



**HIGH-PERFORMANCE WIRELESS
RECORDING VIDEO BORESCOPE
SYSTEM with VGA RESOLUTION
ARTICULATING PROBE**

USER'S MANUAL



DCS18HPART

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) DCS18HPART High-Performance Wireless Recording Video Borescope System with VGA Resolution Articulating Probe. Please read this user's manual carefully and thoroughly before using the instrument.

The DCS18HPART has two components: the DCS1800 Handheld Wireless Recording Video Borescope Console and the P18HPART VGA Resolution Wireless Articulating Probe. The P18HPART is 1m (39 in.) long and has a diameter of 6mm (0.23 in.). In addition to a VGA resolution camera, the probe has three buttons on its controller that enable you to brighten, rotate and remove reflections from video and images to improve their clarity and readability.

You can expand the universe of probes compatible with the DCS1800 console to include dozens of wired, non-articulating probes by purchasing General's DCS1800-TR Wireless Probe Handle/Controller. The DCS1800-TR provides both the connector needed to interface with a high-performance wired probe, and the transmitter needed to send the video it captures to the DCS1800 console.

Two tables describing all probes compatible with the DCS1800 console can be found on p. 19.

A thumbwheel on the right of the articulating probe controller allows you to adjust the brightness of the LEDs illuminating the camera at the end of the probe. Articulation greatly expands the range of inspection possibilities. Being able to change the probe's viewing axis *in situ* by up to 155° in two directions allows you to see around corners or even "behind" the probe, even in close quarters. Separately, the ability to detach the monitor from the probe also increases application flexibility by, for example, enabling two-handed operation, as shown in the photo at right.



The DCS1800 console has three operating modes: Preview, Playback and Menu:

- **In Preview mode**, video framed by the camera's field of view is displayed in real time on the console's LCD. The console automatically enters this mode when powered on. A front-panel button allows you to double the size of a target (a zoom level of 2X). The same button allows you to "mirror" video, making it possible to read serial numbers seen and "reversed" by an attached probe with a mirrored viewing tip. In Preview mode, real-time video also can be exported through an included video cable to any NTSC- or PAL-format TV monitor with RCA input jacks.

Operating in Preview mode, the DCS1800 console also allows you to record inspection video clips and photos at VGA (640 x 480 pixel) resolution on an included SD memory card by pressing icon-labeled buttons on the console's front panel. The remaining front-panel buttons enable access to Playback and Menu modes.

- **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 by removing the SD card and plugging it into the

computer directly or through a card reader. Because videos are saved as .avi files and photos as .jpg files, applications found on most PCs (Microsoft Windows Media Player and Microsoft Office Picture Manager) can open the files. The 4GB SD memory card included in the DCS18HPART case can store at least 4 hours of video, recorded at 15 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. When selected, submenu items execute “housekeeping” functions such as deleting files, setting the date and time, enabling or disabling date and time stamps, choosing any of 28 languages for display indications, selecting a Video out format and adjusting the triggering time of the console's Auto Power Off (APO) function.

KEY FEATURES

- Slim (6mm diameter), wireless, waterproof IP67 probe with articulation range of 155°, high-quality VGA resolution camera at its tip, and light boost, anti-reflection and 90° image rotation buttons on controller. Camera lighting provided by four adjustable-brightness white LEDs.
- Operating flexibility is maximized when console is detached from probe. In this mode, video captured by probe can be sent wirelessly to console from up to 33 ft. (10m) away on any of four channels.
- Console has 3.5 in. diagonal color LCD for viewing probe video instantly and saved video clips and pictures later
- Compatible with dozens of high-performance camera-tipped probes from General (see p. 19)
- 28 available menu languages
- Familiar menu-driven user interface for viewing and recording photos and voice-annotated video clips on standard SD memory card (4GB card included) and playing back media on console, TV or PC
- Console and probe powered by separate rechargeable Lithium-ion batteries with 4-hour capacity
- 1-year limited warranty

SAFETY INSTRUCTIONS

CAUTION!

Never insert any probe attached to the DCS1800 console into any structure or space known or suspected to contain live electric wiring

- The DCS1800 system is intended for industrial applications only. Do not use a compatible probe 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 console. Doing so creates a potentially fatal electrical hazard (and voids the warranty as well).

WHAT'S IN THE CASE

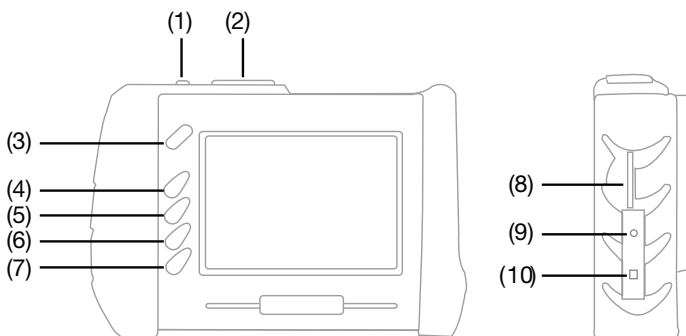
The DCS18HPART system comes in a custom hard plastic protective carrying case. Inside the case are:

- The DCS1800 console. The console integrates an LCD monitor, circuitry for wirelessly connecting to a high-performance camera-tipped probe from General, and front-panel controls for enlarging and/or mirroring live video as well as recording and playing back video clips and photos captured by an attached probe.
- The P18HPART VGA Resolution Wireless Articulating Probe, with a length of 1m (39 in.) and a diameter of 6mm (0.23 in.)
- A 70° mirrored viewing tip for the probe
- A 4GB SD memory card
- An AC adapter/battery charger for a 110/220VAC supply. The adapter has a 5.5VDC, center-positive output plug.
- An A/V cable for connecting the DCS1800 console to a TV monitor. The cable has RCA plugs at one end and a mini-stereo plug at the other end.
- A small flat-blade screwdriver for changing the wireless channel of the console and probe
- This user's manual

PRODUCT OVERVIEW

Fig. 1 shows the names and locations of all of the controls, ports and jacks of the DCS1800 console. Table 1 details how the function of each front-panel button changes with the console's operating mode. Fig. 2 shows the names and locations of the controls and main physical features of the P18HPART VGA Resolution Wireless Articulating Probe. 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, ports and jacks of the DCS1800 console








- | | | | |
|---|--|----|--|
| 1 |  Start/Stop Video Recording Button | 6 | OK/Menu Enter/Save/Enter Menu mode Button |
| 2 |  Snapshot Button | 7 | Esc Escape/Zoom/Mirror Button |
| 3 |  Power On/Off Button | 8 | SD Card Socket |
| 4 |  Previous Video/Photo Button | 9 | A/V Out Jack |
| 5 |  Next Video/Photo Button | 10 | AC Adapter Jack |

Table 1. The DCS1800 console's multi-function buttons



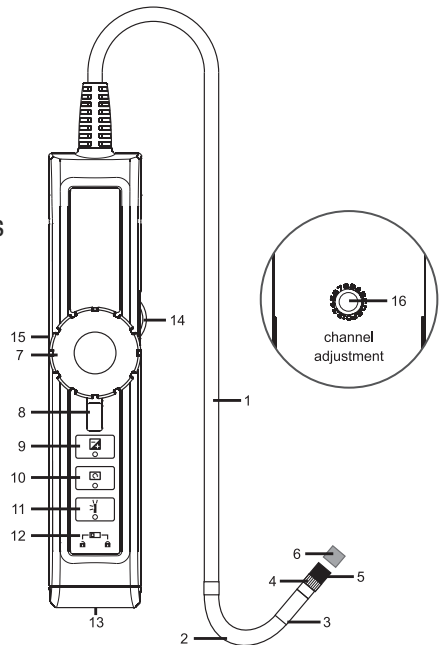
Button Label	In Preview Mode	In Playback Mode	In Menu Mode
▲	Switches to Playback mode	Selects next-oldest video or photo. Also increases playback speed to 1.5X, 2X or 4X.	Moves up one line. When setting date/time, moves ahead one field.
▼	Switches to Playback mode	Selects next-newest video or photo. Also decreases playback speed from 4X, 2X or 1.5X.	Moves down one line. When setting date/time, moves back one field.
OK/Menu	Switches to Menu mode	Plays/pauses video clip	Executes highlighted command
Esc	Pressed briefly , doubles size of target (zooms 2X) Pressed and held , mirrors video	Switches to Preview mode	Switches to Preview mode
	Takes a picture (stores .jpg photo on SD card)	No action	When setting date/time, increases field value by one unit
	Starts/stops recording an .avi video on SD card	Offers option to delete selected video/photo file	When setting date/time, decreases field value by one unit

Fig. 2. The controls and physical features of the P18HPART VGA Resolution Wireless Articulating Probe

1. Soft metal probe
2. Flexible-obedient, remote-controlled neck
3. Stainless steel camera head with three forward-facing LEDs and two side-facing LEDs
4. Stainless steel accessory alignment ring
5. Black metal thread protector ring
6. Red rubber lens cap
7. Articulation angle control wheel
8. Control wheel locking lever
9. Light boost button
10. 90° rotation button
11. Anti-reflection button
12. Button lock/unlock switch
13. Mini-USB charging jack
14. Power switch/brightness adjustment thumbwheel
15. Probe battery status LED
16. Channel selector switch (on back)



SETUP INSTRUCTIONS

CHARGE CONSOLE AND PROBE BATTERIES

To prepare to power the system on for the first time, securely attach the P18HPART probe controller to the back of the DCS1800 console using the two motions shown at right. Plug one end of the supplied AC adapter/battery charger into a 110VAC receptacle. Then swing the black rubber protective flap away from the right side of the DCS1800 console to expose the AC adapter jack (Fig. 1, Callout 10). Insert the cylindrical plug at the end of the adapter/charger cable into the AC adapter jack. This will begin charging the console's battery and the probe's battery at the same time. Next, power on the probe by rotating the probe controller's thumbwheel (Fig. 2, Callout 14) downward until you feel and hear a click.

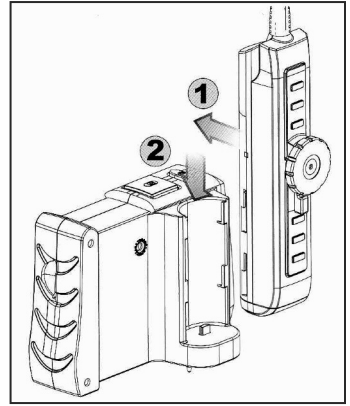




Table 2. Correlating the color of the LED on the probe controller with probe battery charge

LED COLOR	BATTERY STATUS	COMMENT
Green	In use	Working under full battery
Dark Red	Low battery	Recharge battery when dark red light appears during usage
Orange	Charging while in use	Charging while in use
Red	Charging with power off	Charging with power off
None	Full battery with power off	Light dims when battery is fully charged

Next, press the red the  button on the console (Fig. 1, Callout 3) and hold it for at least five seconds. The LCD will illuminate and briefly show a battery charge indicator and two SD card status advisories (see page 9 for details) superimposed on video being captured in real time by the camera at the end of the probe. After a few seconds, only live video will remain.

Practice using the thumbwheel on the probe controller to adjust the intensity of the camera's lighting. In a brightly lit room, moving the thumbwheel has a big effect on the brightness of the LEDs at the tip of the probe, but a much smaller effect on the brightness of video on the screen. The on-screen impact of changing brightness is more pronounced in dark environments.

To power off the DCS1800 console, push the  button and hold it for at least five seconds.

It will take several hours to fully charge the console and probe batteries the first time. **You cannot replace either battery**, which can only be replaced by General-authorized service personnel. **Do not open the case of either component in an attempt to**

change the battery yourself. Doing so creates a potentially fatal electrical hazard (and voids the warranty as well) with the AC adapter plugged in.

With proper care (charging the batteries often, and never allowing them to completely discharge), you can expect each battery to last four or five years. Fully charged batteries should power at least four hours of operation.

SYNC CONSOLE AND PROBE

It's important to realize that the DCS1800 console is now showing video only because the probe is physically attached to it. For most inspection applications, you will want to detach the probe from the console and use its built-in transmitter to send video to the console's LCD wirelessly. Detaching the two components frees up both of your hands. You can then use one hand to feed the probe into the area you want to inspect, and the other hand to adjust the probe's articulation angle.

The probe and console can communicate wirelessly only if both components are operating on the same channel. Four channels centered on 2.4GHz are available. Both components may have already been set to the same channel at the factory. To discover whether that is the case, detach the probe from the console. If the console's LCD resumes showing probe video after a brief delay, the two units are already operating on the same channel and there is no need to sync them.

If detaching the probe from the console causes the video to disappear, leaving static on the screen, you must sync the two components.

To synchronize the transmitting frequency of the probe with the receiving channel of the console, you can either change the channel of the probe or the channel of the console. In either case, you will use the small flat-blade screwdriver included in the case. The channel selector switch of the console is on the rear of the unit, in the center near the top. The channel selector switch of the probe controller is also on the back of the unit (Fig. 2, Callout 16).

Since there are only four available channels, the fastest way to sync the two components is to use the screwdriver to move the channel selector switch of *either* component through all four of its possible positions. When probe video appears on the console, you have succeeded in syncing the two units.

INSERT SD CARD

This final setup step enables storage of video clips and photos. Remove the supplied 4GB SD memory card from its packaging. Discard the packaging, but save the plastic storage case.

Push the SD card into the socket on the right side of the console (Fig. 1, Callout 8). Be sure the card's gold contacts are facing the rear and enter the socket first. Push in the card until you feel it spring back and you hear a click.

Note that when you inserted the SD card, the advisory **"SD CARD INSERTED"** briefly appeared on the bottom line of the LCD and a new icon with four bars appeared briefly on the bottom right. This icon indicates the used capacity of the memory card. Four green bars indicate a full SD card. No green bars indicate an empty card.

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.

OPERATING INSTRUCTIONS


VIEWING LIVE VIDEO ON THE CONSOLE

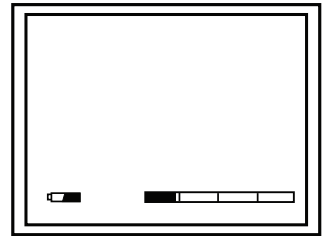
Continue charging the console and probe batteries until both are fully charged. To determine whether the console's battery is fully charged, either power the console off and then on again, or press the ▲ or ▼ button, followed by the **Esc** button. A battery charge status icon will briefly appear at the lower left of the LCD, as explained and shown below on this page.

The charge of the probe's battery is indicated by the color of the LED on the side of the controller (Fig. 2, Callout 15). Table 2 on p. 7 correlates the LED's color with the probe's charge level.

While the batteries continue to charge, General recommends that you become familiar with the DCS1800 console's controls, indicators and menu options before taking the unit out into the field. The system operates the same way whether powered by batteries or the AC adapter.

To begin, power off the unit by pressing and holding the ⏻ button on the console. Then press and hold the button again to power the console back on. Each time the console is powered on, the screen shown below will appear briefly, superimposed on live video captured by the camera probe. Together, the number of bars in each icon represent the DCS1800 console's two "vital signs"—battery charge and available memory capacity.

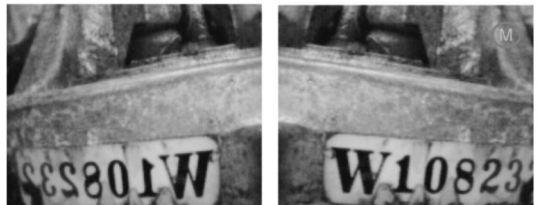
The number of filled-in bars at the bottom of the screen reflects the amount of data currently stored on the SD card. A full card would be indicated by four bars. The more filled-in bars in the  icon, the higher the current level of battery charge. Four bars indicate a fully charged battery.



Finally, note the dual function of the **Esc** button in Preview (live video) mode:

- **Press the Esc button briefly** and the size of targets will be doubled as the camera's field of view is reduced by that amount. A magnifying glass icon and the text **+2.0x** will appear on-screen and remain there after the available memory capacity bars and the battery charge icon make a brief appearance.
- **Press and hold the Esc button** and video will be mirrored horizontally, as shown in the two photos below right. The effect makes it possible to read text or serial numbers "reversed" by an attached probe with a mirrored viewing tip—by undoing the reversal. A mirror icon will appear on-screen to indicate that video is being mirrored.

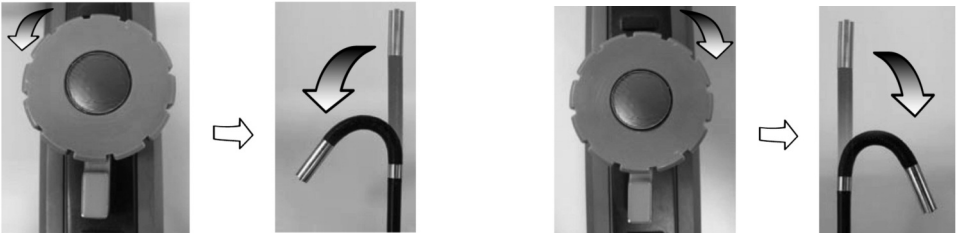
You can mirror and zoom videos at the same time by pressing the **Esc** button briefly, and then pressing and holding the button. In this case, a magnifying glass icon, the text **+2.0x** and a mirror icon will appear on-screen together.



MANIPULATING THE ARTICULATING PROBE

Next, get used to manipulating the articulating probe. Typically, borescope users insert their probe into an orifice (a hole in a wall or an engine's cylinder, for example) or into an inaccessible or hazardous area (the back or an equipment rack or an engine compartment, for example) to view components or environments that would otherwise be invisible. Compared to an obedient probe, your soft metal articulating probe is more flexible, but it does not retain its shape. Its obvious advantage is articulation. Using the articulation control wheel (Fig. 2, Callout 7), you can turn the probe tip to inspect targets off the main axis of the probe while it is in a tight space, without having to remove and re-insert the probe.

The articulation control wheel allows you to bend the tip of the probe up to 155° to the left or right. **To bend the tip to the left**, rotate the wheel counterclockwise (see photos below left). **To bend the tip to the right**, rotate the wheel clockwise (see photos below right).

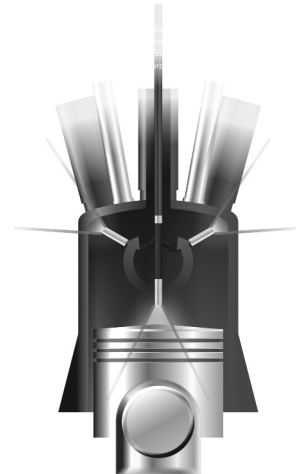


To lock the tip of the probe into its bent position, move the red lever below the control wheel to the left (see photo at right). Remember to unlock the probe tip (by moving the red lever to the right) before using the control wheel to move it again.




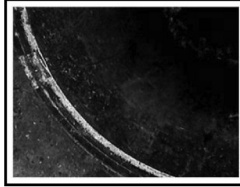
Be aware that your application environment may limit how much you can articulate the probe. For example, if you are inspecting a 1 in. diameter pipe, you will be unable to bend the probe tip more than a few degrees; any more would bring the tip into contact with the pipe's inside wall. The relevant P18HPART specification is that 2 in. (50mm) of clearance is required for 90° articulation (in either direction).

In many cases—inspecting the interior of an engine cylinder, for example (see photo at right)—adequate clearance will not be an issue. In fact, the $\pm 155^\circ$ articulation range enables “look back” inspections of intake and exhaust valves from within the cylinder.

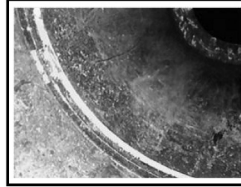


USING THE THREE CONTROL BUTTONS

To boost the intensity of the three LEDs normally providing 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 probe controller.

This anti-reflection feature of the P18HPART is most useful for eliminating reflections of the three forward-facing LEDs in the camera head from shiny surfaces. Note that pressing the  button extinguishes the three forward-facing LEDs and shifts responsibility for camera lighting to the two side-facing LEDs. The net effect, as shown in the two photos at right, is a clearer and more-readable image.

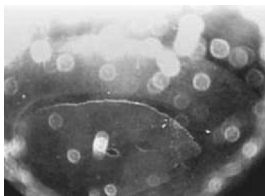
You can also use the anti-reflection function to remove glare created by the P18HPART's mirrored viewing tip (see the next section of this manual for installation and alignment instructions). The pair of images below illustrates the net positive effect.



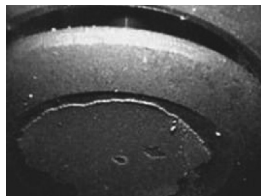
WITHOUT ANTI-REFLECTION



WITH ANTI-REFLECTION




MIRRORED VIEW
WITHOUT ANTI-REFLECTION

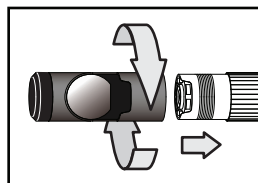
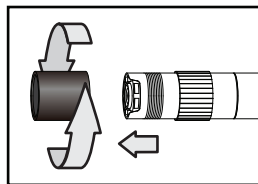


MIRRORED VIEW
WITH ANTI-REFLECTION

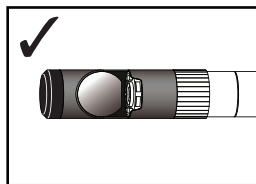
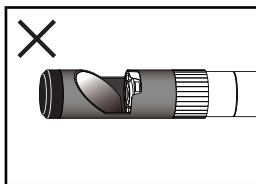
ATTACHING THE MIRRORED VIEWING TIP (OPTIONAL)

The only accessory included with the P18HPART is a 70° mirrored viewing tip. To attach it to the probe:

1. Pull off the red rubber lens cap (Fig. 1, Callout 6).
2. Unscrew and remove the black metal thread protector ring (Callout 5), as shown at right.
3. Turn the stainless steel accessory alignment ring (Callout 4) 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 3) 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 the thumb and forefinger of one hand 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.



Remove the blue circular protective film from the mirror by pulling on its tab with a tweezers.

VIEWING LIVE VIDEO ON A TV MONITOR


Your DCS1800 system comes with a video cable for connecting the console to a 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 console's.



To implement the connection in hardware, insert the stereo mini-plug of the provided cable into the A/V Out jack of the console (Fig. 1, Callout 9). Then insert the yellow RCA plug at the other end of the cable into the Video In jack of your TV or TV monitor, and the white RCA plug into the left or right channel audio input jack of the TV. Be sure to set the TV input to external video.



Live video shown on a TV monitor can be enlarged, mirrored, or enlarged and mirrored at the same time, as it can when viewed on the console's LCD.

To activate the connection in software and begin exporting console's video to a TV, refer to the instructions for the **AV OUTPUT** and **TV SYSTEM** lines in the "Navigating the Main Menu" section of this manual, beginning on p. 14.

TAKING PICTURES AND RECORDING VIDEOS





To take a picture, make sure the console is in Preview mode (with live video appearing on the LCD) and press the  button (Fig. 1, Callout 2). Doing so creates a .jpg file of the frame being displayed at that moment and stores it on the SD card. The photo's file name and the current date and time appear briefly on the bottom line of the LCD to confirm that a picture was taken. The console automatically returns to Preview mode after taking a picture.

To record a video, make sure the console is in Preview mode and press the  button (Fig. 1, Callout 1). Doing so begins creating an .avi video file for storage on the SD card. An orange running clock appears at the lower left of the screen to confirm that a recording is in progress, and it remains there for the duration of the video. To stop recording, press the  button again. This makes the running clock disappear and returns the console to Preview mode.

While a video is being recorded, all console buttons other than the  and **Esc** buttons are disabled. Pressing the  button stops the recording and returns the console to Preview mode. You cannot pause the recording of a video clip; you must stop the clip and start recording a new one. Briefly pressing the **Esc** button activates the 2X zoom function and applies it "on the fly" to the clip being recorded. Pressing and holding the **Esc** button does not mirror the field of view of the clip being recorded.

The console 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 advisory **SD CARD FULL** at the bottom of the screen in Preview mode. 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 PHOTOS AND PLAYING BACK VIDEOS

To view a picture or play back a video clip (or more than one in order) on the console's LCD or a TV monitor, switch the unit out of Preview mode and into Playback mode by pressing the  or  button (Fig. 1, Callouts 4 and 5, respectively). In Playback mode, pressing the  button repeatedly recalls all photos and videos from memory in reverse chronological order (in other words, the newest first and the oldest last). Each press of the  button selects the next oldest picture or video.

Selected photos are displayed automatically, with their file name appearing briefly at the bottom of the LCD and their position in the chronological order of all saved files (7/10, for example) appearing briefly at upper right. After a few seconds, only the date and time of the photo's capture remain superimposed on the image at the bottom of the screen.

Like photos, selected video clips are indicated by the brief appearance of their file name at the bottom of the screen and their chronological position at upper right. Selection of a video clip is also indicated by the presence of a film strip icon and the clip's duration on the top line. Unlike photos, video clips are not displayed automatically. **To start playing**

a **video clip**, press the **OK/Menu** button. To **pause playback**, press the **OK/Menu** button again. To resume playback, press the button again.

To **increase the video playback speed** to 1.5X, 2X or 4X normal, press the ▲ button once, twice or three times. To **decrease playback speed** toward normal (1X), press the ▼ button once, twice or three times.

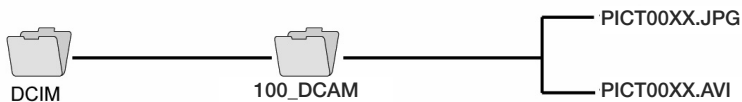
While each photo and video is on-screen, pressing the 🗑️ button gives you the option to delete its file. Pressing the button calls up a dialog box with the word **DELETE** on the left and the term **[OK]** on the right. To **delete the file**, press the **OK/Menu** button. To keep the file and select the next-oldest file for display, press the **Esc** button.

ACCESSING SD CARD CONTENT

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 eject the memory card from the console and plug it directly into a PC. If your PC does not have an SD card slot, you can purchase a USB SD card reader (Part No. SDRD1) from General.

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 it contains. 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.

Details of the SD card's file structure are worth mentioning because assigned file names contain useful information. The figure below illustrates the hierarchy. It shows that the SD card contains one folder named "DCIM" and one subfolder named "100_DCAM". The 100_DCAM folder contains all stored photo and video files, identified by their .JPG and .AVI extensions. **You should not rename the DCIM or 100_DCAM folders while the SD card is inside your PC. If you rename either folder, the console will fail to recognize the SD card the next time you plug it in.**



NAVIGATING THE MAIN MENU

The main menu of the DCS1800 console provides access to the following housekeeping and operational functions:

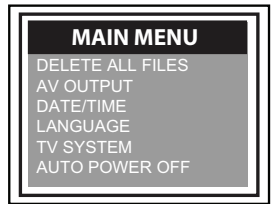
- Bulk file erasure
- Video exporting
- Setting the date and time
- Choosing a display language
- Selecting a TV format
- Enabling/disabling and adjusting the triggering time of the Auto Power Off function

Menu mode has a hierarchical structure and uses prompts and dialog boxes familiar to anyone who has used an Automated Teller Machine (ATM). The only constraint on using

the menu is your own response speed. If no selection is made within 2-1/2 minutes following entry into Menu mode, the console will automatically revert to Preview mode. The same time constraint applies to selections within submenus. If you do not respond to a prompt (indicated by a flashing word or line of text) within 2-1/2 minutes, the console will switch back to Preview mode—its default operating state.

To access the main menu, press the **OK/Menu** button to enter Menu mode. Doing so brings up the screen shown at right.

To navigate the main menu, use the **▲** and **▼** buttons to move up and down until the parameter you wish to change is highlighted and flashing in green. Then press the **OK/Menu** button to select it and call up its submenu.



The **DELETE ALL FILES** line gives you two options (yes and no) that can be selected using the **▲** and **▼** buttons. The sequence is similar to the previously described procedure for deleting an individual photo or video.

The **AV OUTPUT** line allows you to send live video, or saved video clips and photos, out through the unit's A/V out jack to an NTSC or PAL TV monitor. Before selecting this option, make the physical connection described in the "Viewing Live Video on a TV Monitor" section. Once you have connected to an external display, the console's LCD will go black and remain that way until you unplug the A/V cable from the console's A/V Out jack. If you attempt to activate A/V output mode without having plugged in an A/V cable, the LCD will display the following advisory: **NO AVOUT CABLE**.

The **DATE/TIME SETUP** line allows you to set the console's calendar and clock. Doing so is necessary only if you wish to keep track of your photo and video files by date and time.

When **DATE/TIME SETUP** is selected, the first screen to appear will have the year highlighted in orange. To decrease the value, press the **⏪** button. To increase the value, press the **⏩** button. Once you have set the year, save the setting and advance to the next field—the month—by pressing the **▼** button. Set the month as you did the year, by using the **⏪** and **⏩** buttons to increase or decrease the value by one unit per button press, and pressing the **▼** button to save the change (if any) and move on to the next field. Repeat this process until all six date and time components have been set. To back up from any field to the previous field, press the **▲** button.

The **DISPLAY** line below the date and time fields allows you to choose whether or not to superimpose the date and time on the display in Preview mode. To always superimpose the date and time, press the **⏪** button until **YES** appears at the right of **DISPLAY**. To never superimpose the date and time, use the same button to select **NO**. To save your selection, press the **OK/Menu** button. Finally, press the **OK/Menu** button again to save all of your settings.

The **LANGUAGE** line of the main menu allows you to view the main menu, as well as the **DELETE** screens for individual photos and videos, in any of 28 languages (see the Specifications section on page 16 for the full list). Use the **▲** and **▼** buttons to navigate to the language you wish to use and then press the **OK/Menu** button to save your selection.

The **TV SYSTEM** line enables you to choose either **NTSC** or **PAL** formatting of the videos you export to a TV monitor. Press either the **▲** and **▼** button to make your choice and then push the **OK/Menu** button to save the setting.

The **AUTO POWER OFF** line of the main menu is not visible on the screen that first appears after you press the **OK/Menu** button to put the console into Menu mode. To show the line, scroll down past the **TV SYSTEM** line. When the **AUTO POWER OFF** line appears, press the **OK/Menu** button to open the APO sub-menu..

By default, the **AUTO POWER OFF** function of the console is disabled. To enable it, and to choose how quickly to power off the instrument following a period of inactivity, navigate to one of the four options (5, 10, 15 or 30 minutes) and press the **OK/Menu** button. To re-disable the function later, enter Menu mode, scroll down to the **AUTO POWER OFF** line, press the **OK/Menu** button, select **OFF** and press the **OK/Menu** button again to save the setting.

SPECIFICATIONS

DCS1800 CONSOLE

Display Type	Color TFT LCD
Display Size	3.5 in (89mm) diagonal
Display Resolution	320 by 240 pixels (QVGA)
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 Out Formats	NTSC, PAL
Video Frame Rate	30 frames per second (fps)
Receiving Frequencies	2.414GHz, 2.432GHz, 2.450GHz, 2.468GHz
Recording Medium	Standard-size SD card
Interfaces	A/V Out
Languages	English, Spanish, Italian, French, German, Portuguese, Traditional Chinese, Simplified Chinese, Japanese, Korean, Danish, Dutch, Polish, Russian, Bulgarian, Turkish, Swedish, Finnish, Norwegian, Estonian, Lithuanian, Latvian, Hungarian, Czech, Slovak, Slovenian, Romanian, Greek

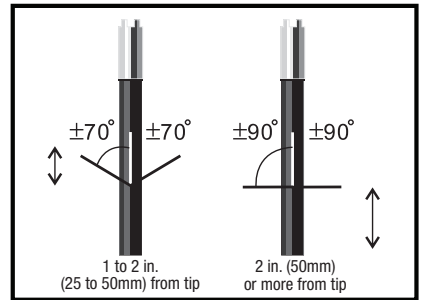
Power Source	Rechargeable 3.7V Li-ion battery
Power Consumption	1.8A @ 5.5VDC
Operating Temperature	32° to 140°F (0° to 60°C)
Storage Temperature	-4° to 140°F (-20° to 60°C)
Recharge Temperature	32° to 104°F (0° to 40°C)
Console Dimensions	5.8 x 4.1 x 2.8 in. (147 x 105 x 71mm)
Console Weight	11.9 oz. (335g)

P18HPART PROBE

Length	1m (3.28 ft.)
Diameter	6mm (0.23 in.)
Depth of Field	0.25 to 12 in. (6.4 to 300mm)
Field of View	60° (diagonal)
Resistances	To water, oil & dust per IP67 standard
Camera Lighting	3 forward-facing LEDs + 2 side-facing LEDs
Articulation Angle	±155°
Clearance Required for 90° Articulation	2 in. (50mm)
Transmitting Frequencies	2.414GHz, 2.432GHz, 2.450GHz, 2.468GHz
Wireless Range	33 ft. (10m)
Operating Temperature	-4° to 140°F (-20° to 60°C)
Dimensions of Probe Controller	5.47 x 1.38 x 1.26 in. (139 x 35 x 32mm)
Weight of Controller (without probe)	7.76 oz. (220g)

OPERATING, MAINTENANCE & TROUBLESHOOTING TIPS

- 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 remains or goes dark, make sure that the console and probe batteries are adequately charged, and that both components are operating on the same channel.
- If live video begins to look spotty, streaky or intermittent, the likely reason is an under-charged battery. Plug in the AC adapter/battery charger immediately.
- Avoid using corrosive liquids such as alcohol to clean either the LCD or the camera head. To clean the camera lens and LEDs, use a cotton swab and a few drops of water. To clean the LCD, use a soft cloth, cotton swabs and water. To clean the plastic housings of the console and probe controller, use a soft, dry cloth.
- 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:
 - Do not bend the last 1 to 2 inches of the probe by more than $\pm 70^\circ$
 - Do not bend the probe at any other point by more than $\pm 90^\circ$
 - To avoid permanently damaging the delicate wires and fiber optic cables inside the probe, never curl it into a circle with a diameter of less than 6 in.
- 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 (see table below) or they will ruin the head.
- Unless you wish to install the 70° mirrored viewing tip, do not remove the thread protector ring (Fig. 2, Callout 5). Never use the probe without attaching either an accessory or the thread protector ring to it.
- 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.



P18HPART's Tolerance of Various Liquids

Liquid	Tolerant	Liquid	Tolerant	Liquid	Tolerant
Aviation fuel	Yes	Ethanol ($\text{CH}_3\text{CH}_2\text{OH}$)	Yes	Mr Muscle (for bathroom)	No
Hydraulic oil	Yes	Brine	Yes	Edible vegetable oil	Yes
Turbine oil	Yes	Engine oil	Yes	Urea ($\text{CH}_4\text{N}_2\text{O}$)	Yes
Antifreeze	Yes	Brake fluid	Yes	Insulating oil	Yes
Toluene (C_7H_8)	No	Gasoline	Yes	SeaFoam	No
Ethyl acetate ($\text{C}_4\text{H}_8\text{O}_2$)	No	Diesel fuel	Yes	Nitric Acid (HNO_3)	No
Methyl ethyl ketone (butanone) ($\text{C}_4\text{H}_8\text{O}$)	No	Transmission fluid	Yes	Ammonia (NH_4OH)	No
		Mr Muscle (for glass)	Yes	Oil booster	Yes

COMPATIBLE PROBES

The tables below describe and compare all probes compatible with the DCS1800 console.

COMPATIBLE PROBES

Model No. (SKU)	Probe Description	Camera Head Diameter	Probe Length	Depth of Field
P18HPART	VGA Resolution Wireless Articulating Probe (included with DCS18HPART system)	6mm (0.23 in.)	1m (3.28 ft.)	0.25 to 12 in. (6.4 to 300mm)
P18ART-1SM	QVGA Resolution Wireless Articulating Probe		1m (3.28 ft.)	
P18ART-2SM			2m (6.6 ft.)	
P18ART-3SM			3m (9.8 ft.)	

PROBES MADE COMPATIBLE BY DCS1800-TR WIRELESS PROBE HANDLE/CONTROLLER

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

WARRANTY INFORMATION

General Tools & Instruments' (General's) DCS18HPART High-Performance Wireless Recording Video Borescope System with VGA Resolution Articulating Probe 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.



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DCS18HPART User's Manual

Specifications subject to change without notice

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MAN# DCS18HPART

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