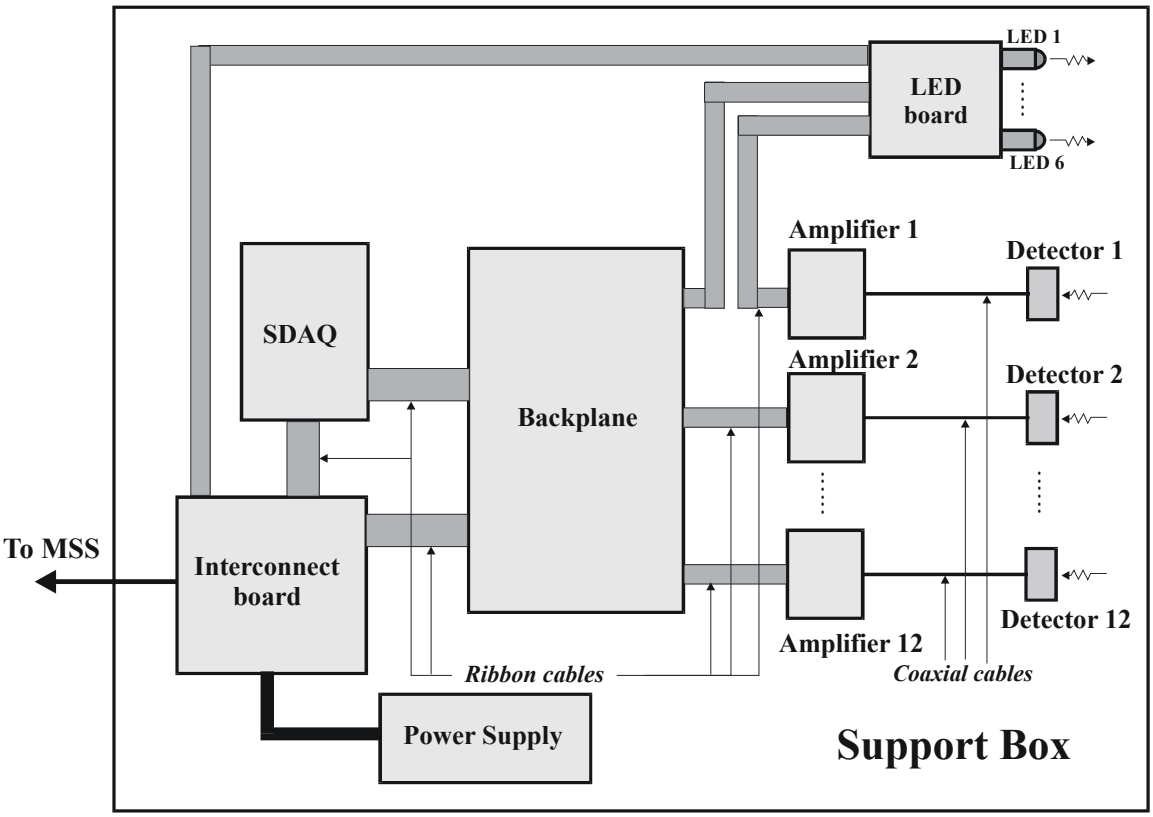

Figure 4-1 Electronics Interface Cabinet Layout (Pictorial)

CAUTION:	Before any troubleshooting, check the power levels at the interconnect board (24 VDC at the testing points TP1 and TP2).

CAUTION:	There are static sensitive components in the EIC. Anyone working within the EIC must wear the antistatic wrist strap provided to avoid damage to these components.

NOTE:	Sensor signals may vary from normal when the EIC door is open during troubleshooting because stray electromagnetic fields may induce noise on the sensitive, high impedance detectors, causing changes to sensor readings. It is a requirement that the door to the IEC be completely closed and latched at all times during normal operation in order to avoid these problems.

Table 4-1 Sensor Electronics Troubleshooting

Symptom	Probable Causes	Possible Solutions
LED does not emit any light and the LED DARK indicator on the LED driver board is OFF.	1. LED burned out or a voltage is incorrect or LED driver board failure.	1. Check power coming to the LED board: +5 VDC at TP2; +15 VDC at TP6; -15 VDC at TP7 – all with respect to TP5. 2. Make sure that there is 24 VDC at TP8 (TP9 – return). 3. If any of these voltages are absent or do not have the correct value – check the power at the IR backplane board: +5VDC at TP7; -15VDC at TP6; +15VDC at TP4 (all respected to TP5). 4. If all voltages at the backplane are okay, check cables. 5. If the voltages at the backplane and the cables are okay, replace the LED driver board.
LED does not emit any light and the LED DARK indicator on the LED driver board is ON.	1. LED DARK contact output is asserted or LED driver board failure.	1. At the LED driver PCB, disconnect the 2 pin connector from the interconnect PCB. If the LED still does not emit any light, replace the LED driver PCB. 2. Reconnect the 2 pin connector at the LED driver PCB and disconnect this cable at the interconnect PCB. If the LED does not emit any light, check the cable for a possible short and replace it if necessary. 3. At the interconnect PCB, disconnect the cable at J4 from the SDAQ. If the LED does not emit any light, there is a short on the interconnect PCB and it should be replaced. 4. Check the cable (step 3) from the SDAQ for shorts. Replace if necessary. 5. If the cable is good, verify that the software is not asserting the LED DARK signal. If it is not, replace the SDAQ PCB.

Symptom	Probable Causes	Possible Solutions
LED emits light, but still no signals.	1. Optical modulation is absent.	1. Measure the LED modulation current at TP4 (with respect to TP9). This signal must be a square sine wave with 5kHz frequency and 2.3 V peak-to-peak amplitude. The signal is not centered around zero average, but is always positive. 2. If the amplitude or frequency of LED modulation is incorrect, perform the supply voltage checks in steps 1, 2 and 3 on page 8. 3. If the supply voltages are correct, replace the LED driver board.
LED emits light, LED driver board is OK, optical signal coming through to the detector but still no signal on TP1 and TP2 at the amplifier board.	1. Defective photodiode	1. Find a working channel. Disconnect coaxial cables from the photodiodes of the malfunctioning and working channels at the detector PCB. Connect the coaxial cable of the working channel to the detector of the malfunctioning channel. Check the voltages at TP1 and TP2 for the working channel amplifier. The absence of a signal means that the photodiode is defective or damaged and the detector board must be replaced. 2. If the signal at TP1and TP2 are okay, it means that the detector and coaxial cables are functioning properly and that the reasons for the malfunction of the channel are more than likely a damaged fiber optic cable or an amplifier board failure.
	2. Damaged coaxial cable.	1. Disconnect coaxial cable from the detector and amplifier of the malfunction channel. Test the continuity of the conductor and the shield. Also test impedance between conductor and the shield to be sure that there is no short. If the coaxial cable is damaged, replace it. 2. Coaxial cable is okay. Amplifier has problems and must be replaced.
No DC output signal on TP1, TP2.	1. Ribbon cables connecting amplifiers with back-plane are damaged.	1. Check channel voltages at back-plane with respect to TP5. If signals are absent, replace ribbon cable.

Symptom	Probable Causes	Possible Solutions
DC out signals at backplane are OK. Still no signal out.	1. Ribbon cables connecting back-plane and SDAQ are damaged	1. Replace the ribbon cable. 2. If a replacement ribbon cable does not help, check the SDAQ. Verify that +24V is present across C40 (between PS1 and PS2). 3. The SDAQ has three LEDs. The "PWR" LED should be illuminated at all times when the SDAQ is powered and ready to accept a poll command. The SDAQ is suspect if this LED is off. 4. The "A OK" LED is illuminated during normal operation. This LED indicates that there is continuous communication with the PCDAQ in the MSS. The SDAQ is not necessary suspect when this LED is off. The MSS must be on, the PCDAQ functional and the communication cable between the SDAQ and PCDAQ must be properly wired per the installation drawing for this LED to be illuminated. 5. The "B OK" LED should never be illuminated in the GelView configuration.

4.1. Electronic Interface Cabinet Fuses

The IR Receiver Backplane contains a 5A, 125V pico fuse on the 24 volt input at F1. This fuse (Honeywell part number 51000215) must be replaced with one having the same physical size and electrical ratings. A spare fuse is provided at F2 for this purpose. If this fuse has opened, there will be no power to the IR Backplane PCB, the LED Driver PCB or any of the detector/amplifier PCBs.

Each contact output on the SDAQ contains a non-replaceable, self-resetting fuse. Each of these fuses is soldered onto the board and is not intended to be replaced in the field. If the fuse fails and does not recover, the board needs to be replaced. These fuses are thermally activated and will open at currents above 1A and will reset themselves after they cool down.

All of these contact outputs are wired to loads inside the enclosure which all draw less than 10ma in the GelView application, much lower than the trip level of an output fuse. If one of these resettable fuses opens, it is an

indication of a malfunction in a component or a possible short in the wiring.