

# **PART 1: GETTING STARTED WITH THE PD 150 and PD 170**

# POWER SWITCH –

under the right thumb when the camera is hand held

The power switch has four positions....

1. Press in the small green button and then rotate the power switch to **VCR**. The camera should bleep and the transport controls illuminate - you can use the player/recorder to review your tapes by operating the **STOP, REWIND, PLAY, FAST FORWARD** and **PAUSE** buttons.
2. **OFF (CHG)** is obviously the power off position and used to save battery. You should also use this position when *charging* a battery.
3. Press in the small green button and then rotate the power switch to **CAMERA**. You should now see a picture.
4. **MEMORY** - select when recording information to the memory stick

# INSERTING A TAPE

Press the small blue **EJECT** button inwards and then slide downwards.

Insert the tape

First close the **inner** cassette compartment first where it says **PUSH**

Finally close the outer cassette lid where it says **PUSH**

# **START / STOP –**

**under the right thumb when the camera is hand held**

This is a red button with the power switch control around it.

**TO START RECORDING** - Press the red button, the message **REC** will appear in the viewfinder

**TO STOP RECORDING** -Press the red button again, the message **STBY** will appear in the viewfinder.

When there is a tape in the camera it will automatically default to save mode after five minutes. You will still see a picture but it will take a few seconds longer to drop into record.

# RECORDING STILL IMAGES

- You may have to record still images for download onto a web page.
1. Press the silver **PHOTO** button (beside the zoom rocker) firmly. The camera will "blink" and record the still for seven seconds. Seven red markers will countdown the recording.
  2. Pictures can also be recorded on a memory stick inserted into the camera.

# POWER ZOOM

1. The 'T' stands for TELEPHOTO and will zoom the lens in.
  2. The 'W' stands for WIDE-ANGLE and will zoom the lens out.
- Press the zoom controller gently for a slow zoom speed and press harder for a faster zoom speed.
  - There is also a manual zoom ring (behind the focus ring) The zoom speed is controlled by the speed at which the ring is turned. Turn clockwise to zoom out and anticlockwise to zoom in.

# AUTO LOCK

1. When the **HOLD/AUTO LOCK** switch is in **AUTO LOCK** position - the camcorder will automatically adjust the IRIS, GAIN, SHUTTER SPEED and WHITE BALANCE.
2. With the **HOLD/AUTO LOCK** turned to the middle position you have the choice of operating the above features manually *or* on auto
3. To retain the settings you have adjusted manually, turn the **HOLD/AUTO LOCK** to the **HOLD** position.

# AUTO FOCUS

1. With the **FOCUS** switch set to **AUTO** the camera will automatically focus for you.
2. Set the switch to **MANUAL** to take control of focusing and  appears in the viewfinder.
3. The **PUSH AUTO** button below will automatically focus the camera on whatever is in the centre of the picture. When you release the button it will revert to the manual mode.

# STEADY SHOT

1. This is an optical means of compensating for camera shake.
2. You can switch it on/off with the **STEADY SHOT** in the menus.
3. When switched off - the  symbol appears in the viewfinder/LCD
4. It should be switched on in most circumstances because even lightweight tripods are inherently unstable.

# EDIT SEARCH

1. Momentarily holding down the **EDIT SEARCH** rocker marked "-" allows you to look at the last two seconds of the last picture you recorded.
2. By holding down the "+" or "-" side of the edit search you can forward or rewind through the tape.
  - Be careful when you use the edit search facility. If you forward onto blank tape and start recording, there will be a break in time code - which will give you problems when you come to edit. Always cue up on the last recorded picture to ensure you have continuous timecode throughout your rushes. The **END SEARCH** function will help you do this...
  - The **END SEARCH** button will take you to the end of the last recorded section. The camera rewinds or fast forwards the tape until it finds the last picture frame - it will play the last five seconds of your pictures and park, ready to record.

# PRE FLIGHT CHECKS

1. Always check that the **viewfinder** is in focus.
  - First of all make sure the lens cap is in place. All you should be able to see in the viewfinder is some of the time code, sound and battery data.
  - Under the rubber eye cup, on the viewfinder, you'll find the viewfinder diopter adjustment.
  - Alter the diopters adjustment until the data is completely out of focus.
  - Slowly bring the data back into focus. You may find it helps to rock the adjuster backwards and forwards – until your sure that the symbols are in perfect focus.
1. Check all of your batteries – you should have at least **three** fully charged camera batteries in your kit along with some spare AA batteries for your microphones.
2. Check the tripod **hot shoe** matches the tripod. You *cannot* mix and match one manufacturers hot shoe with another manufacturers tripod.
3. Adjust the Velcro fastening on the side strap until it is comfortable for your hand size.

# THE LCD SCREEN

1. Once you pull out the LCD screen the viewfinder is automatically switched off.
2. However, both the Viewfinder and LCD will be on together when the screen is turned through 180 degrees
3. Once the LCD screen is re-housed into the side of the camera the viewfinder becomes operational.
4. When the screen is turned through 180 degrees (to do a piece to camera) it drops into "mirror mode".
5. From that screen position you can also push the screen flat against the camera – with the screen facing outwards. This may be useful when conducting an interview with the camera on a tripod.
6. You can adjust the brightness of the screen by using the **LCD BRIGHT +/-** controls on the left hand edge of the screen.
7. You can also adjust the cameras backlight brightness in the menus

- NB in mirror mode a small cartoon face appears in the viewfinder.
- Take care of the LCD screen....
  1. Do not touch the surface of the screen
  2. Do not lift the camera by the viewfinder or screen
  3. Remember the LCD screen uses *more battery power* than the viewfinder. Revert to viewfinder only use, if battery power is running out.
  4. Exposing the screen to sunlight for extended periods will damage it.

# **PART 2: FOCUS**

• **There are two ways of getting your pictures in focus.**

• **You can leave the focus on AUTO and let the camera do it for you or you can adjust it manually.**

- **THE TROUBLE WITH AUTO FOCUS** ... is that it doesn't work well under the following conditions:
  - When the subject is not in the centre of the picture (particularly when there are moving objects in the background)
  - In low light conditions
  - If there is a bright light behind the subject (e.g. a window)
  - When the subject is bright (e.g. a car with its head lamps on)
  - When the subject is of low contrast - walls, the sky
  - If the subject is made up of fine repetitive patterns
  - If the subject is behind vertical bars or a chain link fence
  - When another subject passes between the camera and the point of interest

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# MANUAL FOCUS

- When you start to use the camera you will probably use auto focus. However, with all the above restrictions, I hope you'll want to use the manual focus all the time. Your pictures will look more professional once you get the hang of it.
  1. Set the **FOCUS** switch to **MANUAL**
  2. Zoom in as close as you can to the subject (for a person zoom into their eyes)
  3. Turn the **FOCUS RING**, at the front of the lens, to get the picture into focus
  4. Zoom out to frame the shot.

## ***ZOOM IN... FOCUS... FRAME UP***

- ... **Alternatively**
  1. Set the **FOCUS** switch to **MANUAL**
  2. Zoom in as close as you can to the point of interest
  3. Push the **PUSH AUTO** button. This time the camera will momentarily go into **AUTO FOCUS**.
  4. When focused release the button to resume **MANUAL** focus mode
  5. Zoom out to frame the shot.

# **PART 3**

## **EXPOSURE AND GAIN**

- We can control the amount of light coming through the lens by the use of an IRIS or APERTURE. This works in the same way as the iris (or pupil) of your eye: when you are in bright light the iris is made as small as possible (it 'stops down') to prevent too much light entering your eye, when you are in a darkened room your iris becomes as wide as possible ('opens up') to let in as much light as possible. Of course your brain does all this for you and is constantly adjusting your iris depending upon the prevailing light levels. Domestic and professional cameras allow you to operate the camera iris in manual or in automatic. However, professional users tend to operate in manual only, using the auto iris only to do an occasional 'spot check'.
- We have to be able to control the amount of light that passes through the lens and goes into the camera. If there is too much light the picture is said to be over exposed - too little light and it will be under exposed.

- The AUTO EXPOSURE works by looking at the whole scene, averaging out the bright areas and dark areas and setting the exposure for this average. The problems start when something bright or dark comes into frame. e.g. If a white car drives across the frame the average light level of the scene will go up. The camera over compensates by stopping down the iris causing the surrounding picture to be under exposed. If a black car now drives past the average light level will go down and the iris will open up. Now the surrounding scene will be over exposed. This exposure "hunting" looks amateurish, is a dead give away that you're in auto AND is totally unnecessary.

There are a selection of apertures to choose from when the camera is in manual exposure mode. Apertures are referred to as f-stops (or sometimes just "stops") - the smallest aperture is f11 on most cameras (although some lens are able to offer even smaller apertures) which lets the least amount of light into the camera. The largest aperture is f1.6 which allows the maximum amount of light into the camera. The aperture sizes (f stops) available are:



# SETTING THE MANUAL EXPOSURE

1. Set the **AUTO LOCK** switch into the middle position
2. Press the **IRIS** button on the barrel of the lens - the letter F and a number will appear in the viewfinder/LCD.
3. You can now select the aperture size manually by using the silver **IRIS** dial.

To return to AUTO mode just press the **IRIS** button again.

**NB** if the gain is in AUTO mode when you manually select iris – you'll find the gain increase as you stop down in low light conditions. If you do not want gain to rise make sure you switch it to manual and set it to 0dB until you need it.

# TOO MUCH LIGHT

- Daylight on a clear sunny day can be around 35,000 lux. In very bright sunlight or in highly reflective places (i.e. where there is sand or snow) it is necessary to reduce the amount of light entering the camera so that the pictures do not become over exposed. There are two ways you can reduce the amount of light entering the camera:
  1. IRIS - higher f number = less light. f11 is the highest.
  2. NEUTRAL DENSITY (ND) FILTERS - reduce the amount of light entering the camera. The ND1 filter reduces light to  $\frac{1}{4}$  (= 2 stops) while ND2 reduces light to  $\frac{1}{32}$  (=4 stops) , but does not affect the white balance.
- When the subject has a bright background behind them use the **BACK LIGHT** button
- when the subject is under a spotlight i.e. more brightly lit than the background try the **SPOT LIGHT** button.
- However, rather than use the back light and spot light button you may find the [AE SHIFT](#) function more flexible - or even better - why not try manual exposure.

# HINTS

- If the camera is on AUTO exposure it will automatically reduce the iris to a minimum to reduce the amount of light entering the camera.
- In manual you can do the same by selecting **IRIS** and reducing the aperture.
- The camera will also automatically inform you of the need use the **ND FILTER** by flashing **ND1** or **ND2** in the view finder.
- The **NEUTRAL DENSITY (ND)** filter switch is to the right of the manual zoom ring.
- When the light level drops **ND OFF** will flash in the viewfinder and the **ND FILTER** should be turned off.
- The shutter will also reduce the amount of light entering the camera. A shutter speed of 1/120th of a second will reduce the amount of light entering the camera by about a half.
- Another problem with very bright light is that it causes harsh shadows which will look almost black to the camera and unflattering to your subject. One way of reducing these shadows is to use a reflector (either a professional one made by Lastolite or a home-made version such as a piece of white paper, notebook or a newspaper). The trick is to get the light source to bounce off the reflector and into the shadows.

# ZEBRAS

- The **ZEBRA** switch is in the panel protected by the LCD screen.
  1. **ZEBRA OFF** – no zebra stripes
  2. **ZEBRA 70%** - zebra stripes appear on any part of the picture that is about 70% bright.
  3. **ZEBRA 100%** - zebra stripes appear on any part of the picture that is 100% bright or above.
- Zebra stripes are a device that puts diagonal lines into highlights in the viewfinder (not on to the tape! Just in the viewfinder). They act as an indication of exposure levels and so can be used as an aid to getting the exposure right.
- Think of the 100% zebra level as an audio meter it tells you when things are too loud (in this case, too bright). When you record sound too loud, it distorts and becomes unusable. Well in video terms if large parts of your picture are 100% bright and above the detail in those areas will become crushed (and so lost).
- The 70% zebra is probably more important, because it helps you get faces correctly exposed. White Caucasian faces - when correctly exposed are between 60-70% bright. So if a face has a little bit of 70% zebra on it then it will be about right. There will always be a few hot spots such as noses, foreheads and the shiny bald head - it's the reason we use makeup in TV to reduce the hot spots.

- Remember a good way to check exposure is to ask the camera. Zoom in to the face - go to auto iris and let the camera decide the face's exposure - go back to manual iris - and zoom out to frame your shot.
- There really is no real guideline as to how much Zebra you'll see in the picture. It entirely depends upon what you are shooting and how much there is of it in the frame. Eg a correctly exposed shot of the sky could have 70% zebras all over it - but little or no 100% zebras
- PLEASE NOTE –
  1. Working in the manual exposure mode you would be well advised to use the zebra stripes.
  2. Professionals tend to set their Zebras to between 90-95%. Because 70% is thought to be too low and 100% to high.
  3. Zebras only appear in the viewfinder and LCD screen - not on the output. Think about it - when did you last see zebra stripes on the telly (except on wildlife programmes!).

# GAIN

When shooting in low light conditions (e.g. at night) the iris is will be fully **OPEN** at f1.6 but, the camera may still needs more light to produce a picture. In this case the **EXPOSURE** control can be used to switch in **GAIN** (up to 18dB) until the correct exposure is achieved

The **GAIN** is an electronic method of increasing the brightness of your picture. There are seven gain levels to chose from:



# SETTING THE GAIN MANUALLY

1. Set the **AUTO LOCK** switch down to the middle position
2. Press the **GAIN** button at the back of the camera (beside the battery)-A number will appear in the viewfinder/LCD between 0dB and 18dB.
3. You can now select the gain level you want by turning the **SEL/PUSH EXEC** dial (below the AE SHIFT button).

To return to AUTO mode just press the **GAIN** button again. As you dial in more and more gain you will notice that the picture becomes grainy or noisy.

# AE SHIFT

You can adjust the automatic exposure levels to give you brighter or darker pictures compared to the normal default setting.

1. Set the **AUTO LOCK** switch down to the middle position
2. Press the **AE SHIFT** button. AS 0 will appear in the viewfinder/LCD
3. Turn the **SEL/PUSH EXEC** dial (below the AE SHIFT button) to adjust the auto exposure levels.

# HOW DO YOU EXPOSE CORRECTLY?

I reckon there are three ways of setting exposure.

## **METHOD 1: Does it look right!**

Unfortunately this method has two downsides. If you're a beginner you probably not sure what "right" is anyway. Plus, you need to set up your viewfinder/LCD screen correctly. If your screen is too bright or too dark you could get false positives. But as you get more experienced with your kit and after shooting in a range of conditions - you'll just sorta know when it is right.

## **METHOD 2: Ask the camera.**

Zoom in to the subject - go to auto iris and let the camera decide the subjects's exposure - go back to manual iris - now zoom out to frame your shot.

You must zoom in to the subject to prevent the auto function under or over compensating for the surrounding light levels. Remember there will be times when the subject will be correct but the background is too bright or too dark. That's the nature of video ie poor contrast ratios (about 50:1).

## METHOD 3: Use the zebras.

The trick is to use all three techniques together. eg start by asking the camera (method 2). it says F5.6, but you've a little more zebra (method3) than you think is necessary - then iris down until it looks right (method 1).

### **BEWARE...**

The shutter, gain and iris *all* effect exposure. So, if you leave either shutter, iris or gain in automatic - the camera will be changing them behind your back (or should that be under your nose!) which is not a good idea.

My advice would be to set the shutter manually to 50 (PAL) or 60(NTSC). Only use the shutter for effect.

Gain should be set to 0dB. That said you can usually get away with 3 and 6dB without people noticing. At 9dB and above you'll start to get grainy pictures.

Expose using manual iris (or in Auto to start with until you get used to the camera). Zebras on 70% with the occasional flick to 100%.

..and if the sun comes out and it all gets a bit too bright - flick in one of the ND filters.

# THE SHUTTER

- About 15 years ago when CCD chips were first launched they had a design fault. If the camera was pointed at a bright light, like a car head lamp, a red line (smear) would appear above and below the light source. Eventually the boffins managed to partially solve this problem by introducing a shutter. Today the red smear has been eliminated by redesigning the CCD chips but unfortunately the shutter has remained as a gimmicky extra.

- The shutter speeds available are:
- $1/3$ ,  $1/6$ ,  $1/12$ ,  $1/25$ ,  $1/50$ ,  $1/60$ ,  $1/100$ ,  
 $1/120$ ,  $1/150$ ,  $1/215$ ,  $1/300$ ,  $1/425$ ,  
 $1/600$ ,  $1/1000$ ,  $1/1250$ ,  $1/1750$ ,  $1/2500$ ,  
 $1/3500$ ,  $1/6000$ ,  $1/10,000$  (of a second).

- With the shutter on, the camera views the scene, the way your eyes would, if it was lit by a stroboscopic light such as at a disco (remember those!). Fast moving objects take on a juddery, edgy look. Take a look at the explosions on Steven Spielberg's Band of Brothers or Saving Private Ryan. You'll see every brick, every clod of earth as it it flies though the sky - that's because a high shutter speed was used. Fast moving objects look much more distinct - but remember that's not how the human eye sees the world - so, your subject will look different, strange, not quite real.
- As the shutter speed increases, the amount of light entering the camera effectively decreases, so if you do want to use the shutter ensure you have sufficient light.



# SETTING THE SHUTTER MANUALLY

1. Set the **AUTO LOCK** switch to the middle position
2. Press the **SHUTTER SPEED** button and the speed indicator will appear in the viewfinder/LCD screen.
3. Turn the **SEL/PUSH EXEC** dial to select the speed you want.

- Leave the shutter speed at 50 if you want to see no shutter "effects". Or press the **SHUTTER SPEED** button again to return to automatic.
- Professional camera operators use the shutter for three main reasons:
  - When shooting sports matches. As the slow motion action replay is played the fast moving ball will appear in sharp(ish) focus rather than a blur.
  - For interesting visual effects - such as showing the individual water droplets of a fountain.
  - To reduce flicker when recording a scene with computer screens.

# SHOOTING COMPUTER SCREENS WITHOUT FLICKER

- It was originally thought that it was impossible to shoot a "clean" computer screen (ie no rolling black or white bars) with a PD150 and PD170 - because the shutter speed only goes up in chunks ie 50, 60, 100, 120, 150, 215, etc. Non of which are any use in getting a computer screen without flicker. However, some bright spark at the BBC noticed that if the camera is in auto shutter - it is variable - like a clear scan shutter. So, you can fool the camera into giving a clean computer screen - no black or white bars. Here's how...
- Frame a shot of the computer screen
- Start with the camera set to 0dB gain and auto shutter
- Use auto iris to get the correct exposure
- Once you are happy with the exposure press the iris button so, the camera is now in manual iris.
- **VERY SLOWLY** tilt the camera up, then down, until you see the flickering on the computer screen disappear.
- Once the screen has completely stopped flickering - press the shutter button **IMMEDIATELY**.
- Going into manual shutter mode - holds the correct shutter speed.
- Done!

# WHITE BALANCE

- Lightbulbs, fluorescent tubes and the sun - all of us see these sources of light as white light . But our eyes are deceiving us, these sources of light vary considerably in their colour. Our brains are very good at performing a white balance without us really noticing. However the camera has to be told what type of light it is working in - so that it can correctly reproduce what our eyes see.
- To understand the need to white balance you first have to understand colour temperature...



# COLOUR TEMPERATURE

- If I put a poker in a fire it will start to glow "red hot" - if I put it in a furnace and really heat it up it will look as if it is "white hot". As the temperature of the poker rises the colour of light it emits changes. Red hot is pretty hot while white hot is very hot. There is a definite connection between the temperature of the metal and the colour of light it emits. This "colour temperature" connection is a way of scientifically quantifying the colour of the light source.

- Ok now think about a light bulb - inside is a filament (made of tungsten metal). When you switch on the electricity, a large current flows through a small filament, it gets hot and starts to glow. (ie It behaves like our poker). The colour temperature of tungsten light usually lies at around 3,200 Kelvin. It is actually a reddish orange light.
- The sun is another main source of light. As you'd expect it is hotter than a light bulb! The temperature on the surface of the sun is 5800°K, while inside and especially at its core, it reaches millions of degrees. However, the light that it produces must firstly pass through its own atmosphere and then through the atmosphere of the earth before it reaches earth's surface.

- So, daylight consists of a mixture of the light that comes directly from the Sun with the indirect light that comes from diffusion and reflection, caused by earth's atmosphere and clouds. This makes colour temperature on the ground pretty variable from as low as 2,000 Kelvin up to 20,000 Kelvin. The table below shows the range of temperature possible for daylight and the conditions that effect it (along with some other light sources).

# • LIGHT SOURCES

# COLOUR TEMPERATURE (Kelvins)

• Candle	1,930
• Sunlight at sunset	1,900 - 2,400
• Domestic tungsten light bulbs	2,600 - 2,900
• TV studio tungsten lighting (2000 Watts)	3,275
• TV studio tungsten lighting (5000 Watts)	3,380
• Sunrise, Sunset	2,000 -3,000
• Fluorescent tube	4,800
• Noonday sun	5,000 - 5,600
• HMI lights	5600K
• In shade ( light only from hazy sky)	7,500 - 8,400
• In shade ( light only from Blue sky)	12,000 - 20,000

# WHY IS WHITE BALANCING IMPORTANT?

- Well, we have to tell the camera what colour of light it is working in so that the picture it records looks something similar to what our eyes see. To do this we need to do a white balance.
- When the camera does a white balance - it analyses the spectrum of colours hitting a white piece of paper. It juggles these until the white looks white.

- In areas with a single source of light this is pretty simple. When we have mixed sources of light we can have problems. A camera white balanced in tungsten light (3,200 Kelvin) will give my complexion a blue tint if I am then lit by the sun through the window. Alternatively a camera white balanced in daylight on an average day (around 5,600 Kelvin) will make me look like a red lobster if you switch on any tungsten lamps.
- Well maybe looking a little sun burnt might make me look healthy but with blue skin I'll look deathly. Getting skin tone to look accurate on screen is very important.

- To overcome the problems of mixed light a colour correction gel is used to alter the Kelvin output of the different light source. It is usual (because it is often quicker) to try and alter tungsten lights to match daylight. A blue gel over a 3,200 Kelvin light source will ensure it (pretty much) matches sunlight at 5,600 degree Kelvin. But, it is also possible to use an orange gel over windows to alter sunlight to match indoor tungsten light - you just need more time and plenty of gaffer tape.

- To make white objects appear white to the camera we do a **WHITE BALANCE**. To do a manual white balance the camera must be shown something white (usually a piece of paper) lit by the light source you will be working in. Beware of white balancing in the wrong light source e.g. by a window and then shooting the interview in a corner of the room lit by tungsten light. Whatever light falls on your subject should also fall on the white paper you use to perform a white balance.

# WHEN SHOULD YOU PERFORM A MANUAL WHITE BALANCE?

- In mixed light (e.g. in a tungsten lit room with daylight coming through a window).
- When shooting subjects lit by fluorescent light
- If light conditions are changing quickly (i.e. at sunrise and sunset when you want the shots to match).
- Every time you move from one source of light (e.g. outdoors) to another source (i.e. indoors).

# SETTING THE WHITE BALANCE

- There are four white balance modes to choose from:

SYMBOL	COLOUR TEMP	WHEN DO I USE IT
	adjusted manually by the operator by performing a "white balance".	In locations lit with fluorescent tubes or mixed light (i.e. the sun and artificial light)
	pre-set to <b>5,800K</b> (an average day)	You should use this mode when working in daylight. You <b>MUST</b> use this mode if you wish sunrise/sunsets to look "golden"
	AUTOMATIC MODE	In this mode the camera will white balance for you - given sufficient time to analyse the light it is working in. (about 5-10 seconds)

Thank you

- It is a  
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Presentation