

# CANON'S REFERENCE GUIDE

*for*

## THE 300TL SPEEDLITE



PRODUCED BY THE CANON U.S.A. TECHNICAL DEPARTMENT

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**Acknowledgments:** Writers: Richard Bellomy and Chuck Westfall  
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This Reference Guide has been produced by the Canon U.S.A. Technical Department as a supplement to the instruction manual furnished with each 300TL Speedlite. While every effort has been taken to assure its accuracy, we welcome your comments and suggestions regarding its contents. We urge you to familiarize yourself with the techniques explained herein prior to usage in actual working situations.

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## THE 300TL CONCEPT

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Canon's 300TL Speedlite, in conjunction with the T90 camera, offers an unprecedented amount of creative control in 35mm flash photography. New features such as A-TTL (Advanced Through The Lens), FEL (Flash Exposure Lock), and Second Curtain Sync combine with the T90's 1/250 flash sync speed to make a great variety of complex flash effects as simple as available light photography.

The purpose of this guide is to provide you, the photographer, with additional information above and beyond that found in the 300TL instruction manual. Whereas the manual illustrates which buttons to push, this guide serves to educate the user in the concepts of automatic flash exposure as applied to the 300TL.

The first part of the guide is a simplified technical explanation of TTL, A-TTL, and FEL. The better you understand your options, the easier it will be to select the best mode for your application.

The second section systematically covers each possible T90/300TL/FD Lens setting and shows how to operate the camera and flash with various types of lenses.

The last section covers special T90/300TL applications such as second curtain sync and multiple/off-camera flash. The usage of the T90 with studio-type strobes, with or without wireless sync, and other topics are also covered.

In order to use this guide properly, you should already be familiar with the basic operation of the T90. You should know how to set the various exposure modes and metering patterns. It is also helpful to know how to set the ISO and Exposure Compensation Index.

The T90 and 300TL are strong evidence of Canon's ongoing commitment to the technical advancement of 35mm photography. We at Canon U.S.A. want you to enjoy using your equipment. We know you will enjoy the beautiful results.



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## •1A• CONCEPTS OF FLASH PHOTOGRAPHY

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If you own a Canon T90, chances are you're more than just a casual shooter. You rightfully expect much more than just average results from your photography. Whether you're amateur or professional, you know that the T90 gives you a tremendous amount of creative flexibility.

Since you're reading this Reference Guide, you probably own or are considering purchasing the remarkable Canon Speedlite 300TL. Before reading further, it's important to understand some basic principles of flash photography. The 300TL has been designed to take full advantage of these principles to help you get the most from flash photography.

The vital concept of all flash photography is that every flash picture is a type of "double exposure." Whenever you take a flash picture, you record not only the flash burst itself, but also the available light that was present at the time.

Since both exposures are recorded simultaneously, it follows that the amount of flash exposure can be less than, equal to, or greater than the amount of available light exposure.

In so-called "regular" flash photography, the amount of flash exposure is far greater than the amount of available light exposure; consequently, what you see on film in this case is only the flash exposure. But, as the amount of available light increases, you eventually reach the point where available light exposure equals flash exposure. In the broadest senses of the term, this is known as a "fill-in flash" situation.

What you are doing when you take a flash picture, whether you know it or not, is setting the ratio between flash exposure and available light exposure. As your photographic creativity becomes more refined, you will want more control over this ratio.

The 300TL gives you complete control of your flash photography, whether you want total automation, total manual control, or anything in between. The only limit is your imagination!



## • 1B • 300TL DESIGN CONCEPTS



### T90 COMPONENTS USED IN FLASH PHOTOGRAPHY

The fundamental design concept of the 300TL is its full use of the features of the T90 camera and FD Lens system. The components of the T90 relating to flash photography are shown in Figure 1.

The control center of the T90 is its system of dual CPU's, or "electronic brain." All T90 and 300TL operations are ultimately regulated by this unique pair of microcomputers. The other electronic components fall into two broad categories: input and output devices.

Input devices on the T90 include the metering mode selector, the DX sensors, and the electronic input dial. Output devices include the viewfinder and external data displays plus the electronic shutter.

The DX sensors in the film chamber of the camera body read film speed and number of exposures. Pressure contacts in the body side of the lens mount read maximum aperture plus aperture control status (automatic or manual). Specially designed hot shoe contacts provide 2-way data transfer between camera and flash.

There are two metering sensors in the T90. In non-flash photography Sensor 1 above the eyepiece is used for center-weighted average and partial area metering. Sensor 2, located in the mirror chamber, is used for spot metering.

When the 300TL is used with the T90, these sensors perform additional functions. In TTL and A-TTL modes, Sensor 2 measures flash illumination reflected off the film. In FEL, Sensor 2 functions as a 2.7% spot flashmeter.

All of the above mentioned items are vital in obtaining the necessary data to achieve truly automatic flash exposure.



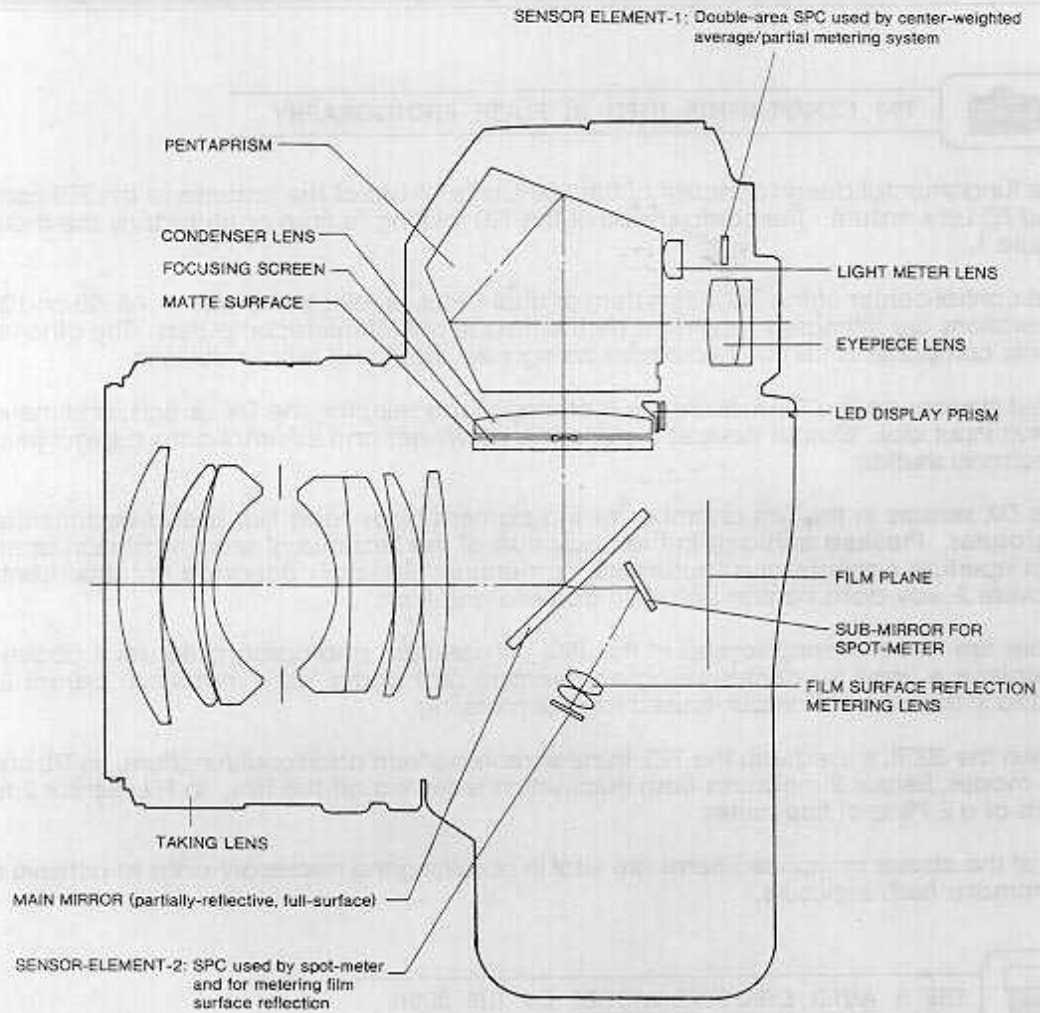
### THE 3 AUTO EXPOSURE MODES OF THE 300TL

**TTL-** Though not marked on the 300TL, this mode allows the photographer *complete* control of both shutter speed and aperture while retaining automatic flash exposure. This is the only auto flash exposure mode possible when the T90 is set to manual mode.

**A-TTL-** The purpose of this mode is to provide fully automatic flash photography. Not only is A-TTL used in the "P" setting (Full Auto Mode) on the 300TL, it can also control flash exposure in Shutter Priority, Aperture Priority, and Stop-Down AE. To use an automotive analogy, A-TTL is to TTL as an automatic transmission is to a stick shift!

**FEL-** Flash Exposure Lock employs the abilities of spot flashmetering and the principle of AE Lock in order to provide automatic flash exposure of the subject in any situation, unaffected by the position of the subject or the reflectivity of the background.

## Optical System for Finder/Light Metering System



SPC ALLOCATION	●: USED FOR METERING      ○: USED FOR EXPOSURE CONTROL	
	SPC SENSOR-1	SPC SENSOR-2
METERING/CONTROL		
CENTER-WEIGHTED AVERAGE METERING	●	
PARTIAL METERING	●	
CENTER SPOT METERING		●
A-TTL, TTL FLASH-AUTO	●	○
FE LOCK	●	●

FIGURE 1

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## •1C• TTL FLASH CONCEPT

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The normal method of TTL flash control is to place a sensor inside the camera, aimed at the film plane. After the shutter opens and the flash exposure begins, the sensor reads the light reflected from the film and stops the flash once "correct" exposure has been achieved.

Using this method, the photographer can select any lens opening desired, within the limits of the film speed, subject distance, and flash guide number (power rating). In most cases, only a fraction of the total amount of flash energy is required. With the 300TL any unused energy is retained and made available for subsequent flash pictures.

The TTL mode works well for many normal flash pictures, and is actually desirable when both aperture and shutter speed must be controlled by the photographer. However, it is far from being perfect for all flash pictures.

For example, the TTL sensor usually reads the entire picture area, favoring the center. This means that off-center subjects could possibly receive incorrect exposure. Also, since the flash sensor only operates during the actual exposure, it is difficult to predict exposure accuracy before the photograph is taken. Another concern occurs during TTL usage in full daylight. Care must be taken when selecting the shutter speed/aperture combination in order not to overexpose the scene due to the existing light.

Last but not least, many photographers prefer some type of automation when it comes to the selection of shutter speeds and/or apertures during flash photography.

## •1D• A-TTL AND FEL CONCEPTS

Canon's Product Development Center evaluated these problems and others in a comprehensive effort to provide the best possible solutions, taking full advantage of the latest microcomputer technology.

After careful consideration of the technical factors involved, combined with the clear intention to simplify the act of taking an excellent flash picture, Canon's design engineers created A-TTL (Advanced TTL) and FEL (Flash Exposure Lock).

Briefly, A-TTL and FEL use subject distance information as well as available light information to calculate exposure. This data, combined with other known information such as film speed and maximum aperture, is fed into the Main CPU before exposure. It is then applied to several built-in software programs, which vary depending on the user-selected T90 settings such as Program, Tv, Av, etc.

These software programs, based on analysis of thousands of actual photographs, evaluate the pre-exposure data in order to provide perfect exposure of both flash and available light. No longer does a photographer have to be an "expert" to get expert results!

There is one major difference between A-TTL and FEL. In an A-TTL setting, flash output is controlled off the film plane *during* the actual exposure. With FEL, flash output is determined *prior* to exposure in order to allow the photographer complete creative control of both the flash and available light exposure. The key point to remember is that A-TTL is quicker to operate while FEL offers the greatest degree of control. The ultimate choice for usage depends on your own particular needs.

Keep in mind that there are times when TTL Auto is preferable to either A-TTL or FEL. Part of the uniqueness of the 300TL is the fact that all three auto flash modes plus manual are available, offering incredible flexibility.

Before we discuss the various combinations of mode settings available with the 300TL and T90, we need to touch quickly on some of the basic principles of operation for both A-TTL and FEL. You may, however, want to jump ahead to section "•2A• HOW TO USE A-TTL SETTINGS" in order to go directly into flash usage. Instructions for using the 300TL as a simple TTL unit are located at the end of the section on A-TTL and FEL usage.

## • 1E • HOW A-TTL AND FEL WORK



### METER READING OF AVAILABLE LIGHT AND FLASH EXPOSURE LEVEL

The first step to occur in either the A-TTL or FEL setting is a center-weighted meter reading of the available light, registered as an EV (Exposure Value) in the T90. Any previously selected metering pattern is disregarded.

The EV level is used to preset the ratio of flash exposure to available light. This Flash Exposure Level is illustrated in Graph E. From EV -4 (the low-light sensitivity threshold of the T90's available light metering system) to EV 10, the flash exposure is either greater than or equal to the available light, depending on the selected T90 exposure mode.

From EV 10 to EV 13, the flash exposure to available light ratio is gradually reduced to -1.5 EV, or in other words, a 1:3 ratio. This results in a more natural flash-fill effect as the level of available light increases. But equally as important, the usable flash to subject distance is significantly extended, increasing the T90's versatility when used with the 300TL.

It is at this point that A-TTL and FEL go their separate ways in terms of calculating flash exposure.



### UNIQUE FEATURES OF A-TTL

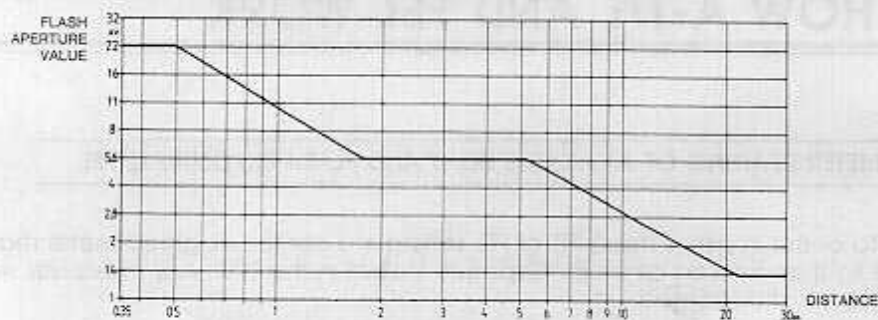
The second operation that occurs in A-TTL is either a near-infrared or visible pre-flash, emitted by the 300TL. In a direct flash situation, the Infrared Light Emitter is used. In any bounce position, the main flash tube will emit a visible, 1/20 power pre-flash. Light reflected from the subject is registered by the external sensor on the 300TL. The acceptance angle of the sensor is 14°, equivalent to the field of view of a 180mm telephoto lens, or approximately 30% of the field of view of a standard lens.

The purpose of the pre-flash is to establish the approximate subject distance and reflectivity. This data is stored in memory and used in different ways depending on the user-selected exposure mode of the T90.

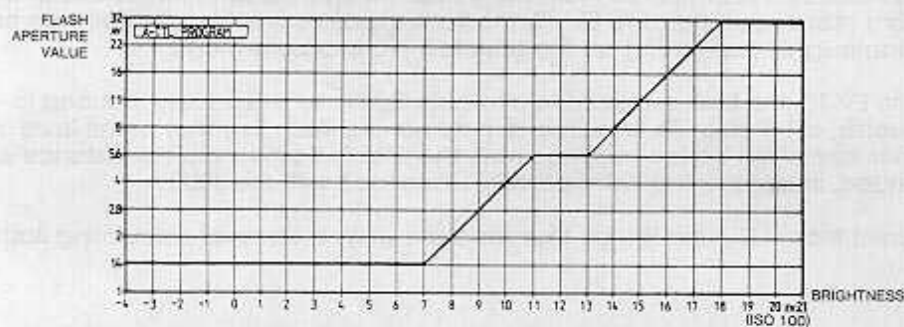
At this point the T90 knows the level of available light, the approximate subject distance, the film speed, and the maximum aperture of the lens in use. And all of this is prior to taking the exposure! The actual flash exposure is controlled based on the amount of light reflected from the film plane onto Sensor 2 after taking these factors into account.

You can adjust or 'fine-tune' the A-TTL setting to suit your own needs simply by adjusting the Exposure Compensation Index or changing the ISO setting on the T90. HOWEVER, KEEP IN MIND THAT SUCH ADJUSTMENTS AFFECT YOUR AVAILABLE LIGHT EXPOSURE AS WELL AS THE FLASH EXPOSURE.

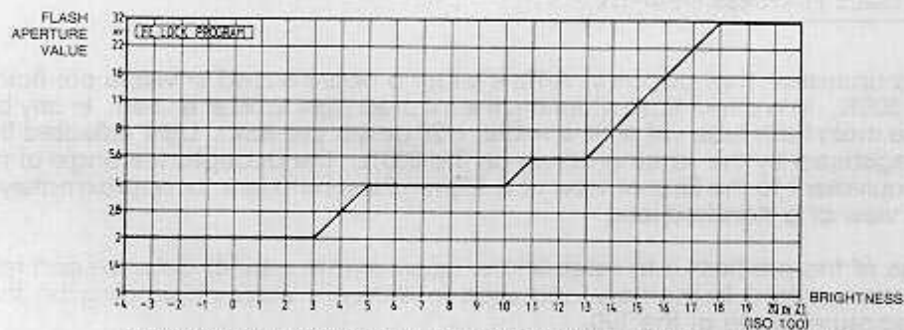
• A-TTL PROGRAM GRAPH A



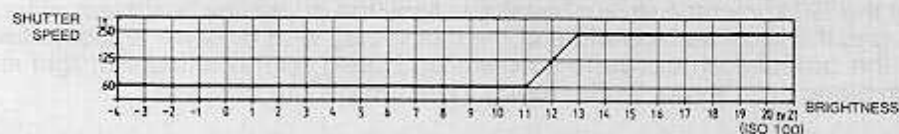
• A-TTL PROGRAM GRAPH B



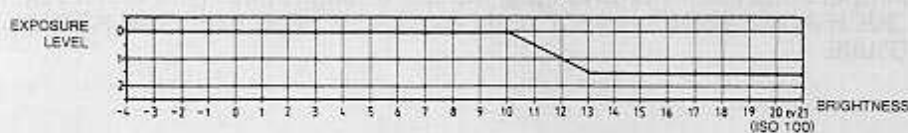
• FE LOCK PROGRAM, TTL PROGRAM GRAPH C



• PROGRAM SYNC SHUTTER SPEED SETTING GRAPH D



• FLASH EXPOSURE LEVEL CONTROL (ALL MODES) GRAPH E





## UNIQUE FEATURES OF FE LOCK

After placing the spot meter area of the T90 over the main subject, FEL is initiated by pressing the T90's spot metering button. This sets the available light meter reading as well as the flash exposure level as mentioned in the previous section.

The second operation in FEL is also a pre-flash emitted by the 300TL. However, unlike A-TTL the infrared emitter is not used. Instead, the main flash head fires a 1/20 power, burst of light in the direct as well as bounce settings. Light reflected from the subject is registered by the 2.7% spot meter (Sensor 2) of the T90 and locked into memory.

FEL readings are held in memory for 30 seconds after the last camera control has been touched to allow you to remove your finger from the spot metering button. The exposure preview button on the back of the T90 can be used to extend viewing time of the exposure information without making any changes. FEL can be reset by re-pressing the spot meter button.

With FE Lock the the photographer is free to place the subject anywhere in the picture area while retaining accurate exposure. Moreover, since the flash exposure is not measured off the film, FEL is not affected by differences in film emulsion reflectance.

The manner in which the available light portion of the exposure is handled varies according to the exposure mode and metering pattern set on the T90. This is discussed in greater detail in the FEL section on usage.

The final exposure is achieved by firing the flash at 20 times the level of the pre-flash memory reading (adjusted for flash exposure level as explained under METER READING OF AVAILABLE LIGHT AND FLASH EXPOSURE LEVEL).

FEL can be cleared under the following conditions:

- 1) After one picture is taken.
- 2) When 30 seconds have elapsed since the last camera control was touched.
- 3) When the 'Metering/Clear' button of the T90 is pressed.
- 4) If the T90 or 300TL is turned off before the picture is taken.

With the above concepts in mind, we can now evaluate the finer points of selecting the most desirable exposure mode combinations of the T90 and 300TL when used with A-TTL and FEL.

## •2A• HOW TO USE A-TTL SETTINGS

### PROGRAM MODE/FULL AUTO MODE



MODE  
SET

The Full Auto Mode is the simplest and easiest to use of all modes on the 300TL. Quite simply, once you have set the selector switch on the flash to 'P' and the FD Lens to 'A', all settings (shutter speed, aperture, metering pattern, A-TTL, first curtain sync) are automatically controlled by the T90.

Any metering pattern or mode (except 'Bulb') set on the T90 is disregarded. At the first stroke of the shutter release several steps occur. The EV level of the available light is registered by a center-weighted meter pattern, the flash to available light ratio is set, and the pre-flash is emitted.

The shutter speed is automatically set between 1/60 and 1/250, based on the EV level as shown in Graph D, to prevent slow shutter speeds in lowlight situations.

The pre-flash produces an aperture value based on subject distance (see Graph A). This value is then compared with a second aperture value based on the available light (see Graph B). The T90 selects the smaller of the two apertures.

If the subject is determined to be out of range based on film speed, maximum aperture, or subject distance a pre-exposure warning is provided in the viewfinder. Both the shutter speed and aperture displays blink. At this point move closer to the subject and initiate another pre-flash. Exposure will be correct if the viewfinder display isn't blinking.

The Full Auto Mode is primarily designed for trouble-free flash photography indoors but works equally as well outdoors for totally automatic fill-in flash results.

### 'MODE SET' OPERATION



MODE  
SET

When you set the selector switch of the 300TL to MODE SET, you can take full advantage of all T90 exposure modes as well as all 300TL settings. As you become more experienced with flash photography, you will probably want more creative control...MODE SET is designed for this! As you start to explore the seemingly limitless combinations, you can refer to this guide to know what to expect.

## MODE SET A-TTL



To use A-TTL, depress the grey Control Mode button above the Mode Set Switch. The following T90 exposure modes are usable with A-TTL: Program, Variable Shift Program, Shutter Priority, Aperture Priority, and Stop-Down AE. A-TTL cannot be used with Manual, Stop-Down-Fixed Index, or Bulb.

## PROGRAM A-TTL

If you select Program or Variable Shift Program on the T90 and Mode Set A-TTL, the end result is the same as if you had set 'P' on the 300TL. There is no difference between Full Auto Mode and any kind of Program A-TTL.

## SHUTTER PRIORITY AND APERTURE PRIORITY A-TTL

If you want to control both shutter speed and aperture simultaneously with the 300TL, these are not the modes for you (refer to section \*•2C• THE 300TL AS A SIMPLE TTL FLASH). However, if you want automatic fill-flash at all times with complete control of aperture or shutter speed, read on!

In Shutter Priority (Tv), you select the shutter speed of choice from 30" to 1/250. If you happen to set a higher speed, the camera will automatically limit it to 1/250. The camera will select the proper aperture.

Aperture Priority (Av) performs much in the same manner as Shutter Priority. The only difference is the camera now automatically selects a shutter speed from 30" to 1/250 based on the aperture you select.

Don't expect to get similar readings in either of these two settings as you did in Program! Remember- the 300TL in Shutter and Aperture Priority A-TTL is providing fill-in flash results, no matter what the available light level! Notice that you get the same meter reading whether the flash is on or off. True fill-in flash photography requires that the available light exposure must be correct.

Pre-exposure warnings are issued under the following conditions-

1) The available light is too bright or too dark for the setting you have selected. Example: you're using ISO 100 film indoors or at night, with Shutter Priority A-TTL at 1/250, and the maximum aperture of the lens is blinking in the viewfinder display. Solution: switch to Program A-TTL if you want the T90 to control shutter and aperture; or switch the T90 to manual and select your own aperture and shutter speed (refer to section \*•2C• THE 300TL AS A SIMPLE TTL FLASH).

2) The subject is too far for the aperture you've selected. Example: you select f/22 in Aperture Priority for maximum depth-of-field, using ISO 64 film, and the subject is over 5 feet away. Both shutter and aperture displays are blinking. Solution: move closer or select a wider aperture.

3) The subject distance is too far for the lens you are using. Example: you're using ISO 100 film and a 70-210mm f/4.0 lens with the subject 35 feet away. Once again both displays are blinking. Solution: move closer or switch to a faster lens.

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### STOP-DOWN AE A-TTL

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This mode is very useful when using non-FD lenses or accessories. You must set the aperture on the lens manually, then press in the depth-of-field preview lever on the T90. Select either Program, Variable Program, or Aperture Priority. A shutter speed will automatically be selected based on the available light. A pre-exposure warning will appear if the correct shutter speed is slower than 30" or faster than 1/250, or if the subject distance is too great.

## •2B• HOW TO USE THE FEL SETTING

### PROGRAM FEL



Working in Program FEL can prove very useful, especially if the photographer has to work quickly with an unusual lighting situation. A good example would be of a football player wearing his helmet and a bright uniform in full sunlight. By using Program FEL it is very easy for the photographer to get a perfect exposure on the player's face.

Program FEL is similar to Program A-TTL in that the T90 automatically sets both aperture and shutter speed for you. The shutter speed range is held between 1/60 and 1/250 (refer to Shutter Speed Graph D), but aperture selection is slightly different.

The main difference between Program FEL and Program A-TTL (Full Auto Mode) is that the camera's automatically selected aperture is based strictly on the available light level (see Graph C). In an outdoor fill-in flash situation this is not that important, but indoors or at night, you can end up with an unnecessarily wide aperture. In this case, you can either select Program A-TTL (just switch the 300TL from Mode Set to 'P'), TTL Auto, or Aperture Priority FEL (see below).

To use Program FEL, select either Program or Variable Program on the T90 and Mode Set FEL on the 300TL. Next place the spot metering zone of the T90 viewfinder over the part of the subject for which you wish to expose. Then press the spot metering button, causing the pre-flash to be emitted by the 300TL.

In the viewfinder you will now see the automatic shutter speed and aperture settings below the picture area. To the right, you will also see a white scale with a triangle index and a small, fixed dot on the right.

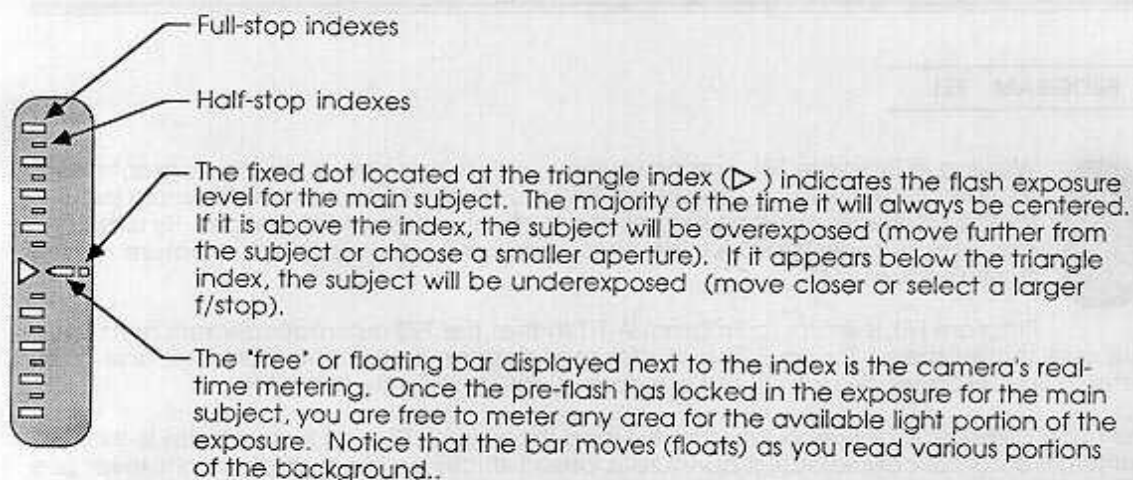
For proper exposure of average subjects, the dot must be lined up opposite the triangle index. If it is below the index, you'll have to move closer to the subject and press the spot metering button again. In Program FEL, it's virtually impossible for the dot to line up above the triangle index when you pre-flash, but if it does, move further from the subject if possible and try again.

### APERTURE PRIORITY FEL

This particular mode takes the greatest advantage of FEL's capabilities. It provides complete and separate control of the flash exposure as well as the available light exposure. At the same time, the photographer has complete control over subject position in the picture area.

First, use the T90's input dial to select the aperture of your choice. Set the desired metering pattern for the available light. You're going to be able to adjust the available light exposure in this mode, so partial or spot metering can be very useful here.

Center the main subject in the spot metering area and press the spot metering button. Now, take a look at the white/blue scale on the right side of the viewfinder.



If the bar is above the triangle index, the background will be overexposed relative to the main subject. If it is below the index, the background will be underexposed. If it is lined up at the triangle index, both background and main subject will be correctly balanced.

Now here's where the fun begins!

First a simple, but very important, rule for fill-in flash photography. Apertures (f/stops) control flash exposure. Shutter speeds determine available light or ambient exposure. With the T90, we have complete control over both flash exposure and available light using Aperture Priority FEL.

To alter the background exposure you must adjust the shutter speeds. This is accomplished by using the Highlight/Shadow buttons located on the back of the T90 (see below). In effect we are under- or overexposing the background by raising or lowering the shutter speed. You'll be able to see the actual speeds change in the viewfinder from 30" up to 1/250. Use the scale to control the amount of over- or underexposure in half-stop increments.



Once you have placed the background exposure at the desired level, you can fine tune the flash exposure if desired. This is done by setting a new aperture with the electronic input dial. Since the flash exposure was locked into memory during the pre-flash, any change in aperture after that will over- or underexpose the main subject. This allows you to adjust for

unusually bright or dark subjects as well as unusual effects.

Note that as you adjust the aperture in this way that the shutter speed changes at the same time. In other words, the available light exposure remains the same if all you want to do is change the flash exposure.

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### SHUTTER PRIORITY FEL

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This mode is perhaps the least useful of any FEL setting, but it can be helpful when you are switching back and forth between flash and available light photography of moving subjects. The viewfinder display looks the same as with Aperture Priority FEL. Shutter speeds are now adjusted with the electronic dial. However, you do not have the flexibility of manipulating the settings the same way as in Aperture Priority FEL.

If you use the Highlight/Shadow buttons, you'll find that the aperture is adjusted but not the shutter speed. This over- or underexposes the main subject and the background at the same time so there's usually no point in doing it.

If you adjust the shutter speed with the electronic dial, the aperture changes to maintain the correct available light exposure but you can adjust the flash exposure on the main subject.

If you pre-flash again after changing the shutter speed, it has the effect of matching the flash output to the new speed.

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### STOP-DOWN AE FEL

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This mode can be used with any FD Lens, but it is more helpful with non-coupled accessories such as the Auto Bellows or the Vari-Extension Tubes.

To use Stop-Down AE, select Program, Variable Program, or Aperture Priority on the T90. Take the lens off of 'A' (if it is an FD Lens) and set the desired aperture manually. At this point, press in the Stop-Down Lever to initiate Stop-Down AE. Set the 300TL for FEL and press the spot metering button on the T90.

The camera will lock in the correct flash exposure value for the subject area within the 2.7% spot meter area. The correct shutter speed for available light exposure is selected at the same time. To adjust the available light exposure, you can use the Highlight/Shadow buttons which will raise or lower the shutter speed. The electronic dial is disabled in this mode, but you can adjust the flash exposure by manually changing the aperture on the lens.

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### STOP-DOWN FIXED-INDEX FEL

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Many people have never heard of the T90's Stop-Down Fixed-Index mode, so a brief explanation is in order here. You can think of SDFI as match-needle manual for the T90. To use it, set Tv mode on the T90 but set the lens aperture manually. Next activate the stop-

down lever located near the lower right corner of the lens mount. Finally, activate the meter by partially depressing the shutter release.

This lights up the white scale that was used in FEL, and allows you to adjust either shutter speed or aperture using the white bar and triangle index. The LED's below the picture area will display either OP, oo, or CL: this indicates underexposure (OPen up), correct exposure, or overexposure (CLose down). Either the scale or LED displays can be used for reference.

Another helpful feature of SDFI is the elimination of the AE lock feature found in Partial or Spot metering, thus allowing you to scan the scene for continuous readings in those metering patterns. You can also use the scale and triangle index for center-weighted average and partial metering, normally impossible in non-stop-down modes.

To use FEL with SDFI, select Tv mode on the T90 and pick your own shutter speed. Take the lens off 'A' (if it's an FD Lens) and set the aperture manually. Don't forget to lock in the stop-down lever! Then press the spot metering button on the T90 for your FEL pre-flash.

The Highlight/Shadow buttons don't work in this mode. However, you can adjust the shutter speed with the electronic dial to control available light exposure. The viewfinder LED display will show the shutter speed and one of the following three symbols: HS, oo, or LS. This is an LED version of match-needle metering, indicating overexposure (Higher Speed), correct exposure, and underexposure (Lower Speed). Once again you can use the scale and triangle index as described above.

To adjust the flash exposure, simply adjust the aperture on the lens. However, keep in mind that unless you also adjust the shutter speed, your available light exposure will change. This is indicated in the viewfinder by the HS, oo, and LS symbols as described above.

## •2C• THE 300TL AS A SIMPLE TTL FLASH

For all the wonderful features that A-TTL and FEL can perform in regard to balancing available light with flash, they do not easily allow the photographer to simultaneously select **both** aperture and shutter speed while retaining automatic TTL flash exposure. There are many situations where manual control of both shutter speeds and apertures is not only desirable but necessary. TTL Automatic is the one mode that delivers!

For total TTL control, the flash should be set to either A-TTL or FEL. The Program setting provides partial TTL control, which will be discussed later. The MHi and MLo settings will not provide any TTL automation.

Set the T90 to Shutter Priority and select the desired shutter speed. At this point, instead of leaving the lens on 'A', manually select an aperture of your choice.

Setting the lens manually allows you to select an aperture based on the desired effect. If you need a quick recycle time, choose a larger aperture. If you're more concerned about depth-of-field, select a smaller one.

As for the shutter speeds, anything between 30" and 1/250 is available within reason. Remember to take the ambient light level into consideration, especially at slower shutter speeds, to prevent possible overexposure.

As mentioned before, placing the 300TL in Program allows only partial control of the manual settings. You can still adjust the aperture according to your needs but the shutter speed will automatically be set to 1/250. This is a very convenient setting when aperture settings are the main concern.



### CONTROL OF AVAILABLE LIGHT AND FLASH EXPOSURE IN TTL AUTO

At first glance, it would appear that separate control of flash and available light exposure isn't possible with TTL Auto. However, it can be achieved with a minimum of effort on your part.

First, set the T90 to Manual or Stop-Down Fixed-Index metering, and read the available light. This step must be performed with the 300TL in the off position, otherwise the flash deactivates the camera's available light meter. You could also use a separate, hand held light meter in order to leave the flash on. The flash must be set in either Mode Set A-TTL or FEL. Also remember not to meter at any shutter speed higher than 1/250.

If you want to lighten or darken the background exposure without affecting the flash exposure, simply raise or lower the shutter speeds. This is a specific instance where the half-step shutter speeds of the T90 offer superior creative control.

If you wish to adjust the flash exposure without affecting the manually set available light exposure, use the ISO override button located on the camera body. The flash "reads" its ISO

information directly from the T90, so this adjustment can control its final output. Raise the ISO to underexpose the flash, lower it to overexpose.

#### PRECAUTIONS :

1) Stay within the range of the flash for the film speed and aperture you have selected. A sticker chart with the Automatic Distance Range (reproduced here) is provided when you purchase your 300TL. Place it on the top of the flash zoom head.

2) Be careful about your available light exposure when necessary. Indoors at night with a fast shutter speed is generally no problem. Outdoors during the day, you'll save yourself many exposure calculation headaches by simply working in either the A-TTL or FEL modes.

ISO 100	ISO 400	24mm	35mm	50mm	85mm
f/2	f/4	4.1-41	4.9-49	5.7-57	6.6-66
f/2.8	f/5.6	2.9-29	3.5-35	4.0-40	4.6-46
f/4	f/8	2.1-21	2.5-25	2.9-29	3.3-33
f/5.6	f/11	1.6-15	1.7-17	2.0-20	2.3-23
f/8	f/16	1.6-10	1.6-12	1.6-14	1.6-16
f/11	f/22	1.6-7.2	1.6-7.8	1.6-10	1.6-12

AUTOMATIC DISTANCE RANGE (FT.)

#### OTHER WAYS TO USE TTL AUTO

Although Manual is probably the most practical mode of the T90 for TTL Auto flash, there are many other ways to achieve it. Here is a brief review of the possibilities:

**T90 :** Set to Program, Variable Program, or Av

**FD Lens :** Manual

**300TL :** Set to Program, A-TTL, or FEL

**RESULTS :** In any combination of the above, you will get TTL Auto at fixed shutter speed of 1/250.

**T90 :** Set to Program, Variable Program, Av, Tv, or Stop-Down AE

**FD Lens :** Automatic (except in Stop-Down mode)

**300TL :** Mode Set with no control mode selected

**RESULTS :** In any of these combinations, the available light exposure will be set as if there were no flash. Flash exposure will be TTL Auto at the aperture indicated in the viewfinder or on the lens. Notice that in either the Program or Variable Program modes the shutter speeds will be limited from 1/60 up to 1/250.

**T90 :** Set to Program, Variable Program, Av, Tv, Stop-Down AE, Stop-Down Fixed-Index

**FD Lens :** Automatic (except Stop-Down mode)

**300TL :** Mode Set, FEL

**RESULTS :** In any of these combinations, IF YOU FORGET TO PUSH THE SPOT METERING BUTTON BEFORE YOU TAKE THE PICTURE, you will get TTL Auto at the aperture indicated in the viewfinder or on the lens.

TTL Auto is also very effective for use with bellows or other accessories where there is no coupling between the lens and the body. As long as the lens can be manually stopped down, TTL Auto is possible.

So the next time you need to shoot an indoor event with action stopping shutter speeds, select TTL Auto. Need a quick recycle time along with it? Choose a larger aperture! TTL Auto puts you in control.

## •2D• MANUAL FLASH WITH THE 300TL



In some cases, automatic flash may not be suitable for your subject. If, for instance, the subject's surroundings are bright white with strong reflections or if the main subject is small with a dark or distant background, the automatic flash exposure may be affected by the contrasting background. Incorrect exposure can be avoided in such cases by using the Manual Hi or Lo modes.

In the MHi or MLo modes, you must calculate the aperture from the Guide Number Chart. A copy of the chart is reproduced here, but you can also use the sticker that is supplied with the 300TL. If you have already attached the Automatic Distance Range sticker to the top of the 300TL, place the Guide Number sticker on the bottom of the main flash head. While it is set in the 24mm position, use a sharp knife or razor blade to cut the sticker where it goes over the crack in the zoom head.

GUIDE NUMBER CHART (ft.)

G.No. (MANUAL Hi)

ISO f	25	50	64	100	200	400	800	1000	1600
24 mm	41	58	65	82	116	164	232	259	328
35 mm	49	69	78	98	138	196	277	310	392
50 mm	57	80	91	114	161	228	322	360	456
85 mm	65	92	104	131	185	262	370	414	524

G.No. (MANUAL Lo) = G.No. (MANUAL Hi) ÷ 4

The formula is Aperture = Guide Number divided by shooting distance. If you use MLo, divide the Guide Number by 4. Refer to the lens for shooting distance information.

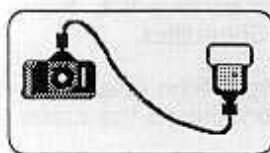
The 300TL instruction manual suggests that you set the T90 to Aperture Priority when using MHi or MLo. You are then recommended to set the aperture calculated from the Guide Number. This has the effect of forcing the shutter speed to 1/250, while allowing you to use the electronic dial to set the aperture.

Although this particular set-up is desirable in many instances, there are several other ways to use the T90 when the flash is set to Manual. For example, if you wish to control both shutter speed and aperture, set the T90 to manual mode. The difference here is that you set the shutter speed with the electronic dial and adjust the aperture on the lens. If you are used to other cameras, this will be a very familiar operation to you.

We don't recommend using Program, Variable Program, or Shutter Priority with MHi or MLo. You won't damage anything if you do...it's just not very productive. In the Program modes, the shutter speed is forced to 1/250 and the aperture is forced to its minimum setting. In Shutter Priority, you control the shutter speed with the electronic dial, but the aperture once again is forced to the minimum (f/16, f/22, or f/32 depending on the lens). In both cases, the viewfinder display will be flashing at f/32.

Stop-Down AE operates the same as Aperture Priority when you're using MHi or MLo. By the same token, Stop-Down Fixed-Index works the same as regular Manual mode. Remember, the available light metering is disconnected as long as the 300TL is left on MHi or MLo.

## •3• SPECIAL T90/300TL APPLICATIONS



### OFF CAMERA AND MULTIPLE FLASH PHOTOGRAPHY

In order to maintain TTL Automatic flash exposure with the T90, when used with up to four 300TL and/or ML2 Speedlites off camera, a series of dedicated accessories are available. These include: the TTL Hot Shoe Adapter, Connecting Cords 60 & 300, the TTL Distributor, and the Off Camera Shoe Adapter.

The TTL Hot Shoe Adapter is always placed in the hot shoe of the T90 and is powered by a lithium battery. This adapter stabilizes and regulates the electrical signals from the off camera Speedlite(s). It also allows the T90 to control the flash duration of each unit, thus controlling flash exposure.

The Off Camera Shoe Adapter accepts the 300TL or ML2 Speedlite, and is connected to the TTL Hot Shoe Adapter by either the Connecting Cord 60 (2 ft. coiled cord) or 300 (9.8 ft. straight cord).

The TTL Distributor accepts up to four Connecting Cords, one of which must be attached to the TTL Hot Shoe Adapter.

Utilizing 300TL units off-camera in conjunction with the T90 creates, in effect, a very portable yet effective lighting system. However, the flash units operate somewhat differently when used with the off-camera accessories.

The first thing you will notice is the lack of any pre-flash functions when using the off-camera accessories. Both the A-TTL and FEL features of the flash are disabled since flash exposure can't be guaranteed in these modes for off-camera or multiple flash photography. The subject distance information provided by the pre-flash in A-TTL can only be guaranteed correct when measured by one flash...on camera. The FEL situation is even more complex, since it depends on the flash being aimed at the same place for both pre-flash and actual exposure.

Simple TTL Auto exposure is often more accurate in off-camera and multiple flash situations. Accordingly, it is available for precisely these situations with the 300TL.

You can select just about any exposure mode on the T90 according to the desired effect. Please refer to the section '•2C• THE 300TL AS A SIMPLE TTL FLASH' for details on the various camera settings.

You'll find that in daylight fill-flash situations, the Program, Shutter Priority, and Aperture Priority modes of the T90 will be the easiest to use since they automatically balance the light. In low light situations, you'll probably prefer setting the T90 to Manual and selecting your own shutter speeds and apertures.

## LIGHTING RATIO CONTROL

One topic that arises when multiple flash is involved is the lighting ratio between flashes. In the T90/300TL system, there is no discrete switching or camera control to achieve this. However, you can control lighting ratios by adjusting the placement of the Speedlites.

For example, you can create beautiful rim lighting by skimming the light from one of the flashes off the side or top of the subject. The effect will be more pronounced the closer you place the 'skim flash' to the subject.

It's beyond the scope of this guide to seriously become involved in all the possibilities of multiple flash. We suggest that you experiment to discover what is most suitable for your applications.

## GENERAL PRECAUTIONS

Here are some general precautions to take when using off-camera or multiple 300TL's with the T90:

1) Check the battery in the TTL Hot Shoe Adapter before shooting. Canon ships this unit with a plastic guard between the CR2025 battery and its contact. This guard must be removed before use. If you attempt to shoot with a dead or disconnected battery, the Speedlites will not fire at all.

2) If any one of the Speedlites is set for manual operation (MHi or MLo), all of them will shift to manual, and there will be no warning in the viewfinder.

3) Visually check the ready light of each flash before firing. The charge completion signal (lightning bolt) in the viewfinder will illuminate even if only one Speedlite is fully charged.

4) If you use flash units other than the 300TL or ML2 in the Off Camera Shoe Adapters, *proper automatic exposure cannot be guaranteed*. However, if the flash units use thyristor circuitry, it is possible to obtain accurate, non-TTL exposures. It's recommended that the units in use have only one center contact or Canon dedication. Otherwise it is advisable to place tape over the existing four rear contacts on the Off Camera Shoe Adapter to prevent any damage.

Since a thyristor circuit basically acts as an off switch, each flash controls its own output based on its automatic setting coupled with the flash distance from the subject.

Simply select an automatic range of your choice on the flash(es). Most provide a minimum of two or three auto settings. With the T90 set in Shutter Priority, manually set the lens to the same aperture as selected on the flash(es). Each flash will independently control its output based on its own circuitry and distance from the subject for correct exposure.

5) If you plan to use an external flashmeter to check exposures, remember to have the T90 loaded with film. Otherwise the readings will be off by as much as 2 stops due to the camera basing the flash output on light reflecting off the black pressure plate rather than the film emulsion.

6) Along with A-TTL and FEL, Second Curtain Sync is also disabled during off-camera or multiple flash.

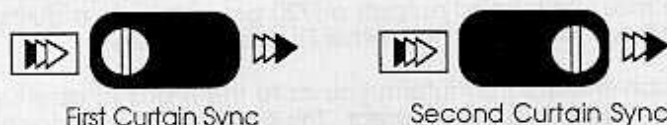
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## SECOND CURTAIN SYNC

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Some photographers like to experiment with flash at slow shutter speeds. Artistic blur can be created by moving the subject, the camera, or both while using flash to create a sharp frozen image somewhere in the frame. With the T90 and 300TL, it's easy to work with this technique in both A-TTL and FEL when used with Aperture or Shutter Priority.

Second Curtain Sync combines with flash, available light, and movement to create unique and distinctive photographs, and at the same time solves a tricky problem encountered in this type of work. To use Second Curtain Sync, simply flip the switch above the on/off control to the right (see below).



When in this position, the flash doesn't fire until just before the shutter starts to close. Therefore, subject blur during slow shutter speeds appears **BEHIND** the direction of movement, not ahead as in first curtain sync. This is a much more natural depiction of motion or movement.

To get the maximum effect from this technique, select a very slow speed such as 1/15 or slower. You can use faster shutter speeds, but the effect is not as noticeable. In fact, any Program setting on the flash or T90 overrides Second Curtain Sync so be sure to stay in either the Tv or Av modes.

Although Second Curtain Sync is disabled when the 300TL is used off camera, that doesn't mean you can't use it in multiple flash setups. In such a case, use the on-camera 300TL as the master flash and set up the other flash units with slave units. Of course your flash exposure control will have to be manual whenever non-300TL or ML2 Speedlites are used.

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## BOUNCE FLASH PHOTOGRAPHY

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Pointing the flash head towards a wall or ceiling, in order to illuminate the subject with light reflected off of that surface, is called bounce flash. Because the light is reflected, a loss of light volume is unavoidable. On the other hand, there will be no dark shadows, and a softer more natural lighting effect is possible.

The 300TL's zoom head swivels 90° upwards, 180° to the left, and 90° to the right in any combination. Click stops are provided for extra convenience. To swivel the flash horizontally, first slide the bounce latch upwards and then rotate the flash head left or right.

With bounce flash photography, it is necessary to set the flash head so that the subject is not illuminated directly by the 300TL. If you only tilt the flash up a few degrees, exposure will not be uniform. The easiest way to use bounce flash is to tilt the flash head up 90° and bounce the illumination off the ceiling.

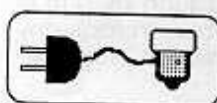
The surface off which the illumination is bounced should preferably be white or nearly white, fairly large, and highly reflective. If the surface is colored, the subject may turn out to be tinted by that color. The color may also be disappointing if the surface is a poor reflector. A very high ceiling does not make a good surface for bounce flash; a better solution would be to bounce the flash off a white card reflector.

Many photographers make their own card reflectors and attach them to the main flash head with tape or a strong rubber band. This technique works quite well for subjects within 10 feet. Generally, the picture will be brighter and higher in contrast the closer the flash is to the reflector.

The A-TTL and FEL modes of the 300TL are ideal for bounce flash photography, because they eliminate the difficult exposure calculations and time delays involved in lesser systems. In these modes, the main flash head outputs a 1/20 power pre-flash during bounce operation, instead of the full power test flash that other TTL flashes require.

Moreover, the T90 can immediately inform you as to the required aperture and/or shutter speed, or warn you if your setting is not correct. This is perfect for fast moving situations when you don't have time to change anything.

If you decide to take the picture, you don't have to wait at all for the 300TL to recycle from the pre-flash. In many cases, this can be the crucial difference between getting a good exposure versus a poor one or worse yet, getting nothing while you're waiting for the ready light after a full power test flash!



#### ALTERNATIVE POWER SOURCES

The 300TL is normally powered by four 1.5 volt AA alkaline batteries. One set of batteries is good for between 100-700 flashes, at recycling times from 0.2-13 seconds at normal temperatures. Recycling times increase as temperatures decrease. Despite these limitations, alkalines are probably the most economical choice for most situations. However, if you have need for more power or faster recycling time, there are some alternatives you should know about.

Rechargeable AA nickel-cadmium (Nicc) batteries are recommended for use in low temperatures, because they exceed the performance of alkalines when the thermometer falls below freezing. Even in normal temperatures the recycling time is about half compared to alkalines.

But for heavy use under all conditions, you may want to consider an external battery pack. Canon does not manufacture such an item for the 300TL, but they are available from several manufacturers. Please check with your local dealer for availability.

#### USING THE T90 WITH OTHER ELECTRONIC FLASH UNITS

The T90 can be used with any electronic flash unit that can be attached to it, either directly through the hot shoe, Canon's off camera flash system, or through a PC contact adapter. Of course only the 300TL and Macrolite ML2 offer TTL flash exposure capability.

However, severe damage can result if non-Canon flash units are improperly used. This next section explains the precautions you must take when using electronic flashes other than the 300TL.

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### **OTHER CANON SPEEDLITES AND NON-CANON DEDICATED FLASHES**

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With shoe mounted flash units, the T90 can use all previously introduced dedicated Canon Speedlites in the T-Series and A-Series, as well as the bracket-mounted 533G and 577G. Basic operation is the same with the T90 as with the older cameras for which these units were originally designed.

With the exception of the 299T, 199A, 577G, and 533G, sync speed cannot be set higher than 1/90 in normal operation, but there is a way to get around this. If you cover the 4 small contacts in the hot shoe with electrical tape, you lose dedication, but you can still have automatic flash exposure and set any shutter speed you want, including 1/250. Of course you will also need to set the aperture manually according to the flash setting. Don't set the shutter higher than 1/250, or you'll lose synchronization.

These comments also apply to non-Canon flash units that are dedicated "for Canon."

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### **NON-DEDICATED HOT SHOE FLASHES**

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These flashes are particularly dangerous when improperly used with the T90 or any other camera with a dedicated hot shoe. If you look at the hot shoe contact on one of these flash units, you'll probably discover that it is much wider and usually rounder than the narrow, blade contact of a Canon dedicated Speedlite.

If you drag the flash over the small contacts in the T90 shoe, you run the risk of shorting out hundreds of volts into a circuit that is designed to deal with very small voltage levels. The net result is that you can burn out the integrated circuits in the T90, necessitating expensive repairs. This is definitely not a warranty situation, either, because it's not a fault with the camera. If you want to avoid this problem, once again it becomes a good idea to cover the small contacts in the hot shoe.

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### **FLASHES WITH PC CONTACTS**

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You undoubtedly have discovered that the T90 does not possess a built-in PC contact. Don't waste your time getting upset about this, because it's never going to change. If you require the use of a PC outlet, several styles of Hot-Shoe-to-PC adapters are available from most photo retailers.

As a precaution when using an adapter, always unplug the strobe unit prior to installation or removal of the adapter to prevent damage to the T90's circuitry. Please contact the nearest Canon Regional Office listed in the back of this guide for further suggestions regarding this subject.

## WIRELESS REMOTE SYNC

This type of remote flash operation is commonly used by professional photographers at many indoor sporting events in order to achieve maximum color quality. At the same time, high shutter speeds are often required to minimize ghost images caused by available light levels that are nearly equal to the flash.

The T90 is particularly well suited for this type of work due to its top sync speed of 1/250. Since this is a *true* 1/250, ideally 4.00 milliseconds, two precautions must be observed.

First, make a film test for synchronization at 1/250, 1/180, and 1/125. This is required due to the variable delays induced by the wireless transmitter which is attached to the PC socket adapter of the T90. If a dark line appears in the bottom portion of the frame, then the shutter speed selected is too fast for that particular wireless device. Either slow the T90's shutter speed down 1/2 step or have the wireless device modified to operate at a *true* 1/250.

Second, be aware that certain studio-type electronic flashes can be slower than others in two areas...the time to reach peak output and total flash duration. This shows up as under-exposure, and can also end up being combined with lack of sync when wireless remotes are used.

The bottom line on wireless sync is that it pays to make a film test under the exact conditions in which the equipment will be used. In this way you can avoid unpleasant surprises when an important job is on the line.

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Our intent with this Guide has been to provide you with the necessary information to fully understand the design concepts behind the 190/300TL system.

We hope this knowledge will assist you in utilizing unique features such as A-TTL, FEL, and Second-Curtain Sync, found within the 300TL Speedlite.

As specific photographic situations arise, we're confident you'll continue to refer to this Guide for help. However, no guide can answer every question you as an individual might have. If you have any further questions or need assistance, please contact your nearest Regional Office listed below.

With Canon's unsurpassed system and your skill and creativity comes the power to create striking new images never before obtainable with a 35mm camera. As we said before, we know you'll enjoy the results!

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