GENERAL®

HIGH-PERFORMANCE
VGA RECORDING
VIDEO BORESCOPE SYSTEM
USER'S MANUAL

DCS1700

Please read this manual carefully and thoroughly before using this product.

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INTRODUCTION

Thank you for purchasing General Tools & Instruments' (General's) DCS1700 (The VIPER 1700) High-Performance VGA Recording Video Borescope System. Please read this user's manual carefully and thoroughly before using the instrument.

The DCS1700 is a complete system that combines a handheld VGA resolution (640 x 480 pixel) recording video borescope console (wand-type grip plus LCD) with General's P16181HP VGA Resolution Probe. The P16181HP is 39 in. (1m) long and has a camera head diameter of 0.22 in. (5.5mm). The DCS1700 grip is also compatible with dozens of other high-performance VGA and QVGA resolution (320 x 240 pixel) probes from General; a complete list can be found on p. 24.

The DCS1700 has three operating modes: Preview, Playback and Menu:

- **In Preview mode**, live video framed by the camera's field of view is displayed on the console's LCD. The VIPER 1700 automatically enters this mode when powered on. Separate front-panel buttons allow you to increase and decrease the brightness of the camera lighting LEDs. Another front-panel button allows you to enlarge (zoom in on) a target by 50% (a zoom level of 1.5X) or 100% (2.0X). Yet another button allows you to horizontally "mirror" video, making it possible to read serial numbers seen and reversed by a probe with a mirrored viewing tip.
  The DCS1700 also allows you to record VGA resolution inspection videos and photos on a standard-size SD memory card with a single push of a button. While you are recording a video or before you take a photo, you can adjust the brightness and contrast of the display or zoom in on the target and these actions will be reflected in the stored file—in other words, what you see is what you save. Analog versions of stored files and raw and manipulated (zoomed or mirrored) real-time probe video can be exported through an included video cable to any NTSC- or PAL-format TV monitor with an RCA input jack.

- **In Playback mode**, you can browse the SD card for saved video and picture files and view the media on the console's LCD or a larger TV monitor. Video clips and photos also can be viewed on a PC: 1) by removing the SD card and plugging it in directly; 2) through a card reader; or 3) via the included USB cable. Photos are saved as .jpg files, so most photo viewer applications can open them. However, although videos are saved as .avi files, Microsoft Windows Media Player lacks the codec need to open them. Video files can be opened by more-versatile media players such as freeVLC (www.videolan.org). The 4GB SD memory card included with the DCS1700 can store more than two hours of VGA resolution video, recorded at an average of 26 Mbytes/minute, in addition to hundreds of photos.

- **In Menu mode**, you use familiar scrolling motions and responses to dialog boxes to navigate a main menu with six submenus as well as a "special function" menu that provides access to two display controls and two custom display modes. Collectively, the menus and submenus let you:

  - Browse video and photo files stored on the SD card

  - Operate in black & white mode

  - Precisely measure the size of any object in the camera's field of view using an included probe tip accessory

  - Set baseline levels for display brightness and contrast

  - Perform "housekeeping" functions such as 1) formatting and checking the capacity of the SD card, 2) deleting files individually or in bulk, 3) setting the date and time, 4) limiting the duration of video clips, 5) enabling or disabling display of the date and time on the LCD, 6) choosing any of 27 languages for menu and on-screen text, 7) selecting a Video Out format, and 8) adjusting the triggering time of the console's Auto Power Off function.

KEY FEATURES

- Wand-type grip can be operated one-handed, freeing your other hand to use tools
- 3.5 in. (89mm) diagonal LCD
- 39 in. (1m) long, 0.22 in. (5.5mm) diameter soft metal probe with 640 x 480 pixel (VGA) resolution camera lit by six LEDs—four facing forward and two at an angle, to provide glare-free indirect lighting
- Light boost, anti-reflection and 90° image rotation buttons on probe handle
- Probe and stainless steel camera head are IP67 water, oil and dust-proof
- Grip accepts dozens of other VGA and QVGA (320 x 240 pixel) resolution probes of various lengths and diameters to suit special applications
- Records VGA resolution video clips and still images using familiar menu-driven user interface. Saved video and photo files incorporate real-time brightness, contrast and zoom adjustments you make on the fly to optimize target clarity and detail
- Slow-motion and fast-forward video playback
- Brightness and contrast control, video mirror and 2X video zoom buttons on grip
- Black & white mode
- Object measurement mode
- 4GB SD memory card
- Analog video out jack and cable with RCA plug
- USB cable for uploading/viewing media saved on SD card on PC without ejecting card
- Adjustable Auto Power Off interval
- Choice of 27 menu languages
- Custom hard plastic carrying case
- Powered by four "AA" Alkaline or rechargeable batteries
- 1 year limited warranty

SAFETY INSTRUCTIONS

CAUTION!

Never insert a probe attached to the DCS1700 into a structure or space known or suspected to contain live electric wiring

- The DCS1700 is intended for industrial applications only. Do not use it for human or any other biological inspections.
- Never insert an attached probe into any flammable gas or liquid (including fuels in an oil, gasoline or diesel tank)
- Do not disassemble the instrument. Doing so creates a potentially fatal electrical hazard (and voids the warranty as well).

WHAT'S IN THE CASE

The DCS1700 comes in a custom hard plastic protective carrying case. Inside the case are:

- The DCS1700 console. The console integrates an LCD, a connector for a high-performance camera-tipped probe from General, separate front-panel buttons for capturing videos and photos, and a keypad containing seven multi-function buttons.

- The P16181HP VGA Resolution Probe and a 110° mirrored viewing tip

- An object measuring tip that fits any of General's 5.5mm diameter high-performance probes

- A 4GB full-size SD memory card

- A video cable for connecting the DCS1700 to a TV monitor. The cable has a male RCA plug at one end and a mini-stereo plug at the other.

- A USB cable with a mini-USB plug on one end and a full-size USB plug on the other end.

- Four "AA" Alkaline batteries

- A soft cloth, a bottle of liquid, and cotton swabs for cleaning the camera's lens and LEDs and the LCD

- This user's manual

PRODUCT OVERVIEW

Fig. 1 shows the names and locations of all of the controls, ports and jacks of the DCS1700. Table 1 details how the function of each front-panel button changes with the console's operating mode. Familiarize yourself with the labels, positions and functions of all buttons and connectors before moving on to the Setup Instructions and Operating Instructions.
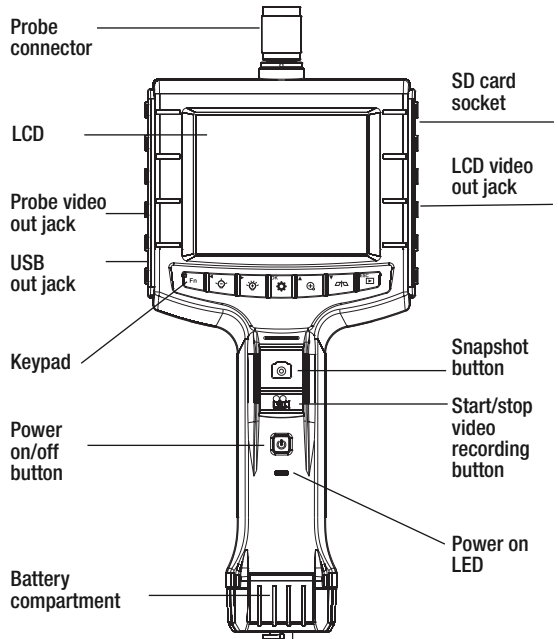

Fig. 1. The controls and connectors of the DCS1700 console.

Table 1. The DCS1700's multi-function buttons

Button Label	In Preview Mode	In Playback Mode	In Menu Mode
🗑 **Fn**	Opens Special Function menu	Offers option to delete selected video or photo file	In Album menu, offers option to delete selected video or photo file
◀ ⊖	Decreases brightness of camera lighting LEDs	N/A	In Album menu, selects (next-oldest) file at left In Settings submenu of Date/Time menu, highlights field at left for change
▶ ⊕	Increases brightness of camera lighting LEDs	N/A	In Album menu, selects (next-newest) file at right In Settings submenu of Date/Time menu, highlights field at right for change
OK ⚙	Opens Main Menu	Initiates playback of selected video clip During playback, pauses/resumes playback	Selects highlighted item In Settings submenu of Date/Time menu, saves displayed setting
▲ ⊕	**Pressed once**, enlarges target 50% (zooms 1.5X) **Pressed twice**, enlarges target 100% (zooms 2.0X) **Pressed three times**, returns to 1X viewing	Selects next-oldest video or photo During video playback, fast-forwards playback: **Pressed once**, slows playback to 50% speed **Pressed twice**, slows playback to 25% speed **Pressed three times**, slows playback to 12% speed	Moves up one line within menu or submenu In Settings submenu of Date/Time menu, increments value of highlighted field
▼ ◁▷	**Pressed once**, mirrors video horizontally **Pressed again**, undoes mirroring	Selects next-newest video or photo During video playback, speeds up playback: **Pressed once**, increases playback speed by 50% (to 1.5X rate) **Pressed twice**, doubles playback speed (to 2X rate) **Pressed three times**, quadruples playback speed (to 4X rate)	Moves down one line within menu or submenu In Settings submenu of Date/Time menu, increments value of highlighted field

Table 1. The DCS1700's multi-function buttons (continued)

| Button Label	In Preview Mode	In Playback Mode	In Menu Mode
ESC ▶	**Pressed once**, enters Playback mode and displays newest video or photo **Pressed again**, returns to Preview mode	Returns to Preview mode During video playback, stops playback and cues up same video to starting point	Exits Main Menu and returns to Preview mode Pressed within a submenu or sub-submenu, moves up one level
📷	Takes a picture (stores .jpg photo on SD card)	N/A	N/A
🎥	**Pressed once**, starts recording an .avi video clip on SD card **Pressed again**, stops recording	N/A	N/A
⏻	Powers console on and off	Powers console on and off	Powers console on and off

SETUP INSTRUCTIONS

INSTALL BATTERIES

The DCS1700's battery compartment is accessible from the bottom of the grip. You can use the supplied four "AA" Alkaline batteries or install your own rechargeable "AA" batteries.

Rechargeable batteries will likely save you money in the long run because the DCS1700 is a "high-drain" device that draws up to 2A from its ~5.5VDC battery stack when recording videos. You should not expect a set of non-rechargeable batteries to power more than 4 hours of operation.

To install batteries:

1. Turn the console upside down and flip up the semicircular handle on the captive screw securing the battery compartment cover. Loosen the screw by placing the handle between your thumb and index finger and turning counterclockwise (left figure at right).
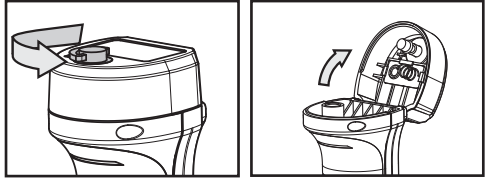
2. Open the battery compartment by flipping up the cover (right figure above).

3. Install two "AA" batteries in the left well and two in the right well, using the + and – polarity marks on the inside of the cover as an orientation guide (left figure at right).
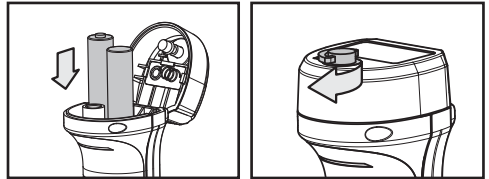
4. Flip down the cover and secure it by turning the screw handle clockwise (right figure above). Flip down the chrome screw handle when you're done.

ATTACH PROBE

Attach the P16181HP (or another high-performance probe from General) by plugging its connector into the probe connector at the top of the console. The connectors mate in only one way, when the two dots—one on the console's connector and the other under the collar at the end of the probe—are aligned. After you have lined up the dots, push the two connectors together so the alignment keys on opposite sides of the probe's connector slide over the flats of the console's connector (left figure above). Slide the collar on the probe's connector forward and tighten the collar by turning it clockwise.
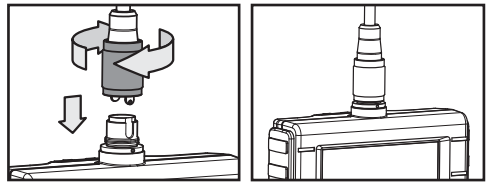
You can now remove the protective rubber cap from the camera-tipped end of the probe. It is good practice to replace the cap whenever the probe will not be used for a while. Now is also the time to peel away and discard the plastic film that protects the console's LCD.

To disconnect the probe from the console in the future, turn the collar counterclockwise and pull the probe straight out and away.

INSERT SD CARD

1. Lift up the bottom of the rubber cover on the right side of the console (left figure).

2. Rotate the cover around its pivot point at the top to expose the SD card socket and LCD video out jack on the right side.

3. Remove the supplied SD card or another card of up to 32GB capacity from its packaging. Discard the packaging but save the plastic storage case.

4. Plug the SD card into the socket (right figure above). Be sure the card's gold contacts face the rear of the console and enter the socket first. Push in the card until you feel it spring back and you hear a click.
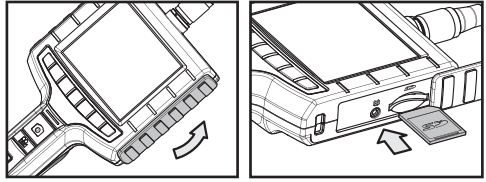
To remove the card later, push it in gently until you hear a click and the card pops out far enough for your fingers to grab.

RESET AUTO POWER OFF INTERVAL

By default, the Auto Power Off function of the DCS1700 is disabled. To minimize how often you must change or recharge the instrument's batteries, General strongly recommends that you reset the Auto Power Off interval to 5 or 10 minutes of inactivity at the front-panel buttons. Having the DCS1700 occasionally power off on its own is only a minor inconvenience because the unit can be restarted in less than 5 seconds.

To change the Auto Power Off interval:

1. Power on the console by pressing the ⏻ button and holding it for at least 3 seconds.

2. Press the ⚙ button to open the main menu. **ALBUM** will be highlighted.

3. Press the ⊕ once to scroll up to and highlight **SETTINGS**.

4. Press the ⚙ button to open the **SETTINGS** submenu. **AUTO POWER OFF** will be highlighted.

5. Press the ⚙ button to open the **AUTO POWER OFF** submenu.

6. Press the button to scroll down to and highlight the **5** or **10** line.

7. Press the ⚙ button to save your selection.

8. Press the ESC button three times to return to Preview mode.

OPERATING INSTRUCTIONS

VIEWING LIVE VIDEO ON THE LCD

If you followed the procedure for resetting the Auto Power Off interval in the previous section, you have already experienced powering the DCS1700 on. Each time you power the unit on—or return to Preview (live video) mode from Playback or Menu mode—the screen below will appear on the LCD.

The two "vital signs" of the DCS1700—remaining battery power (in white, at lower left) and remaining SD card capacity (in green, at lower right)—will appear for four seconds, superimposed on video being captured in real time by the camera at the end of the probe. A fully charged set of batteries would be represented by a completely white icon. The width of the bright-green area at the left of the SD card icon reflects how much capacity is already used. A card that is nearly full would be represented by a bar that is green almost to its right edge.

System time

12/31/12 12:35:45

Battery power

Memory card capacity
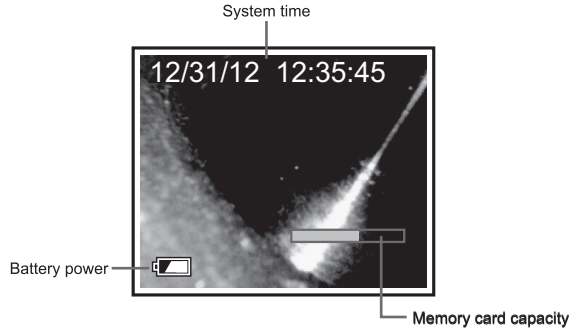
After four seconds, both vital sign indications will disappear, leaving only the system time at the top of the screen. The system time (which includes the date) must be entered by you via one of the menus; see p. 18 for instructions. Time and date settings are retained following battery changes and system resets.

To increase the brightness of the display, press the ☼ button. To decrease brightness, press the ☼ button. In a brightly lit room, changing the intensity of the LEDs at the tip of a probe has only a small effect on the brightness of video on the screen. The on-screen impact of changing brightness is more pronounced in dark environments.

To horizontally "mirror" live video, press the button. This feature makes it easier to read equipment labels and serial numbers, as shown at right.
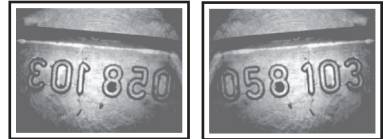
To zoom in on a target, press the ⊕ button. Pressing the button once enlarges the target by 50% (a zoom level of 1.5X). Pressing the button twice enlarges the target by 100% (a zoom level of 2.0X). Pressing the button a third time returns to 1X (actual size) viewing. When video is being zoomed, the zoom level is indicated at the bottom right of the display.

The mirroring and zooming effects can be applied at the same time when viewing video on the DCS1700's LCD.

The P16181HP probe supplied with the DCS1700 system is a "soft metal" design, which means that it will *not* retain its bent shape. Because soft metal probes are so flexible, they are best suited for inspecting the interior of pipes or densely packed equipment enclosures (such as engine compartments). With the probe inserted, you can twirl it until

video appears right-side up. You can change the viewing angle of the probe (enabling it to see around corners) by attaching the included 110° mirror accessory to the tip. See p. 14 for attachment instructions.

For precision inspection work, consider purchasing General's PM003, a set of three mirrored tips with viewing angles of 70°, 90° and 110° that fit all of the company's 5.5mm diameter high-performance probes. To further increase The Viper 1700's viewing flexibility, consider purchasing a flexible-obedient probe, which retains its configured shape and is therefore better for inspecting behind walls, under floors and above ceilings. For the ultimate in viewing flexibility, General offers four articulating probes, one with a VGA resolution camera (P16HPART) and three with a QVGA resolution camera (P16ART-1SM/2SM/3SM). All four, in effect, let you set their viewing angle over a 300° arc centered on the probe's main axis. The table on p. 24 lists the part numbers and key specifications of all General probes compatible with the DCS1700.

Before using The VIPER 1700 system, carefully read the Operating, Maintenance & Troubleshooting Tips section of this manual on pp. 22 and 23 to understand how to use a borescope probe properly and avoid using it improperly. To protect the delicate camera-tipped end of the P16181HP probe, reinstall the rubber lens cap after each inspection session.

The DCS1700 can be powered for up to four hours by the same set of four "AA" batteries. It's time to replace the batteries when the battery icon appears at the lower left of the display during viewing of live video. The first sign of weak batteries is a change in the appearance of the icon from a steady white to a flashing red. When the batteries are critically low, the flashing will stop and the icon will switch to a solid red. To replace the batteries, follow the procedure on p. 8 of this manual.

VIEWING LIVE VIDEO ON A TV MONITOR

The DCS1700 comes with a video cable for connecting the console to any TV or TV monitor that uses either the NTSC or PAL analog broadcast standard. By making the connection, you can view live video, or saved videos and pictures, on a screen larger than the DCS1700's.

To make the connection, insert the yellow RCA plug of the video cable into the Video in jack of your TV monitor and set the TV's input to external video. Then insert the stereo mini-plug of the cable into either the Probe video out jack on the left side of the unit or the LCD video out jack on the right side of the unit.

Which jack should you use? In most cases, use the LCD video out jack because its output exactly matches what appears on the LCD—including any brightness adjustments or zooming that you have used to improve the clarity or detail of your inspection target. The only reason to use the Probe video out jack is to compare the details of a real-time scene to those of the same scene recorded on the SD card at an earlier time. To do so, you would view a recorded clip of the scene on the LCD of the DCS1700 while looking at live video of the same field of view on a TV. This would make any change in the position or appearance of a component or object easy to spot.

Before making either external connection, make sure that your DCS1700 is configured to export video in the same format as your TV or TV monitor. The default format is NTSC. You can switch to PAL format by following the instructions on p. 19.

OPERATING THE VGA RESOLUTION PROBE

The P16181HP is a high-performance camera-tipped probe that captures video and still images at VGA (640 x 480 pixel) resolution. The probe's six super-bright LEDs make it particularly suitable for inspecting dark environments and viewing parts and structures within them.

Fig. 2 shows the controls and key structures of the P16181HP. Familiarize yourself with their positions and functions before using the probe.

Fig. 2. The controls and key structures of the P16181HP

1. Probe
2. Stainless steel camera head containing four forward-facing LEDs and two side-facing LEDs
3. Stainless steel accessory alignment ring
4. Black metal thread protector ring
5. Rubber protective cap
6. Probe handle
7. Light boost button
8. 90° rotation button
9. Anti-reflection button
10. Probe connector
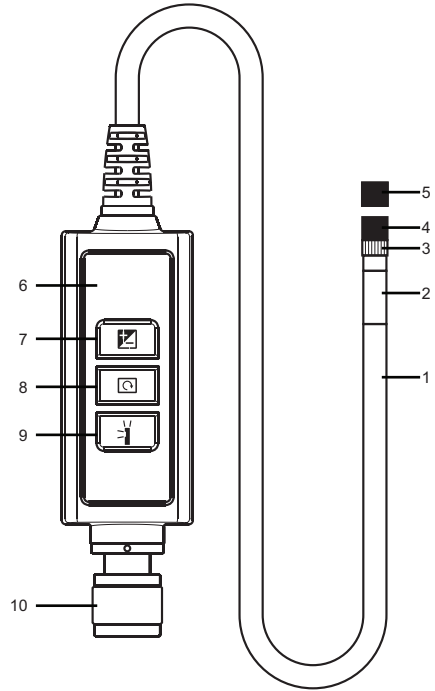
To adjust the intensity of the LEDs at the tip of the P16181HP, use the and buttons.

Remember to remove the rubber protective cap from the tip of the probe before using it.

Using the Three Control Buttons

To boost the intensity of the four LEDs that normally provide camera lighting, press the button. Doing so lights a red LED behind the button and improves the brightness of video and images, as shown below.
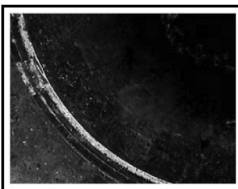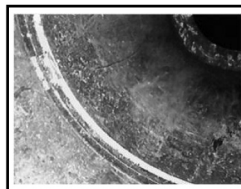
BEFORE BOOST   AFTER BOOST

This feature can help you cope with very low-light conditions. When recording with the boost feature activated, you must hold the probe very steady or your videos and images will be blurred.

To rotate the probe's field of view, use the ▢ button. Pressing the button once backlights the button red and rotates the frame clockwise by 90°. Pressing it a second time rotates the frame by an additional 90°, in effect turning the original view upside-down. Pressing the button a third time rotates the field of view yet another 90°. Pressing the ▢ button a fourth time restores the original view and extinguishes the red button backlight.

To remove glare, reflections or spots from the field of view, use the ⌐ button. Pressing the button adds a red backlight to it, just like the other two buttons on the VGA Probe handle.

This anti-reflection feature of the P16181HP is most useful for eliminating reflections of the four forward-facing LEDs in the camera head from shiny surfaces. Note that pushing the ⌐ button extinguishes the four forward-facing LEDs and shifts responsibility for camera lighting to the two side-facing LEDs. The net effect, as shown below, is a clearer and more-readable image.
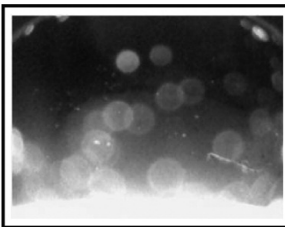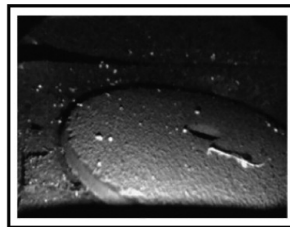
WITHOUT ANTI-REFLECTION   WITH ANTI-REFLECTION

You can also use the anti-reflection function to remove glare created by the P16181HP's mirrored viewing tip (see the next section of this manual for installation and alignment instructions). The pair of images below illustrates the net positive effect.

MIRRORED VIEW
WITHOUT ANTI-REFLECTION   MIRRORED VIEW WITH ANTI-REFLECTION

Attaching the Mirrored Viewing Tip

The only accessory included with the P16181HP is a 110° mirrored viewing tip. To attach it to the probe:

1. Pull off the rubber protective cap (Fig. 2, Callout 5).

2. Unscrew and remove the black metal thread protector ring (Callout 4), as shown below.

3. Turn the stainless steel accessory alignment ring (Callout 3) clockwise to move it away from the probe tip. Keep turning until the ring can travel no further.

4. Screw the mirrored viewing tip onto the camera head (Callout 2) by turning it clockwise, as shown at right. Keep turning until the viewing tip is as far from the probe tip as possible. In this position, it can rotate freely.

5. Press the ⊰ button to activate the two-side facing LEDs.

6. Slowly turn the mirrored viewing tip counterclockwise to move it toward the probe tip. Once the threads of the tip grip the camera head, continue turning only until the two LEDs are clearly visible through the gap in the tip's housing.

7. Secure the tip with your thumb and forefinger and use your other hand to turn the alignment ring clockwise. Keep turning the ring until its leading edge contacts the mirrored viewing tip, locking it in place. The pair of figures below illustrate the incorrect (left) and correct (right) orientation of the mirror with respect to the LEDs.
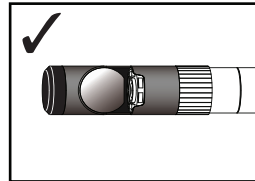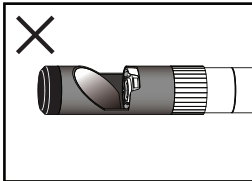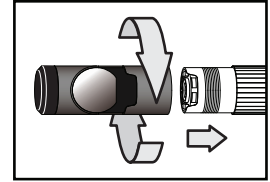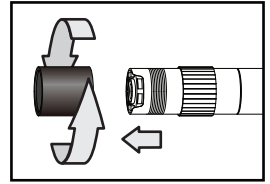
8. Remove the blue circular protective film from the mirror by pulling on its tab with a tweezers.

TAKING PICTURES AND RECORDING VIDEOS

To take a picture, make sure the DCS1700 is in Preview mode (with live video appearing on the LCD), optimize the display brightness and zoom level for the target, and press the ◻ button. Doing so creates a .jpg file of the frame being displayed at that moment and stores it on the SD card. The alphanumeric name of the stored picture file, which begins with "PICT" and has the suffix ".JPG", is briefly displayed in red at the bottom of the LCD to confirm that a picture was taken. The DCS1700 automatically returns to Preview mode after taking a picture.

T**o record a video clip**, make sure the DCS1700 is in Preview mode and press the 📹 button. Doing so begins creating an .avi video file (with MPEG-4 compression) for storage on the SD card. A red running clock indicating the duration of the clip recorded so far will appear at the lower left of the screen and remain there until the recording is stopped.

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To stop recording, press the 📷 button again. This causes the red running clock to disappear and returns the DCS1700 to Preview mode. As the clip is ended, its file name is briefly displayed in red at the bottom of the screen to confirm that the clip was stored. Like photo files, video files begin with the letter PICT; unlike photo files, video files have the suffix ".AVI".

In the DCS1700, files are named consecutively, regardless of type. For example, if you first take a picture and then record a video, the first file would be named PICT0001.JPG and the second PICT0002.AVI.

While a video is being recorded, the following console buttons remain active: 📷Fn , 🔆 and 🔅 (brightness up and down), and 🔍⊕ (zoom). The effects of changing brightness and zoom level are reflected in the video recording. So are the effects of changing brightness and contrast through the 📷Fn button (see the Navigating the Two Menus section of this manual for details). You cannot pause the recording of a video clip and resume it later; to cover two time spans, you must record two videos.

The DCS1700 will be unable to store videos and pictures if its SD memory card is full, write-protected or damaged. When the instrument senses any of these conditions, it will superimpose the words **SD CARD FULL** at the bottom of the screen in red. To remedy the situation, either replace the full SD card by another card with spare capacity, or delete files individually or in bulk. Instructions for deleting files can be found later in this user's manual.

VIEWING SAVED PHOTOS AND VIDEOS

To view a picture or play back a video on the DCS1700's LCD or a TV monitor, switch the unit out of Preview mode and into Playback mode by pressing the 📷ESC button. The DCS1700 will then recall and display either a still photo (if a photo was the last recording stored) or the first frame of a video clip (if a video was the last recording). In both cases, two pieces of information about the file will be displayed briefly: its name (in red at the bottom of the LCD) and its position in the recording sequence (for example, 16/16) in white in the upper right corner of the LCD. For video clips, another piece of information will also be shown: its duration, in the upper left corner of the LCD.

In Playback mode, pressing the ⏬ button repeatedly sequentially recalls all photos and videos from memory in the *reverse* order in which they were stored (in other words, the newest first and the oldest last). By contrast, pressing the 🔍⊕ button repeatedly sequentially recalls all stored photos and videos from memory in the *same* order in which they were stored (the oldest first and the newest last).

To begin playing back a video whose first frame is on-screen, press the OK⚙ button. Once a video clip begins playing, a running clock and moving timeline will help you relate what you see now against what you saw when you recorded the clip. You can pause and resume the clip as often as you like by pressing the OK⚙ button to toggle between the two actions.

During video playback, you can use the 🔆 and ⏬ buttons to speed up or slow down playback; see Table 1 for the specific speeds available. Pressing the 📷ESC button during playback stops the video and cues it up to its first frame, ready to be restarted.

Whenever a photo or (the first frame of) a video clip is on-screen in Playback mode, pressing the 📷Fn button gives you the opportunity to delete it from the SD card.

Photos and videos stored on the SD card also can be viewed on a PC. If your computer has an SD card slot, you can remove the SD card from your DCS1700 and plug it directly into your PC. If your PC does not have an SD card slot, you can purchase a USB SD card reader (Part No. SDRD1) from General.

Alternatively, you can use the included USB cable to transfer video clips and pictures stored on the SD card to a PC for viewing on the PC's larger screen or exporting elsewhere. **To connect the DCS1700 to a PC:**

1) Insert the full-size USB plug at one end of the cable into a USB port of your PC.

2) Insert the mini-USB plug at the other end into the USB out jack on the left side of the DCS1700 grip (see Fig.1).

3) Making the USB connection will cause the DCS1700 screen to display two icons to choose from: ◎ above 🆂🅳. Press either the ⁴⊕ button or the ⱽ button to select the SD card icon. The SD card icon is selected when the red rectangle moves down to surround it.

4) Press the ᵒᵏ✿ button to choose the SD card. The screen will display the phrase "MASS-STORAGE MODE" against a blue background.

5) On most PCs, making this connection will activate AutoPlay. In the General options section, choose "Open folder to view files". Doing so will give you access to the SD card's content via its hierarchical file structure. At the top of the hierarchy is a folder named "DCIM".

Details of the SD card's file structure are worth mentioning to underscore the importance of *not* changing any factory-assigned folder names. As the figure below shows, the SD card has been formatted to contain one folder named "DCIM" and one subfolder named "100COACH". The 100COACH folder contains all stored photo and video files, identified by their .JPG and .AVI extensions. **You should not rename the DCIM and 100COACH folders while the SD card is inside your PC or connected to it to through a card reader. If you rename either folder, the DCS1700 will fail to recognize the SD card the next time you plug it into the console**.

DCIM   100COACH   PICT00XX.JPG
                                PICT00XX.AVI

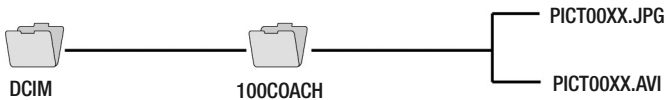If you choose to remove the SD card from the console and plug it into a PC, either directly or through a card reader, remember to eject the card from the PC once you are done viewing (and/or copying) the files stored on the card. Depending on your PC's startup settings, your computer may fail to restart following its next shutdown if the SD card remains inserted. The PC's operating system may try to reboot from the SD card and be unable to do so.

NAVIGATING THE TWO MENUS

The DCS1700 has two menus: the Main menu, which is accessible through the ᵒᵏ✿ button, and the Special Function menu, which is accessible through the ⛿Fn button.

The Main menu has six submenus for accessing and controlling the following operational and housekeeping functions:

- **The ALBUM submenu** lets you browse thumbnails of photo and video files stored on the SD card

- **The LANGUAGE submenu** lets you choose one of 27 languages for on-screen notifications and menu items

- **The DATE/TIME submenu** lets you set the current date and time (together known as system time) and the date format. It also lets you choose whether to superimpose the system time on live video.

- **The TV SYSTEM submenu** lets you choose the analog video output format (NTSC or PAL) compatible with your TV or TV monitor. Be aware that you cannot change the format of Year/Month/Day (Y/M/D) used for photo time stamps.

- **The SD CARD STATUS submenu** lets you check the free storage capacity of the SD card. It also lets you bulk-erase and format the card. Formatting the card also bulk-erases any files it contains.

- **The SETTINGS submenu** lets you determine the triggering time of the Auto Power Off function (never, 5 minutes or 10 minutes) and set the maximum duration of video recordings (unlimited, 5, 10, 15, 20, 25 or 30 minutes)

Five of the six submenus are navigated in identical fashion. When any of the last five submenus is open, its name is displayed in white at the top of the LCD. No more than three options are presented in rows below (see figure at right).

If more than three options are available, you must use the ⁴⊕ and ⊽⊿⊓ buttons to scroll up or down to make the additional options visible.

Scrolling an option to the middle of the three visible rows highlights it and makes it available for selection. Pressing the ᵒᴷ❀ button saves the setting and switches the display to the next-highest level of that menu or submenu. Pressing the ᴱˢᶜ button has the same effect: it switches the display to the next-highest level. In this regard, the ᴱˢᶜ button functions just like the "up one level" button in a traditional computer folder-subfolder hierarchy.
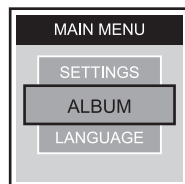
The ALBUM submenu is different for two reasons: 1) when selected, its name does not appear at the top of the LCD, and 2) its options can be scrolled horizontally (using the ◄⊖ and ⊙► buttons) as well as vertically (using the ⁴⊕ and ⊽⊿⊓ buttons).

The image at right underscores how much information about stored files is quickly made available to you by using the ALBUM submenu to browse your saved photos and video clips.

MAIN MENU

SETTINGS
ALBUM
LANGUAGE

2010/09/22 12:35:45 013

TOTAL NUMBER OF FILES STORED ON SD CARD

DATE AND TIME RECORDED

[DELETE]   [ESC]
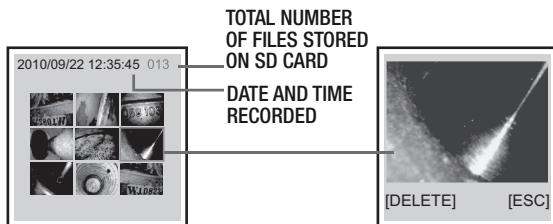
Although the LCD is only large enough to show thumbnails of nine files, thumbnails of all files stored on the SD card can be made visible by repeatedly pressing the ⁴⊕ button. Scrolling up in this way will replace the newest nine files by the nine next-newest, and then the nine next-newest, and so on. Thumbnails of video clips are identified by a white film-strip icon in their upper left corner. When a thumbnail of a file is highlighted, the underlying file can be deleted by executing the **DELETE** command made available by pressing the ᵀᶠₙ button. If you decide not to delete the file at this point, you can press the ᴱˢᶜ button to execute the **ESC** command.

Finally, remember that once you open any menu or submenu, **you have 2 minutes and 30 seconds to select an option before the menu automatically closes**, returning the DCS1700 to its default Preview operating mode.

The LANGUAGE submenu

Submenu name	Options	Instructions/Comments
N/A	English, French, German, Italian, Spanish, Portuguese, Japanese, Traditional Chinese, Simplified Chinese, Danish, Dutch, Polish, Russian, Bulgarian, Turkish, Swedish, Finnish, Norwegian, Estonian, Lithuanian, Latvian, Hungarian, Czech, Slovak, Slovenian, Romanian, Greek	Selects language of screens, menus and submenus. Use the ⌃⊕ or ⌄⊝ button to navigate to your preference and highlight it. Then press the ᴱˢᶜ button to save the selection and return to the Main Menu.

The DATE/TIME submenu

Submenu name	Options	Instructions/Comments
SETTINGS	Current date Current time	A) **To enter the current date** in the default format of Y/M/D (year, month, day): 1) Press the ⌃⊕ or ⌄⊝ button to increase or decrease the Y value. Then press the ⌖ button to advance to and highlight the M field; 2) Press the ⌃⊕ or ⌄⊝ button to increase or decrease the M value. Then press the ⌖ button to advance to and highlight the D field; Press the ⌃⊕ or ⌄⊝ button to increase or decrease the D value. Then press the ⌖ button to advance to and highlight the hours field.
		B) **To set the current time**: 1) Press the ⌃⊕ or ⌄⊝ button to increase or decrease the value in the hours field to match the current hour in 24-hour (military time) format. Then press the ⌖ button to advance to and highlight the minutes field; 2) Press the ⌃⊕ or ⌄⊝ button to increase or decrease the minutes value to match the current value. Then press the ⌖ button to advance to and highlight the seconds field; 3) Press the ⌃⊕ or ⌄⊝ button to increase or decrease the seconds value. Then press the ᴼᴷ✿ button to save both the date and time settings and return to the DATE/TIME submenu.

The DATE/TIME submenu (continued)

Submenu name	Options	Instructions/Comments
FORMAT	Y/M/D (default) M/D/Y D/M/Y	To change the date format: 1) Use the ⬆⊕ or ⬇⬒⬓ button to cycle through the three options: Y/M/D (default), M/D/Y and D/M/Y. 2) With your preference highlighted, press the ᴼᴷ✿ button to save the setting and return to the DATE/TIME submenu.
DISPLAY	YES (default) NO	Select **YES** to always show the system time (current date and time) on-screen in Preview (live video) mode. Select **NO** to never show the system time on-screen

The TV SYSTEM submenu

Submenu name	Options	Instructions/Comments
N/A	NTSC (default) PAL	Choose **NTSC** in North America, Central America, Japan, South Korea and Taiwan. Choose **PAL** in Europe, Africa and much of Asia and Africa. When your selection is highlighted, press the ᴼᴷ✿ button to save the setting and return to the Main Menu.

The SD CARD STATUS submenu

Submenu name	Options	Instructions/Comments
DELETE ALL FILES	Yes No (default)	Choose **YES** to delete all files on the SD card. Choose **NO** to preserve all files. When your selection is highlighted, press the ᴼᴷ✿ button to take the action and return to the SD CARD STATUS submenu.
FORMAT SD CARD	YES NO (default)	Choose **YES** to format the card, realizing that doing so erases its entire contents. Press the ᴼᴷ✿ button to do so. The confirmation "OPERATION COMPLETED" will appear in red at the bottom of the LCD.
SD CARD STATUS	N/A	Entering this sub-submenu displays this screen:

SD CARD STATUS
▣ 9527
• number of photos for which space is available
🎞 3min
• remaining VGA video recording time
🔟 66%(168MB)
• percentage of card/capacity free for storage

The SETTINGS submenu

Submenu name	Options	Instructions/Comments
AUTO POWER OFF	OFF (default) 5 10	Choose **OFF** to disable the Auto Power Off function (not recommended). Choose **5** or **10** to automatically power off the DCS1700 after 5 or 10 minutes of inactivity on the keypad. When your selection is highlighted, press the ⚙ button to save the setting and return to the SETTINGS submenu.
RECORDING TIMER	0 (default) 10 15 20 25 30	Choose 0 to never limit the duration of video recordings. Choose another value to limit the duration of video recordings to that value, in minutes. When your selection is highlighted, press the ⚙ button to save the setting and return to the SETTINGS submenu.

The Special Function menu that opens when you press the ᵉFn button provides access to two display controls and the option to operate the display in either of two custom modes.

The two display controls are for brightness and contrast. The controls let you establish baseline levels of those two display attributes that remain in effect in both Preview and Playback mode after you exit the Special Function menu and until you power off and on again.

Note: Unlike the Main menu and its submenus, the display controls made available through the Special Function menu must be manipulated within four seconds. If you do not adjust the baseline level of brightness or contrast within four seconds, the on-screen display control will disappear and you will have to start over, from Preview mode, by pressing the ᵉFn button.

To set a baseline level for display brightness:

1. Enter the Special Function menu by pressing the ᵉFn button.
2. Use the ⊕ or ⊟ button to scroll down to and highlight the ☀ line.
3. Press the ⚙ button
4. Use the ⊖ and ⊙ buttons to increase or decrease the display brightness, as represented by the number of green bars in a horizontal row. The default baseline level is represented by the blue bar in the middle of the row.

To set a baseline level for display contrast:

1. Enter the Special Function menu by pressing the ᵉFn button.
2. Use the ⊕ or ⊟ button to scroll down to and highlight the ◑ line.
3. Press the ⚙ button
4. Use the ⊖ and ⊙ buttons to increase or decrease the display contrast, as represented by the number of green bars in a horizontal row. The default baseline level is represented by the blue bar in the middle of the row.

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The other two options available through the Special Function menu do the following:

1) **Switch the display to operate in black & white mode**. To open this mode, enter the Special Function menu, scroll down to and highlight the line labeled "BW", and press the $\overset{\text{OK}}{\clubsuit}$ button. The notification BW will appear at the bottom of the LCD.

2) **Measure the size of any object or gap visible on-screen**.
To do so, open the Special Function menu, scroll down to and highlight the line labeled "MT" and press the $\overset{\text{OK}}{\clubsuit}$ button. A green grid of 12 squares, each measuring 0.2 in. on a side, will appear as a screen overlay. Remove the included object measuring tip from its glass vial and screw it on to the tip of the probe after removing the thread protector ring (Callout 4 of Fig. 2 on p. 12). Using only the tip and your eyesight, you should be able to measure the dimensions of any visible object or gap with an accuracy of ±0.02 in.
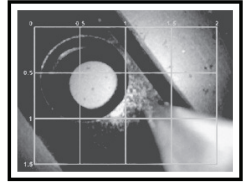
Finally, be aware that once black & white mode or object measurement mode is activated, the DCS1700 will continue to operate in that mode until you deactivate it or reboot the console. To deactivate either special operating mode, enter the Special Function menu by pressing the $\overset{\text{⊞}}{\text{Fn}}$ button. Scroll down to either the MT or BW line. If its label is green, the mode is active. To deactivate it, press the $\overset{\text{OK}}{\clubsuit}$ button.

SPECIFICATIONS

Display Size, Type	3.5 in. (diagonal), color TFT LCD
Display Resolution	320 x 240 pixels (QVGA)
Probe Length, Type, Diameter	39 in. (1m), soft metal, 0.22 in. (5.5mm)
Diameter of Camera Head with Thread Protector	0.23 in. (6mm)
Probe Resistances	To water, oil & dust per IP67 standard
Probe Depth of Field	0.4 to 12 in. (10 to 300mm)
Probe Field of View	60°
Camera Head Length	0.78 in. (20mm)
Camera Lighting	4 forward-facing LEDs + 2 side-facing LEDs
Video Recording Resolution	640 x 480 pixels (VGA)
Video File Format	.avi
Photo Recording Resolution	640 x 480 pixels (VGA)
Photo File Format	.jpg
Video Zoom Options	1.5X, 2X
Video Playback Speeds	12%, 25%, 50%, 1X, 1.5X, 2X, 4X
Interfaces	Two analog video out jacks & one USB 2.0 jack (USB jack reserved for future use)

Specifications (continued)

Video Out Formats	NTSC and PAL
Video Frame Rate	30 frames per second (fps)
Compression Format	Compatible with MPEG4
Recording Medium	Standard-size SD card of up to 32GB capacity
Menu Languages	English, French, German, Italian, Spanish, Portuguese, Japanese, Traditional Chinese, Simplified Chinese, Danish, Dutch, Polish, Russian, Bulgarian, Turkish, Swedish, Finnish, Norwegian, Estonian, Lithuanian, Latvian, Hungarian, Czech, Slovak, Slovenian, Romanian, Greek
Probe Operating/Storage Temperature	-4° to 140°F (-20° to 60°C)
Grip Operating Temperature	32° to 122°F (0° to 50°C)
Dimensions of Grip	10.8 x 4.8 x 2.2 in. (275 x 123 x 55mm)
Weight of Grip (without Batteries)	13 oz. (370g)
Power Source	(4) "AA" Alkaline or rechargeable Ni-MH batteries
Battery Life (typical)	4 hours operation

OPERATING, MAINTENANCE & TROUBLESHOOTING TIPS

- The probe is flexible to make it easy for you to inspect hard-to-reach areas. Never insert or bend it by force, and never over-bend any part of the probe. Specifically (see figure at right):

±70° ±70° ±90° ±90°

1 to 2 in. (25 to 50mm) from tip 2 in. (50mm) or more from tip

  - Do not bend the last 1 to 2 inches (25 to 50mm) of the probe by more than 70°

  - Do not bend the probe at any other point by more than 90°

- Never remove the SD card while taking a picture or recording a video. Doing so may damage the card and erase or corrupt the photo or video.

- If the LCD suddenly goes dark, the first two things to check are the integrity of the console's connection to the probe and the charge of the console's batteries. The reason for the failure also could be that you have forgotten to remove the rubber cap protecting the probe tip.

- If live video begins to look spotty, streaky or intermittent, the likely reason is weak batteries.
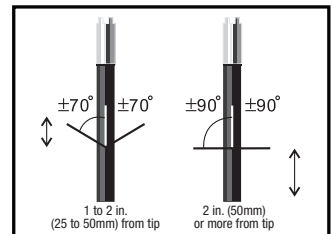
- If the console "freezes" (pushing buttons has no effect) like a computer, straighten out a paper clip and use one end to press the red Reset button on the back of the console.

- Avoid using corrosive liquids such as alcohol to clean either the console or the probe. To clean the camera's lens and LEDs, use one of the supplied cotton swabs and a small amount of the cleaning solution. To clean the LCD, use the supplied cloth, cotton swabs and liquid. To clean the housing of the console, use a soft, dry cloth.

- Operate and store the DCS1700 only in a cool (under 122ºF or 50ºC), dry, well-ventilated place. Avoid exposing the unit to sunlight for long periods of time.

- To avoid damaging the console's probe connector, use only compatible probes.

- Never use the probe or camera head to modify surroundings or to clear pathways or clogged areas.

- The camera head, LEDs and thread protector ring are waterproof, but not acid-proof or fire-proof. Do not touch acidic, corrosive or hot materials or they will ruin the head.

- Cover the camera-tipped end of the probe with the protective rubber cap when not using it.

- Unless you wish to install a mirrored viewing tip, do not unscrew the thread protector ring from the camera head.

- When inspecting a vehicle, shut off the engine. Metal and liquid under the hood may be hot. Do not get oil or gas on the camera head.

- If condensation forms inside the camera lens, let it evaporate before using the probe again.

- Do not try to disassemble any part of the probe. Doing so creates an electrical hazard, could damage the probe, and voids the limited warranty.

COMPATIBLE PROBES & ACCESSORIES

The table below lists and describes all probes and accessories compatible with the DCS1700.

Model No. (SKU)	Description	Camera Head Diameter	Probe Length	Depth of Field
P16ART-1SM	Soft Metal Articulating Probe	6mm (0.23 in.)	1m (3.28 ft.)	0.4 to 12 in. (10 to 300mm)
P16ART-2SM	Soft Metal Articulating Probe	6mm (0.23 in.)	2m (6.6 ft.)	0.4 to 12 in. (10 to 300mm)
P16ART-3SM	Soft Metal Articulating Probe	6mm (0.23 in.)	3m (9.8 ft.)	0.4 to 12 in. (10 to 300mm)
P16HPART	VGA Resolution Articulating Probe	6mm (0.23 in.)	1m (3.28 ft.)	0.4 to 12 in. (10 to 300mm)
P16HP2ART	VGA Resolution Articulating Probe	6mm (0.23 in.)	2m (6.6 ft.)	0.4 to 12 in. (10 to 300mm)
P16HP3ART	VGA Resolution Articulating Probe	6mm (0.23 in.)	3m (9.8 ft.)	0.4 to 12 in. (10 to 300mm)
P16181SR-M	Flexible-Obedient Probe	5.5mm (0.22 in.)	1m (3.28 ft.)	0.4 to 12 in. (10 to 300mm)
P16182SR-M	Flexible-Obedient Probe	5.5mm (0.22 in.)	2m (6.6 ft.)	0.4 to 12 in. (10 to 300mm)
P16183SR-M	Flexible-Obedient Probe	5.5mm (0.22 in.)	3m (9.8 ft.)	0.4 to 12 in. (10 to 300mm)
P16181SM-M	Soft Metal Probe	5.5mm (0.22 in.)	1m (3.28 ft.)	0.4 to 12 in. (10 to 300mm)
P16183SM-M	Soft Metal Probe	5.5mm (0.22 in.)	3m (9.8 ft.)	0.4 to 12 in. (10 to 300mm)
P16185SM-M	Soft Metal Probe	5.5mm (0.22 in.)	5m (16 ft.)	0.4 to 12 in. (10 to 300mm)
P161810SM-M	Soft Metal Probe	5.5mm (0.22 in.)	10m (32 ft.)	0.4 to 12 in. (10 to 300mm)
P161830SM-M	Soft Metal Probe	5.5mm (0.22 in.)	30m (98 ft.)	0.4 to 12 in. (10 to 300mm)
P1839-M	Ultra-Slim Flexible-Obedient Probe	3.9mm (0.15 in)	1m (3.28 ft.)	0.25 to 6 in. (6.4 to 150mm)
P16182-39	Ultra-Slim Flexible-Obedient Probe	3.9mm (0.15 in)	2m (6.6 ft.)	0.25 to 6 in. (6.4 to 150mm)
P16183-39	Ultra-Slim Flexible-Obedient Probe	3.9mm (0.15 in)	3m (9.8 ft.)	0.25 to 6 in. (6.4 to 150mm)
P1618FS-49	Switchable Front/Side View Flexible-Obedient Probe	4.9mm (0.19 in)	1m (3.28 ft.)	0.25 to 6 in. (6.4 to 150mm)
P16182-49	Switchable Front/Side View Flexible-Obedient Probe	4.9mm (0.19 in)	2m (6.6 ft.)	0.25 to 6 in. (6.4 to 150mm)
P16183-49	Switchable Front/Side View Flexible-Obedient Probe	4.9mm (0.19 in)	3m (9.8 ft.)	0.25 to 6 in. (6.4 to 150mm)
P16181HP	VGA Resolution Probe (P16181HP included with DCS1700 system)	5.5mm (0.22 in.)	1m (3.28 ft.)	0.4 to 12 in. (10 to 300mm)
P16182HP	VGA Resolution Probe (P16181HP included with DCS1700 system)	5.5mm (0.22 in.)	2m (6.6 ft.)	0.4 to 12 in. (10 to 300mm)
P16183HP	VGA Resolution Probe (P16181HP included with DCS1700 system)	5.5mm (0.22 in.)	3m (9.8 ft.)	0.4 to 12 in. (10 to 300mm)
P1618SV-1SM	Side View Soft Metal Probe	5.5mm (0.22 in.)	1m (3.28 ft.)	0.25 to 6 in. (6.4 to 150mm)
P1618SV-1SR	Side View Flexible-Obedient Probe	5.5mm (0.22 in.)	1m (3.28 ft.)	0.25 to 6 in. (6.4 to 150mm)
P16PIP	Pipe & Duct Inspection Probe & Reel Set	28mm (1.1 in.)	22m (72 ft.)	0.4 in. (10mm) to infinity
PM003	Set of 3 Mirrored Viewing Tips (70°, 90°, 110°) for all 5.5mm dia. probes	———	———	———
RP1618	Reel Stand for Long Soft Metal Probes	———	———	———

For more information or to order a part, begin by visiting www.generaltools.com and entering the Model No. in the SEARCH box at the top of the home page.

WARRANTY INFORMATION

General Tools & Instruments' (General's) DCS1700 (The VIPER 1700) High-Performance VGA Recording Video Borescope System is warranted to the original purchaser to be free from defects in material and workmanship for a period of one year. Subject to certain restrictions, General will repair or replace this instrument if, after examination, the company determines it to be defective in material or workmanship.

This warranty does not apply to damages that General determines to be from an attempted repair by non-authorized personnel or misuse, alterations, normal wear and tear, or accidental damage. The defective unit must be returned to General Tools & Instruments or to a General-authorized service center, freight prepaid and insured.

Acceptance of the exclusive repair and replacement remedies described herein is a condition of the contract for purchase of this product. In no event shall General be liable for any incidental, special, consequential or punitive damages, or for any cost, attorneys' fees, expenses, or losses alleged to be a consequence of damage due to failure of, or defect in any product including, but not limited to, any claims for loss of profits.

RETURN FOR REPAIR POLICY

Every effort has been made to provide you with a reliable product of superior quality. However, in the event your instrument requires repair, please contact our Customer Service to obtain an RGA (Return Goods Authorization) number before forwarding the unit via prepaid freight to the attention of our Service Center at this address:

> General Tools & Instruments
> 80 White Street
> New York, NY 10013
> 212-431-6100

Remember to include a copy of your proof of purchase, your return address, and your phone number and/or e-mail address.

NOTES

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GENERAL®

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