Product Test Plan

DDS Group

ECE 481 – Senior Design II

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# Troubleshooting Guide

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| Camera image on computer screen is abnormal. | Image is blurry or distorted | Check light fixtures  
Check camera lens for dust  
Check camera alignment  
Check camera focus (see Adjusting Camera Focus) |
| | Image is blank | Insure camera positioned correctly  
Check camera power supply  
Insure Vari-focal lens attached to camera |
| | No image being received | Swap out camera/vari-focal lens  
Visually inspect communication wires.  
Fix Matrox card (see Troubleshooting Matrox Card) |
| The frequency of defect detection non-normal and image on computer screen is fine. | Too many/not enough | Adjust software inspection settings (see Adjusting Contrast Setting and Setting Search Window and Adjusting Scan Window Size) |
| | Constant | Check amplifier circuit for short-circuit (see Troubleshooting Amplifier Circuit) |
| | Never | Check communication link between computer and amplifier (See Troubleshooting Amplifier Circuit)  
If computer is sending correct signal (see Troubleshooting Amplifier Circuit)  
If computer is not sending correct signal and the program says no defect (see Adjusting Threshold Limit)  
Check wires between amplifier and relay  
Check if Vc amplifier voltage is \( \equiv 2.5 \text{volts} \), if yes, check relay (see Figure 1. Amplifier Schematic)  
If Vc never fluxuates if a defect is detected, then replace NPN transistor (see Troubleshooting Amplifier Circuit) |
| Computer locks up or freezes | Defect software frozen | First reboot defect program. If need be reboot computer (see Troubleshooting Software Failure) |
| | Windows XP frozen | Roboot computer (see Troubleshooting Software Failure) |
Troubleshooting

A) Adjusting Camera Focus

Focusing the camera can be tricky for this system, since the camera is not near the display. It requires two people to communicate via radios to adjust the focus. It is also possible to disconnect the camera from the system and connect it into the back of the computer, where the lens can be focused more quickly. The camera will still need to be aimed using radio communications.

To begin focusing or aiming the camera, click on the “Camera Calibration” option in the control program and then select “Focus / Aim Camera.” To see the video output from the camera, click on the “MIL DISPLAY #0” window icon at the bottom of the Windows screen. This will make this window visible. DO NOT CLOSE THIS CAMERA VIEWING WINDOW! This will prevent the video image from being viewed. To get it back, the program needs to be restarted. The program can perform all other functions, but it won’t allow you to see the image to focus the camera if this window is closed.

Begin manually adjusting the camera by twisting the two black dials on the vari-focal lens. Once the picture is as clear as possible, twist the green/gray dial on the camera to achieve maximum clarity.

When the camera is aimed or focused, just click on the main control program window to put it back on top. Leaving the video run in the background does not cause any problems. The scanning program will work whether the video runs or not, but focusing requires the extra video window.

B) Adjusting Threshold Limit

The Threshold value is the number of dark pixels (dots) in a square that are dark. It works almost like a percentage analysis. If the number of dark pixels is above the Threshold value, a defect is reported. A single defective area on a blanket may be reported as many, possibly even thousands of defects. Only one defect is required to stop the equipment. If the Threshold value is increased too much, it can prevent the reporting of defects. If it is set too low, there will always be defects, even if none are present.

C) Adjusting Contrast Setting

This is found under the “Camera Calibration” menu selection as “Image Contrast.” The contrast won’t affect the ability to see an image. Contrast is used to adjust the scanning program’s sensitivity to the darkness of defects. If contrast is set too high, it increases the sensitivity to defects. If it is set too low, no defects will be seen, defeating the purpose of this system. The default level for contrast is 40, and it can be adjusted up and down from there. Contrast should be adjusted if the product quality isn’t matching the output of the scanning program. This can be adjusted along with the Threshold value.

D) Adjusting Scan Window Size

The scan window is the square in which the pixels (dots) are checked. This option is found under “Camera Calibration” and “Scan Size” menu options. The default value for a scan window is 85x85 pixels. This value can be adjusted up or down to allow a change in minimum or maximum size of a defect. If the scan window size is changed, a change in the Threshold value will also be necessary (see Troubleshooting threshold)

E) Setting Search Window

The search window is the portion of the image from the camera to scan for defects. If there are a large number of defects showing up, it is possible that the search window may need to be set again. From the “Camera Calibration” menu, select “Set Search Window” and use the red buttons to select which borders to move in. Click a red button, then click on the image at the point you want to become the new edge of the image. This allows you to crop the image to
block out the dust collectors, mesh rolls, and edges of the conveyor. All of those may look like a defect to the system if they are not cropped.

F) Troubleshooting Software Failure

If the software from the MIL-LITE CD fails, the Matrox card won’t work properly. This is very unlikely, and there isn’t much you can do to detect this. A failure of the MIL-LITE library would be easier to detect by a programmer, and it would most likely have been detected during program development.

If the computer “locks up” it is most likely a problem with the Defect Scanner Program or Windows Operating System. First, try restarting the Defect Scanner program. If that isn’t possible or doesn’t work, restart the computer. This will most likely fix the problem. If it continues to lock up, the program or operating system may need to be reinstalled.

If the program seems to be working improperly it can be stopped and restarted. There is a possibility that some of the data may become corrupted during operation of the program. This isn’t permanent, and can be fixed by simply restarting the program.

It is possible that a “memory leak” problem may occur in the computer program where it uses up memory and doesn’t free it. This can be detected by pressing the Ctrl-Alt-Del key combination to bring up the Task Manager window. From the Task Manager, select the “Processes” tab, and look in the GDI Objects column. If the “Quality Checker” process shows more than 100 GDI objects, it is likely that there is a memory leak. This can only be fixed by changing the program code. This is not a highly likely problem to see, and the code has been tested for this problem. It hasn’t appeared in the tests, and it is being presented as just a remote possibility if all other troubleshooting fails.

Note: Windows XP has been chosen as the Operating System because it is one of the “most stable” versions of Windows to date. This does not mean that it is exempt from problems. It just means that it “crashes” much less frequently than earlier versions, including some versions of Windows NT.

A CD with a copy of the program code and Defect Scanner program will be provided in the event that the software needs to be reinstalled. To reinstall the Defect Scanner, simply find the program on the CD and copy it onto the hard drive of the Computer. There is no complicated installation necessary.

To reinstall the MIL-LITE software or Matrox system drivers, insert the Matrox CD and follow the installation instructions.

It will require a programmer familiar with Windows programming to modify the program code.

G) Troubleshooting Matrox Card

If you suspect that the Matrox image capture card is failing, there are a couple of things to try in order to verify that it works.

1. Make sure that the camera is connected to either the single round BNC jack on the back of the computer, or to the red #1 jack on the multiple connection cable. Close the Defect Scanner program and open the “Intelicam” program. Click on the movie camera icon at the top of the screen. Select NTSC for this camera and click OK. This should open a window that displays a video image. If you don’t see this, try changing the connection to a different jack. Go from the round jack to the #1 connection on the multiple connection cable or vice versa. Then try Intellicam again.

2. Try connecting a known “good” camera to the cable, and repeat the process.

3. Make sure that the camera has power to it. It needs a 12 to 34 Volt DC power supply connected in order to function. If you see a message that a Timeout error occurred, it could mean that the camera has no power, or is connected to the wrong jack.

4. If all of this fails, verify that under the “Video Signal” tab in the Intellicam program, Input Channel 0 is selected.

5. Replace the Matrox card – If all of the above fails, the Matrox card is likely to have failed.
H) Troubleshooting Amplifier Circuit

If the system is constantly giving a “defect” signal when there is no defect on the blanket then the NPN transistor in the amplifier circuit has likely been shorted. First, check to see if there is a voltage drop from the collector of the transistor to ground. If the voltage is zero then the transistor has been shorted internally and will need to be replaced.

If the system fails to provide the proper signal for a defect when one should be detected then there are two likely candidates for the problem. First, the communications link between the amplifier and the computer may have been severed. Starting with the serial port on the back of the computer check to ensure that all cables are properly attached. At the signal input to the amplifier circuit check to see that the positive and negative wires are properly attached.

If the communication wires between the amplifier and the computer are properly attached the system continues to fail to provide a defect signal then a more in-depth diagnostics test will need to be performed on the amplifier circuit.

1. Cover the lens to the camera to ensure that the computer will be sending a “defect” signal to the amplifier circuit.
2. Check power supply to relay
3. Measure all voltages on the circuit and compare relative to the nominal values on circuit schematic (see Figure 1. Amplifier Schematic)
4. If voltage drop across resistors and/or diodes are incorrect then replace that component and re-measure the voltages.
5. If all voltages appear to be normal and the circuit is still not working, then connect the system using the secondary/backup circuit and retest the system.
6. If the system still does not work then the problem is a software issue (see Troubleshooting Software Failure).

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**Figure 1. Amplifier Schematic**