General Scientific Corp.

SurgiCam® Digital Camera System
One Year Limited Warranty

General Scientific Corp. ("GSC") warrants this product against defects in material or workmanship as follows:

PRODUCT: GSC will repair this product with new or refurbished parts, free of charge, for a period of one (1) year from the date of original purchase in the event of a defect in materials or workmanship.

REPAIRS: GSC will repair or replace defective parts used in the repair or replacement of this product with new or refurbished parts, free of charge, for a period equal to the remainder of the original limited warranty period on the original product, or for ninety (90) days after the date of the repair or replacement, whichever is longer.

This warranty is extended only to the original purchaser. A purchase receipt, bill of sale or other receipted proof of date of original purchase will be required before warranty service is rendered. This warranty only covers failures due to defects in materials and workmanship which occur during normal use. The warranty does not cover damages which occurred in shipment, cosmetic damage, damage that is attributable to acts of God, failures which are caused by products not supplied by the warrantor, or failures which result from accident, misuse, abuse, neglect, mishandling, faulty installation, misapplication, improper installation, operation or maintenance, alteration, modification, introduction of sand, humidity or liquids, line power surge, improper voltage supply, lightning damage, or subjecting the product to operating/environmental conditions in excess of the maximum values or below the minimum values set forth in the applicable specifications, or products serviced by anyone other than GSC.

General Scientific Corp.

SurgiCam® Digital Camera System
One Year Limited Warranty (continued)

This warranty is invalid if the factory-applied serial number has been altered or removed from the product or if the camera casing has been opened. This warranty does not cover products sold AS IS or WITH ALL FAULTS. This warranty excludes all optical lenses.

THERE ARE NO EXPRESS WARRANTIES EXCEPT AS LISTED ABOVE. REPAIR OR REPLACEMENT AS PROVIDED UNDER THIS WARRANTY IS THE EXCLUSIVE REMEDY OF THE PURCHASER. GSC SHALL NOT BE LIABLE FOR LOST PROFITS, LOST SALES, LOSS OF USE OF THE PRODUCT, OR OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES RESULTING FROM THE USE OF THIS PRODUCT, OR ARISING OUT OF ANY BREACH OF THIS WARRANTY. ALL EXPRESS AND IMPLIED WARRANTIES, INCLUDING THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND TITLE, ARE LIMITED TO THE APPLICABLE WARRANTY PERIOD SET FORTH ABOVE.

Some states do not allow the exclusion or limitation of incidental or consequential damages, or allow limitations on how long an implied warranty lasts, so the above exclusions or limitations may not apply to you. This warranty gives you specific legal rights and you may also have other rights which vary from state to state. If a problem with this product develops during or after the warranty period, please contact:

General Scientific Corp.
Customer Service Department
77 Enterprise Drive
Ann Arbor, MI 48103
USA

www.surgitel.com

Tel: 734-996-9200
Fax: 734-662-0520

This equipment has been tested and found to comply with the limits for a Class B digital device pursuant to Part 15 of the FCC Rules. These limits are designated to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the manufacturer's instruction manual, may cause interference with radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, you are encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

***Tested To Comply
With FCC Standards***

The product complies with the harmonized EMC standards EN 55022 and EN 55024. It complies with essential requirements of the EMC Directive 89/336/EEC. The manufactured products are in accordance with a product for which a technical report has been obtained from the Centre de Recherche Industriel du Québec (ISO 9001 certificate n° 008999) which is accredited by the Conseil Canadien des Normes (certificate n° 138). The product is CE Marked in 2003. As manufacturer, we declare that the equipment follows the provisions of the Directives stated above.

***Tested To Comply
With CE Directives***

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1. Introduction

Thank you for choosing the SurgiCam® Digital Camera System. Designed from the ground up with ease-of-use in mind, this digital video camera will take you to a level of simplicity and portability never achieved before.

We suggest that you take a few minutes to consult this manual before you begin to use your SurgiCam® Digital Camera System. By doing so, you will reap the full benefits of what your digital camera has to offer.

1.1.   _The SurgiCam® Digital Camera System_

The SurgiCam® Digital Camera is a digital video device. Compared to an analog device, The SurgiCam® Digital Camera digitally acquires video data, compresses it and transfers it to your computer in its digital form over the USB standard.

The lenses of your SurgiCam® Digital Camera System have been pre-calibrated in order to obtain the clearest and sharpest picture in operating room light conditions. This eliminates most of the adjustments you would normally have to perform.

Each individual lens is calibrated for use on your own camera at a distance to match your normal working distance. It is possible to operate the camera from a different focal distance, however, some adjustments are required and you may need to use a different calibrated lens.

Your SurgiCam® Digital Camera System may be used with lenses other than the ones it came with. If you choose to do so, please contact your General Scientific Corp. representative for information about available lenses.

The digital camera requires good lighting conditions to perform optimal quality video and images. The camera does not perform well in less illuminated conditions.   The use of a complementary light is recommended.

1.2. _Sterilization_

⚠️ **DO NOT STERILIZE THE CAMERA.**

Attempting to sterilize the camera or any other part will most likely damage it.

The SurgiCam® Digital Camera must not be sterilized. It is designed to be used in a non-sterilized zone. It is recommended to perform the adjustments before its use in surgical environment. When mounted on an OR tripod, the use of a protective sterile drape is strongly recommended.

1.3. _Interference from other equipment_

The SurgiCam® Digital Camera System was designed to minimize electrical interference problems that may result from using high power electrical equipment in the vicinity of the camera. An auto-reset feature has been developed and implemented into the camera that will detect that condition and automatically reset the camera to its initial state. If the Camera hasn't recovered from an interference problem within a short delay, you can manually reset it by unplugging it and plugging it back.

Notes

5. Technical Support

If you encounter trouble with your SurgiCam® Digital Camera System or its accompanying software, follow the steps below to obtain assistance:

1. Consult this *User's Guide* for information related to the situation.

2. Check the Support section of our web site at **www.surgitel.com**

3. Contact us via email at: info@surgitel.com. Please include a detailed description of the situation.

1.4. Field of view and lens size

The table below presents the focal length of each of the lenses supported by the SurgiCam® Digital Camera System along with the corresponding field of vision they provide when used at an operating distance of 40 cm (16 inches).

OPTICAL LENS SPECIFICATIONS

OPTICAL LENS	FIELD OF VIEW	FOCAL DISTANCE	DEPTH OF FEILD	MAGNIFICATION
5.5mm	11.5" x 8.7"	18"	± 14"	1x
11mm	5.5" x 4.1"	18"	± 12"	2x
20mm	2" x 1.5"	16"/14"/12"	± 5"/4.5"/3.5"	3x

OPTICAL LENS	FIELD OF VIEW	FOCAL DISTANCE	DEPTH OF FEILD	MAGNIFICATION
5.5mm	29 cm x 22 cm	45 cm	± 35 cm	1x
11mm	14 cm x 10 cm	45 cm	± 30 cm	2x
20mm	5 cm x 4 cm	41/36/30 cm	± 13/11/9 cm	3x

1.5. Connectivity and interoperability

Because the image frames captured by the SurgiCam® Digital Camera System are natively digital, its video data is easily transferred to another medium, using multimedia equipment is simplified, image processing is hassle-free, noise and distortion are a non-issue, and image frames remaining fully intact is guaranteed. Furthermore, once your video footage has been recorded, you can easily edit it and save it in your preferred file format.

1.6. For your protection

Your new SurgiCam® Digital Camera is designed to be used conjointly with your personal computer as a USB device. Before using the camera, you must ensure that your computer meets the requirements for this type of environment. For this reason, you should:

⚠ **Never use the camera system as diagnostic equipment.**

⚠ **Ensure that the lens is securely tightened to the camera and that it will not come loose or fall during the intervention. Hand tightening only, using a tool will most likely damage the lens.**

⚠ **Do not operate camera at extreme temperatures. Normal operating temperatures are between 59°F (15°C) and 77°F (25°C).**

⚠ **Do not let the camera or any of its components near a child to avoid any risk of suffocation.**

⚠ **For external use only. Always keep the recommended distance between the camera and the sterilized zone.**

⚠ **Avoid any contact with water. Do not submerge under water.**

⚠ **Do not attach objects that are not designed to be used with the camera.**

⚠ **Do not use the camera if you have not read the user's manual.**

4.3.3. Video Playback

Once a video project has been captured, you will most likely wish to review it at a later date:

1. If the Video Files panel isn't visible on-screen, click the **File List** button to show the list of your projects.

2. Click on the project that you wish to view. Notice that the Information section is updated with information from the project you just selected.

3. Press the **Play** button or the **F6** key to start playback.

4. You can change the current position within the video by using the slider in the Camera Control panel. Simply click and hold the scroll thumb and drag it to a new location.

⚠ **You can start instant playback of a project directly from the Video Files panel by double-clicking on one of the projects.**

4.3.4. Capturing Still Images

You can take a snapshot of a single image from what you see in the Display panel at any time by pressing the **Snapshot** button or the **F7** key.

These images will be saved in JPEG (*.jpg) format under the ViziCapture "Images" sub-folder. The name assigned to each file is based on the following scheme "viz######.jpg" where ###### is a sequential number incremented after each snapshots (E.g. viz000001.jpg, viz000002, etc.).

Once you are done with the picture adjustment, you are ready to start recording video footage:

1. Click the **Record** button or press the **F5** key to start recording. You will know that the software is recording because of the word "Recording" appearing in the top of the Display panel.

2. If, for some reason, you need to momentarily interrupt the recording, press the **Pause** button. Press it again to resume recording.

3. Once you are done with your case, press the **Stop** button or press the **F5** key to stop recording. The current project will be saved to disk in the ViziCapture "Record" sub-folder.

4. Fill the Information panel with any information relevant to the case you are recording. This step can be performed at a later time; however, it is recommended that you enter some basic information on-the-fly to be able to identify this case in the future.

If you take a look at the ViziCapture "Record" subfolder, you will notice that all projects are grouped within folders named with the date and time the recording started. The exact folder name will be based on the following scheme: "ViziCapture_YYYYMMDD_HHMMSS". Each of these folders contains one or multiple AVI files that are named following a similar scheme with a sequential number appended to the name of each file. The exact file name is based on the following scheme: "ViziCapture_YYYYMMDD_HHMMSS_###" where ### is the sequential number (E.g. 001, 002, 003, etc). Each of these files is not larger than 640Mb; it was designed this way so it would be possible to make a copy of your recording on a recordable CD or DVD without having to edit or trim the recorded files first.

⚠️ **You should always make a copy of your original material on a recordable CD or DVD before editing it. It is a good practice to move your material to a recordable media as soon as possible. You can always copy the files back to your computer's hard drive if you need to edit them at a later time.**

2. Hardware Setup

The SurgiCam® Digital Camera System is designed so that it requires very little efforts to setup. The digital camera is delivered pre-attached to the accessories you have ordered. Some accessories may need to be setup on per-need basis.

2.1.   *Package content*

The following equipment comes standard with any SurgiCam® Digital Camera System kit:

- One SurgiCam® Digital Camera
- A printed copy of this User's Manual
- An installation CD for the ViziCapture Software for XP in English
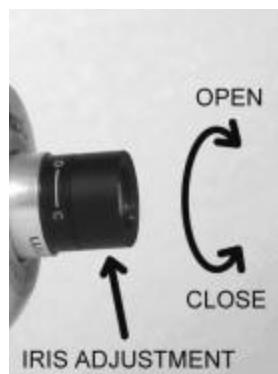
The following optional accessories may be included:

- Various pre-calibrated camera lenses
- Various Clip-On
- Fiber Optic Light

2.2. _Adjusting lenses_

A variable optical iris enables the control of the amount of light provided to the image sensor.

A fully opened iris provides the maximum amount of light to the image sensor. The main advantage of using an open iris is to better adapt to various lighting conditions of different environments.

Slightly rotate the ring to adjust the iris. Avoid unscrewing the lens. The iris should be adjusted in a manner to get the maximum amount of light within the focus range without overly saturating the image.

Conversely, a closed iris blocks the maximum amount of light. The main advantage of using a closed iris is to increase the depth of field, which is of paramount importance when the camera is mounted on your loupes or headlight. Video images may be "noisy" at first when the iris is closed in a poor lighting condition but the combination with a co-axial light greatly improves the depth of field.

Lenses are calibrated at your normal working distance. Users proceeding with a closer or further distances might experience blurred images as the camera would be out of the focus range.

⚠️ **The 5.5mm lens provides 1x of magnification.**
The 11mm lens provides 2x of magnification.
The 20mm lens provides 3x of magnification.

4.3. _Operating the SurgiCam$^®$ Digital Camera System_

4.3.1. Preview Mode

When you launch the ViziCapture software with a SurgiCam$^®$ Digital Camera plugged in your computer, the software automatically switches to Preview mode. In this mode, the picture captured by the SurgiCam$^®$ Digital Camera is shown on screen but nothing is recorded on your computer's hard drive.

Before you start recording video footage, some adjustments should be done to ensure that you will obtain the best possible picture.

1. Center the SurgiCam$^®$ Digital Camera on the viewing area (This may not be relevant depending on how you use your SurgiCam$^®$ Digital Camera System).

2. Adjust the distance between the SurgiCam$^®$ Digital Camera and the viewing area to ensure that the image focus is perfect

3. If required, fine-tune the picture using the filters available in the Camera Configuration panel (see section 4.2.2).

4.3.2. Recording Video Footage

⚠️ **Recording digital videos makes high demand of your computer's resources. For this reason, it is critical that you close all other applications before recording with the ViziCapture software.**

⚠️ **It is important to disable any screen savers or energy saving feature that may be enabled on your computer. Refer to your operating system documentation for specific instructions on how to disable these features.**

4.2.4.   Display panel

The Display panel is where the video preview is displayed. The panel header shows the software state (E.g. Preview, Recording, Playing, etc.)

Right clicking anywhere in the Display panel will pop a menu where you can modify the way the video will be rendered on screen. You can also use this menu to control the camera while in full screen mode.

Full Screen	F8
Full Size Render	Ctrl+F8
Record	F5
Play	F6
About	F1

Full Screen: When this option is enabled, the video is scaled so that it covers the whole screen. You can go back to windowed mode by right-clicking on the video in full screen mode and deselecting the Full Screen option. You can also use the **F8** key to switch from Normal to Full-Screen mode and vice-versa.

Full Size Render: This option prevents the software from automatically resizing the video to fit your screen. When enabled, the video resolution is set to 640x480 and scaling is turned off. Image clipping may occur if the video panel isn't large enough to display the whole scene. You can also use the **Ctrl-F8** key combination to switch from Normal to Full Size Render mode and vice-versa.

4.2.5.   Video Files panel

This is a list of the video files you have recorded. Click on an item to load it into ViziCapture. Double-clicking instantly starts playback of the selected item.

Any lens used in combination with a headlight should have a closed iris in order to increase the depth of field. It is strongly recommended to combine the use of the camera with a light source because of this benefit.

Any lens used in combination with an Image Stabilizer Arm should have an open iris in order to have the maximal amount of light for the camera.

2.3. _Lens Replacement_

> ⚠️ **Before removing the lens, ensure that you are in a dust free environment in order to minimize the risks of dust and grime collecting on the surface of the optical image sensor.**

To replace the lens, unscrew the lens currently attached to the front of the SurgiCam® Digital Camera. Inspect the new lens to ensure it is clean and screw it in place. Never use a tool to remove or tighten the lens as it may damage it.

You may notice spots on the image that never move if there are specks of dust on the image sensor or the lens, Clean the affected area with a lens cloth and isopropyl alcohol. Take care not to use a cloth that will scratch or leave fabric fibers on the optical components after cleaning. Keep unused lenses in a dust free environment.

2.4. _Connecting to the computer_

The only connection required by the SurgiCam® Digital Camera System is to plug the camera cable in your computer's USB port.

> 🔌 **Look for the USB symbol if you have problems locating your USB port**

4.2.3. Video Control panel

The Video Control panel can be compared to the control panel of a VCR; most of the functions work exactly the same way as on your own VCR.

Press the **Record** button to create a new ViziCapture project and start the video recording. This function is available in Preview mode only.

Press the **Play** button to start playback of a video file. This function is available in Preview mode only when there is a ViziCapture project loaded.

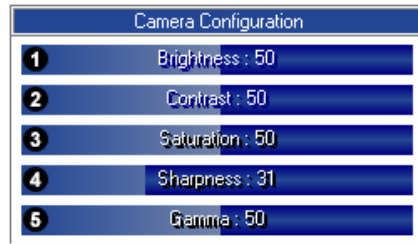Press the **Pause** button while viewing or recording videos to momentarily pause the video stream.

Press the **Stop** button at any time to put the software back in Preview mode.

Press the **Snapshot** button to take a single image snapshot of what is currently playing. The result is a JPEG image that will be stored in the ViziCapture "Images" subfolder.

4.2.2. Camera Configuration panel

The Camera Configuration panel is displayed when the software is in Preview or Record mode. Use the different sliders to quickly adjust picture quality settings and see their effects in real-time.

❶ **Brightness**: The quality of radiance or luminosity of a visible object. Brightness can be measured as luminance (radiant energy).

❷ **Contrast**: The degree of difference between light and dark extremes of color on a monitor or on printed output.

❸ **Saturation**: Vividness of hue; degree of difference from a gray of the same lightness or brightness.

❹ **Sharpness**: Clarity of form and detail.

❺ **Gamma**: The exponent in a power-law relationship between video or pixel values and the displayed brightness.

⚠ **Changes made to these settings are saved automatically; it is strongly recommended that you take note of the value of each setting before changing it.**

3. Software setup

3.1. ViziCapture setup

⚠ **Do not connect the SurgiCam® Digital Camera System to your computer's USB port before you are done with the software installation.**

⚠ **Verify that you are logged on to your Windows workstation as a user with Administrative privileges; otherwise the software may not work as expected.**

Insert the CD-ROM in your computer's CD drive, and the setup procedure should begin automatically. If it doesn't, manually launch the "ViziCaptureSetup.exe" program by browsing the files that are on the CD. Complete the setup procedure by following on-screen instructions.

If you connected the SurgiCam® Digital Camera System before installing the software, the system will automatically detect a new device present on your computer and it will attempt to locate a suitable driver amongst its own list of integrated Windows drivers. Depending on your system, Windows will most likely not be able to find any suitable drivers for the camera. It is recommended that you cancel the Windows device installation procedure, that you unplug the camera from your computer and that you install ViziCapture software before plugging the camera back.

3.2. Software update

The ViziCapture software is in constant evolution. You will need to update your software version if you wish to benefit from all the new features and fixes.

Contact General Scientific Corporation to see if any software updates are present for your camera or check our website at www.surgitel.com

4. Using the software
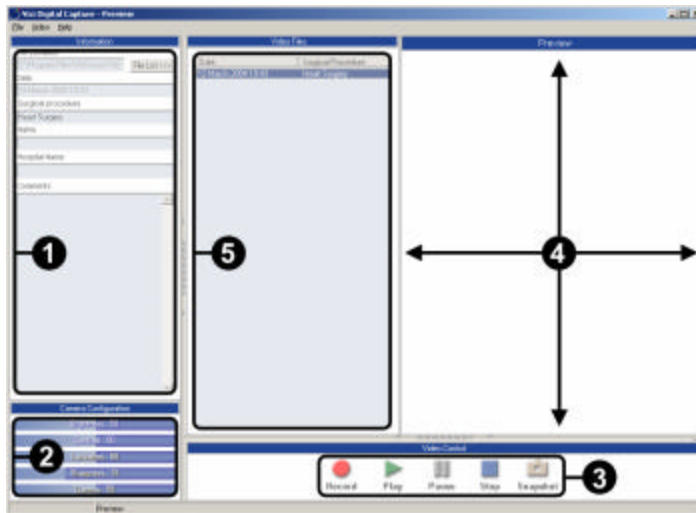
4.1. *Getting started*

The ViziCapture software icon can be found on your Windows desktop or in the start menu.

Once the installation is completed, you are ready to start using the ViziCapture software. Launch the ViziCapture software from the shortcut on your desktop.

4.2. *Interface overview*

Below is an overview of the ViziCapture software interface.
- ❶ The Information panel
- ❷ The Camera Configuration panel
- ❸ The Video Control panel
- ❹ The Display panel
- ❺ The Video Files panel

4.2.1.   Information panel

The Information panel is where you will enter any case specific information.

There are multiple fields available here for you to fill with information relevant to the surgical procedure you are documenting:

The **File Location** ❶ field is filled automatically when you start a new project. It shows the location of the file on your hard drive. You cannot modify the content of this field.

The **Date** ❷ field is filled automatically when you start a new project. It shows the date and time at which the project was created. You cannot modify the content of that field

The **Surgical Procedure** ❸, **Name** ❹, **Hospital Name** ❺ and **Comments** ❻ fields are custom fields that can be filled with any type of information. Note that the only field in which you can enter multiple lines of text is the Comments field. Use the scrollbar on the right side of the field to navigate within its content.

To save the information entered in any field, just click on the STOP button from the Video Control Panel.

Press the **File List** button ❼ to expand or collapse the Video Files panel.