

### **CAMERA EXPOSURE:**

DIGITAL CAMERAS ARE VERY SIMILAR TO FILM CAMERAS WHEN IT COMES TO THEIR BASIC OPERATION. THERE ARE A FEW BASIC IDEAS YOU SHOULD UNDERSTAND ABOUT EXPOSURE IN ORDER TO TAKE BETTER PICTURES. IN ESSENCE “EXPOSURE” IS THE AMOUNT OF LIGHT THAT THE FILM OR DIGITAL SENSOR IS EXPOSED TO, AND THUS DETERMINES HOW LIGHT OR DARK THE PICTURE COMES OUT.

ULTIMATELY THE SCENE YOU ARE SHOOTING WILL HAVE A CERTAIN LIGHT LEVEL TO IT, AND THERE ARE SEVERAL FACTORS TO HOW YOUR CAMERA TAKES IN THAT LIGHT AND REGISTER IT ON THE FILM OR DIGITAL SENSOR.

### **APERTURE:**

WITHIN THE LENS OF YOUR CAMERA THERE IS AN IRIS SHAPED SHIELD THAT CAN VARY THE AMOUNT OF LIGHT ALLOWED TO PASS THROUGH FROM THE LENS. THE WIDER THE APERTURE OPENING THE MORE LIGHT PASSES THROUGH. APERTURE SETTINGS ARE MEASURED IN STOPS OR F-STOPS. WHILE THE F-STOP NUMBERS ON YOUR CAMERA MAY SEEM ARBITRARY, THEY ACTUALLY REPRESENT A RATIO BETWEEN THE LENS AND THE DIAMETER OF THE OPENING. IT HELPS TO READ THE F-STOP NUMBERS AS THOUGH THEY WERE FRACTIONS, THUS HIGHER NUMBERS ARE ACTUALLY SMALLER OPENINGS. DIFFERENT LENS (OR CAMERAS WITH FIXED LENS) WILL HAVE A LIMIT TO HOW WIDE THE APERTURE CAN OPEN.

APERTURE SETTINGS GREATLY AFFECT FOCUS RANGE AND DEPTH OF FIELD.

### **DEPTH OF FIELD:**

AS YOU KNOW CAMERAS CAN FOCUS (EITHER AUTOMATICALLY OR MANUALLY) ON A SUBJECT AT A GIVEN DISTANCE. WHEN THE CAMERA IS SET TO FOCUS ON A SPECIFIC OBJECT (OR DISTANCE FROM THE CAMERA) IT ACTUALLY HAS A RANGE IN FRONT OF AND BEHIND THE FOCUS POINT THAT WILL STILL BE IN FOCUS. THIS IS CALLED DEPTH OF FIELD. DUE TO THE PHYSICS OF LIGHT BEING PROJECTED THROUGH A HOLE, THE APERTURE SETTING ON YOUR CAMERA WILL GREATLY AFFECT THE FOCUS RANGE IN A SHOT. BASICALLY, THE WIDER THE APERTURE OPENING THE NARROWER THE DEPTH OF FIELD WILL BE. THIS CAN BE USED TO YOUR ADVANTAGE FOR CREATING SPECIFIC EFFECTS IN A SHOT. SETTING THE APERTURE SMALL (AT THE COST OF SLOWER SHUTTER SPEED) YOU CAN HAVE THE SUBJECT IN THE FOREGROUND IN FOCUS AS WELL AS THE BACKGROUND. LIKewise, BY SETTING TO APERTURE WIDE OPEN, YOU CAN PURPOSELY BLUR THE SCENE BEHIND OR IN FRONT OF YOUR SUBJECT. KEEP IN MIND THAT THE DEPTH OF FIELD IS NOT PERFECTLY CENTERED ON YOUR SUBJECT. THE RANGE OF FOCUS IS GREATER BEHIND THE SUBJECT THAN IT IS IN FRONT OF IT.

### **SHUTTER SPEED:**

IN ADDITION TO THE APERTURE YOUR CAMERA HAS A SHUTTER THAT QUICKLY OPENS AND SHUTS TO EXPOSE THE FILM OR CCD TO LIGHT FOR A SPECIFIED AMOUNT OF TIME. THE TIME SETTINGS CAN VARY FROM 1/1000 OF A SECOND (OR LESS) TO A FULL SECOND. MANY CAMERAS EVEN HAVE A MANUAL SETTING WHERE YOU CAN HOLD THE SHUTTER OPEN AS LONG AS YOU WANT. SOME LOW LIGHT AND NIGHT EXPOSURES CAN TAKE AS LONG AS 10 OR 20 MINUTES TO GET PROPER EXPOSURE. THE LONGER YOUR SHUTTER IS OPEN THE MORE MOVEMENT IN THE SHOT WILL SHOW UP AS BLURS IN THE PICTURE. HIGH SHUTTER SPEEDS ARE GOOD FOR FAST MOVING SUBJECTS (UNLESS OF COURSE YOU WANT THE EFFECT OF MOTION BLUR IN YOUR IMAGE). AS A GENERAL RULE, SHUTTER SPEEDS LOWER THAN 1/125 OF A SECOND SHOULD BE TAKEN WITH A TRIPOD; BELIEVE IT OR NOT AT 1/60TH OF A SECOND YOUR BREATHING, HEARTBEAT, AND SLIGHT MOVEMENT OF YOUR HANDS CAN CAUSE THE IMAGE TO BE BLURRED.

### **ISO:**

ISO IS REALLY A TERM USED TO DESCRIBE THE LIGHT SENSITIVITY OF TRADITIONAL FILM. ISO STANDS FOR THE INTERNATIONAL STANDARDS ORGANIZATION. LOWER ISO FILM

IS LESS SENSITIVE TO LIGHT AND IS GOOD FOR OUTDOOR SHOOTING WHERE THERE IS A LOT OF LIGHT. HIGHER SPEED FILMS ARE NECESSARY FOR INDOOR AND LOW LIGHT SHOOTING, BUT WILL PRODUCE GRAINIER IMAGES (PARTICULARLY WHEN ENLARGED). WHILE TYPE OF FILM HAS NO RELEVANCE TO A CAMERA WITH A DIGITAL SENSOR, MANY DIGITAL CAMERAS HAVE ISO SETTINGS, WHICH BASICALLY ADJUST THE SENSITIVITY LEVEL OF THE DIGITAL SENSOR TO COMPENSATE FOR LIGHT CONDITIONS.

### **APERTURE, SHUTTER SPEED, ISO REFERENCE**

SO NOW THAT YOU HAVE A BETTER UNDERSTANDING OF APERTURE, SHUTTER SPEED AND ISO HOW ABOUT SOME REAL WORLD REFERENCE.

#### **SHUTTER SPEED**

- SLOW SHUTTER SPEEDS E.G. 15, 20, 30 CAN CAUSE CAMERA SHAKE AND BLURRY IMAGES; USE A FASTER SPEED, AN IS LENS OR A TRIPOD.
- WATERFALL: USE SLOW SHUTTER SPEED LIKE 1/15, 1/20, 1/30 SEC WITH A TRIPOD OR IS LENS
- A TIGHT AUTO RACE: USE FAST SHUTTER SPEED (E.G. 1/1000 SEC) TO FREEZE MOTION AND DETERMINE WINNER
- BICYCLE RACE: USE SLOW SHUTTER SPEED AND A TECHNIQUE CALLED PANNING TO SHOW MOTION
- AIR SHOW: USE SLOW SHUTTER SPEED AND PANNING (TRY MANY SPEEDS FOR DIFFERENT EFFECTS)
- SPEEDING BOAT OR JET SKI: USE FAST SHUTTER SPEED TO FREEZE MOTION AND WATER DROPLETS

#### **APERTURE**

- LARGE APERTURES E.G. F2.8, F3.5, F4.0 ARE GENERALLY USED WHEN YOU WANT THE BACKGROUND (BEHIND YOUR SUBJECT) TO BE OUT OF FOCUS.
- SMALL APERTURES E.G. F11, F13, F16 ARE BEST USED FOR LANDSCAPES, CROWDS OR WHENEVER YOU WANT MOST OF YOUR SCENE TO BE IN SHARP FOCUS.
- LARGE APERTURES (E.G. F2.8, F4) ARE OFTEN USED FOR PORTRAITS PHOTOGRAPHY AND MACRO PHOTOGRAPHY.
- SMALL APERTURES (E.G. F11, F16) ARE OFTEN USED TO PHOTOGRAPH LANDSCAPES, CROWDS, ROWS OF PLANTS AND ANYTHING THAT REQUIRES A WIDE AREA OF ACCEPTABLE FOCUS.

#### **ISO**

- ISO 100 FOR OUTDOORS
- ISO 400 FOR INDOORS
- ISO 800 OR GREATER FOR WHEN YOU NEED TO RECORD AS MUCH AMBIENT LIGHT AS POSSIBLE WITH A FASTER SHUTTER SPEED.
- AT ISO 400 YOU WILL BEGIN TO SEE NOISE.
- AT ISO 800 YOU MIGHT FIND THE NOISE TO BE OVERWHELMING THE IMAGE.

#### **LIGHT METERS:**

PRETTY MUCH ALL CAMERAS HAVE BUILT IN LIGHT METERS THAT REGISTER HOW MUCH LIGHT IS COMING THROUGH THE LENS (WITH THE APERTURE WIDE OPEN) AND SUGGEST AN APPROPRIATE APERTURE AND SHUTTER SPEED SETTING FOR PROPER EXPOSURE. WHILE THERE ARE VARYING TYPES OF LIGHT METER READINGS, MOST BASIC CAMERAS TAKE A SAMPLING FROM THE CENTER OF YOUR LENS AND MAKE CALCULATIONS FROM THAT. PROFESSIONAL PHOTOGRAPHERS OFTEN USE SPECIALIZED (AND EXPENSIVE) LIGHT METERS

THAT CAN TAKE MORE ACCURATE LIGHT READINGS FROM VARIOUS POINTS IN A SCENE THEY ARE GOING TO SHOOT.

WHEN YOUR CAMERA IS SET TO AUTOMATIC EXPOSURE THE APERTURE AND SHUTTER WILL AUTOMATICALLY BE SET TO WHAT THE LIGHT METER DETERMINES IS THE BEST FOR THE LIGHT CONDITIONS IT READS. WHILE THIS IS FINE FOR MOST SNAPSHOTS, THERE ARE MANY REASONS YOU MAY WANT TO OVERRIDE, OR ADJUST THESE SETTINGS TO COMPENSATE FOR SPECIAL CIRCUMSTANCES OR TO ACHIEVE SPECIFIC EFFECTS.

#### **RECIPROCITY:**

THERE IS A DIRECT RELATIONSHIP BETWEEN THE APERTURE OPENING, THE SHUTTER SPEED AND THE ISO. THE MORE LIGHT THE APERTURE ALLOWS THROUGH THE LENS, THE FASTER THE SHUTTER WILL NEED TO OPEN AND CLOSE FOR PROPER EXPOSURE. IN FACT THE NUMBERING SYSTEM USED FOR F-STOPS, SHUTTER SPEEDS ARE BOTH SET TO DOUBLE THE AMOUNT OF LIGHT THE FILM OR DIGITAL SENSOR RECEIVES. THIS MEANS THAT ONE STOP SLOWER ON YOUR SHUTTER SPEED IS EQUIVALENT TO ONE STOP SMALLER ON YOUR APERTURE.

IMAGINE YOUR LIGHT METER IS TELLING YOU THAT THE PROPER SETTINGS FOR EXPOSURE SHOULD BE F5.6 AND SHUTTER SPEED 1/125 AT ISO 100, BUT YOU ARE TAKING A PICTURE OF AN ATHLETE RUNNING BY AND WANT THE SHUTTER SPEED TO BE AS FAST AS POSSIBLE SO THE IMAGE WON'T BE BLURRY. SINCE A STEP OPEN ON THE APERTURE IS EQUAL TO A STEP FASTER ON THE SHUTTER SPEED, YOU COULD MANUALLY SET YOUR CAMERA TO F2 AND YOUR SHUTTER SPEED TO 1/1000. BECAUSE THE ISO (THE SENSITIVITY SETTING OF THE CAMERA'S SENSOR) PLAYS A PART IN RECIPROCITY YOU COULD ALSO DOUBLE THE CAMERA'S SENSITIVITY TO LIGHT BY CHANGING THE ISO FROM 100 TO 200. SINCE A STEP UP IN SENSITIVITY OF ISO IS EQUIVALENT TO EITHER A STEP CLOSED ON THE APERTURE OR A STEP FASTER IN SHUTTER SPEED YOU COULD THEN SHOOT THE ATHLETE RUNNING AT 1/2000TH OF A SECOND.

MANY CAMERAS HAVE FEATURES THAT ALLOW YOU TO ADJUST THE EXPOSURE WITHOUT HAVING TO SET THINGS COMPLETELY MANUALLY. SOME HAVE "APERTURE PRIORITY" WHICH ALLOWS YOU TO MANUALLY SET THE APERTURE AND IT PICKS AN APPROPRIATE SHUTTER SPEED. OTHER CAMERAS HAVE BASIC SETTINGS LIKE "ACTION" WHICH WILL FAVOR A HIGHER SHUTTER SPEED WHEN IT CHOOSES THE SETTINGS.

#### **BRACKETING:**

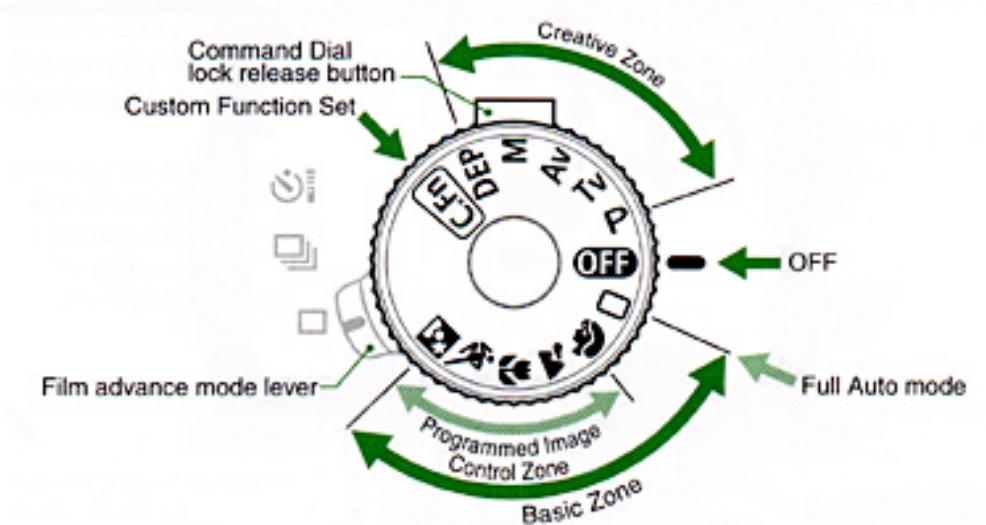
THE INTERNAL LIGHT METERS WITH IN CAMERAS AREN'T ALWAYS PERFECTLY ACCURATE, PARTICULARLY IN DIFFICULT SCENES (SUCH AS A SCENE WHERE MOST OF THE IMAGE IS LIGHTER OR DARKER THAN WHERE YOU ARE CENTERING THE SHOT). BRACKETING IS A TERM FOR SHOOTING THREE SHOTS IN A ROW. ONE AT THE SETTING THE LIGHT METER SUGGEST, ONE AT A STOP HIGHER, AND ONE AT A STOP LOWER. WHILE THIS IS TAKING THREE PICTURES TO GET ONE RIGHT ONE, IT IS A CONVENIENT WAY TO INSURE AN ACCURATE EXPOSURE.

#### **EXPOSURE ADJUSTMENT:**

MANY CAMERAS ALSO HAVE A FEATURE WHERE YOU CAN USE AUTOMATIC EXPOSURE, BUT FORCE THE CAMERA TO SHOT AT VARYING STEPS HIGHER OR LOWER THAN THE LIGHT METER IS READING. THIS IS EXPOSURE VALUE COMPENSATION, OR EV. AN EV -1 WILL UNDEREXPOSE THE EXPOSURE ONE STOP. AN EV OF 2 WILL OVEREXPOSE THE EXPOSURE TWO STOPS. THIS CAN BE VERY HANDY FOR QUICKLY COMPENSATING FOR THE IN CAMERA LIGHT METER WHEN IT IS NOT GIVING YOU THE EXPOSURE YOU DESIRE. FIND THIS BUTTON ON YOUR CAMERA AND LEARN TO USE IT!

#### **EXPOSURE MODES:**

## Command Dial








### ① Basic Zone

Basically, all you do is point and press the shutter button.

 : Full Auto

Fully automatic mode where the camera takes care of everything.

**Programmed Image Control Zone**  
Fully automatic modes for a particular subject.

-  : Portrait mode
-  : Landscape mode
-  : Close-up mode
-  : Sports mode
-  : Night Scene mode

### ② Creative Zone

Semi-automatic and manual modes enable you to take control of the camera to obtain the desired result.

- P** : Program AE
- Tv** : Shutter speed-priority AE
- Av** : Aperture-priority AE
- M** : Manual exposure
- DEP** : Depth-of-field AE

### ③ Custom Function Set

 : Custom Function

### ④ OFF : Off

DEPENDING ON THE CAPABILITY OF YOUR CAMERA, EITHER THROUGH DIALS OR THROUGH MENUS, YOU MAY FIND DIFFERENT EXPOSURE MODES. THEY DIFFER BETWEEN CAMERA MANUFACTURERS, BUT THEY SHARE MANY SIMILARITIES. BECAUSE THEY ARE ALL LINKED TO THE SAME INTERNAL LIGHT METER IN THE CAMERA, ALL EXCEPT FOR MANUAL WILL GIVE, OR ATTEMPT TO GIVE, THE EQUAL EXPOSURE TO ANY OTHER MODE; THE DIFFERENCE BETWEEN THEM IS HOW THEY BALANCE THE VALUES FOR APERTURE, SHUTTER SPEED, AND ISO.

#### BASIC ZONE

CANON LISTS THE FOLLOWING MODES UNDER BASIC ZONE. BASICALLY ALL THE PHOTOGRAPHER DOES IS POINT AND PRESS THE SHUTTER BUTTON.

- FULL AUTO = FULLY AUTOMATIC MODE WHERE THE CAMERA TAKES CARE OF EVERYTHING.

FULLY AUTOMATIC MODES FOR A PARTICULAR SUBJECT:

- PORTRAIT MODE
- LANDSCAPE MODE
- CLOSE-UP MODE
- SPORTS MODE
- NIGHT SCENE MODE

#### CREATIVE ZONE

CANON LISTS THE FOLLOWING EXPOSURE MODES UNDER CREATIVE ZONE. THEY ARE SEMI-AUTOMATIC AND MANUAL MODES THAT ENABLE THE PHOTOGRAPHER TO TAKE CONTROL OF THE CAMERA TO OBTAIN THE DESIRED RESULT.

- P = PROGRAM AE MODE
- TV = SHUTTER-PRIORITY AE MODE
- AV = APERTURE-PRIORITY AE MODE
- M = MANUAL EXPOSURE MODE

#### P: PROGRAM AE

IN THIS MODE THE CAMERA AUTOMATICALLY SETS THE SHUTTER SPEED AND THE APERTURE. YOU DO HAVE CREATIVE CONTROL OVER SUCH THINGS AS AF MODE, DRIVE MODE, ISO, WHITE BALANCE AND FILE SIZE.

IF YOU HAVE A LIMITED UNDERSTANDING OF WHEN TO USE SLOW/FAST SHUTTER SPEEDS AND SMALL/LARGE APERTURES, START BY USING THE P MODE.

A CREATIVE TOOL THAT YOU CAN USE IN "P" MODE IS CALLED PROGRAM SHIFT. LETS SAY THAT THE RECOMMENDED EXPOSURE FOR A SCENE IS 125 8.0 (1/125 SEC AT F8). YOU DECIDE TO USE A FASTER SHUTTER SPEED TO PREVENT THE EFFECTS OF CAMERA SHAKE. YOU TURN THE MAIN DIAL AND THE CAMERA NOW RECOMMENDS 500 5.6 (1/500 SEC AT F5.6). BASICALLY, THE CAMERA SHIFTED THE EXPOSURE VALUES WHILE STILL ALLOWING THE SAME AMOUNT OF LIGHT TO EXPOSE THE SENSOR.

#### TV: SHUTTER-PRIORITY AE

IN THIS MODE YOU MANUALLY SET THE SHUTTER SPEED AND THE CAMERA AUTOMATICALLY SETS THE APERTURE TO ENSURE AN ACCURATE EXPOSURE. BE AWARE THAT THIS MODE CAN FAIL YOU. IT IS POSSIBLE TO REQUEST A SHUTTER SPEED FROM THE CAMERA THAT REQUIRES AN APERTURE THAT THE CAMERA CAN NOT MATCH. FOR INSTANCE IF YOU ARE IN A DARK ROOM AND PUT IN A SHUTTER SPEED SETTING FOR 1/500 OF A SECOND, THE CAMERA DOES NOT HAVE AN APERTURE LARGE ENOUGH TO ALLOW IN ENOUGH LIGHT TO GET A CORRECT EXPOSURE AND YOUR IMAGE WILL COME OUT UNDEREXPOSED.

A CREATIVE USE OF SHUTTER SPEED IS USING SLOW SHUTTER SPEEDS TO BLUR AN IMAGE AND GIVE A SENSE OF MOTION. CONVERSELY, FAST SHUTTER SPEEDS FREEZE MOTION.

#### SHUTTER SPEED DISPLAY

THE SHUTTER SPEEDS FROM "8000" TO "4" INDICATE THE DENOMINATOR OF THE FRACTIONAL SHUTTER SPEED. FOR EXAMPLE, "125" INDICATES 1/125 SEC. ALSO, "0"5" INDICATES 0.5 SEC. AND "15" IS 15 SEC. (SOURCE: CANON EOS 40D MANUAL PAGE 87)

#### AV: APERTURE-PRIORITY AE

IN THIS MODE YOU MANUALLY SET THE APERTURE AND THE CAMERA AUTOMATICALLY SETS THE SHUTTER SPEED TO ENSURE AN ACCURATE EXPOSURE.

THE "STANDARD" SEQUENCE OF APERTURE VALUES (F) IS:

1 1.4 2.0 2.8 4 5.6 8 11 16 22

YOU MAY HAVE NOTICED THAT YOUR CAMERA DISPLAYS ADDITIONAL APERTURE VALUES SUCH AS 7.1 AND 9. THE MOST IMPORTANT THING TO REMEMBER ABOUT THESE NUMBERS IS THAT THE SMALLER NUMBERS (1.4, 2, 2.8, 4) REPRESENT LARGE OPENINGS (APERTURES) IN THE LENS AND THE LARGER NUMBERS (11, 16, 22) REPRESENT SMALLER OPENINGS (APERTURES) IN THE LENS.

WHEN SMALLER F-NUMBERS ARE USED, LESS OF THE FOREGROUND AND BACKGROUND ARE IN ACCEPTABLE FOCUS. WHEN LARGER F NUMBERS ARE USED MORE OF THE FOREGROUND AND BACKGROUND ARE IN ACCEPTABLE FOCUS.

THE TERM DEPTH OF FIELD IS CLOSELY RELATED TO APERTURE VALUES. DEPTH OF FIELD IS DEFINED AS THE AREA OF ACCEPTABLE FOCUS THAT STRETCHES FROM FOREGROUND TO BACKGROUND. WHEN PHOTOGRAPHING A PERSON OR A SINGLE FLOWER YOU WANT THAT AREA TO BE NARROW BUT WHEN PHOTOGRAPHING A BEACH OR A CITY/TOWN THAT AREA SHOULD BE AS WIDE AS POSSIBLE.

#### M: MANUAL EXPOSURE

THIS MODE IS BEST SUITED FOR PROFESSIONALS AND PERSONS WHO HAVE A VERY GOOD KNOWLEDGE OF WHEN TO USE SMALL AND LARGE APERTURES AND SLOW AND FAST SHUTTER SPEEDS.

IN THIS MODE YOU MANUALLY SET THE SHUTTER SPEED AND THE APERTURE TO SUIT THE LIGHTING CONDITION. ONE OF THE BEST WAYS TO DETERMINE THE CORRECT EXPOSURE IS TO USE A COMMERCIALLY AVAILABLE HANDHELD LIGHT METER.

ALTERNATIVELY, YOU CAN USE THE EXPOSURE LEVEL INDICATOR IN THE VIEWFINDER TO HELP YOU GET THE CORRECT EXPOSURE.