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Find the *OZ Optics DA-100-3A-1550-9/125-S-60* at our website: *Click HERE*

OZ OPTICS LTD.

APPLICATION NOTE

DA-100

OZ OPTICS FAMILY OF DIGITAL VARIABLE ATTENUATORS

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INTRODUCTION

The OZ Optics family of Digital Variable Attenuators satisfy the needs of the instrumentation marketplace.

The DA-100 handheld Digital Variable Attenuator provides a single means of setting optical attenuation directly through a keypad. The DA-100 comes complete with a large LCD display and a simple to use menu driven user interface. The product allows for keypad entry of the wavelength and optical attenuation or operation in a mode which allows for continuous increment and decrement using the UP/DOWN arrows. For those applications where the programmability of the attenuation is best controlled by a computer, the DA-100 offers a built-in RS-232 interface. The host computer can send attenuation commands directly to the DA-100 via this RS-232 port.

APPLICATIONS

- Bit Error Rate (BER) testing.
- Simulating Optical Link Budgets.
- Designing Optical receiver Front-ends.
- Power Meter Linearity measurements.
- Power setting.

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THEORY OF OPERATION

The working principle behind the family of Digital Variable Attenuators is quite simple. Depending on whether a singlemode or multimode attenuator is required, a blocking type or neutral density filter type device is used.

Blocking Type Attenuator

In the blocking type attenuator used in singlemode applications, light from the source fiber is collimated into a beam approximately 0.4mm – 0.6mm wide (458nm-1550nm). A blocking device is then inserted into the beam of collimated light in varying degrees depending on the attenuation required. A precision stepper motor through a reduction gear assembly controls the blocking device. (See Figure 1)

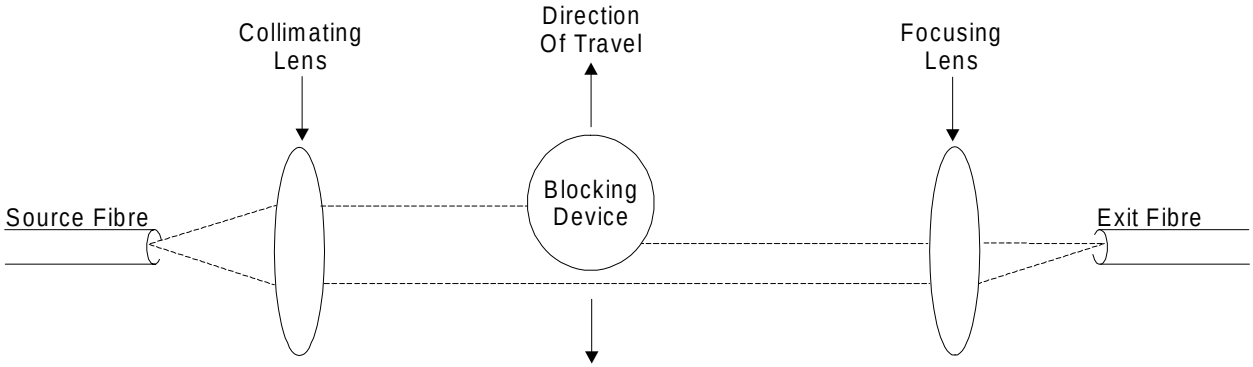


Figure 1

This technique allows for high speed, high-resolution attenuation under digital stepper motor control.

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Neutral Density Filter Type Attenuator

In the neutral density filter type attenuator used for multimode applications, light is again collimated into a beam. A neutral density filter whose attenuation varies from 0.5 dB to over 30 dB is then inserted into the collimated light. The position of the filter within the beam determines the attenuation experienced. The filter is controlled using a leaf spring loaded cam system connected to a precision stepper motor through a gear reduction assembly (See Figure 2).

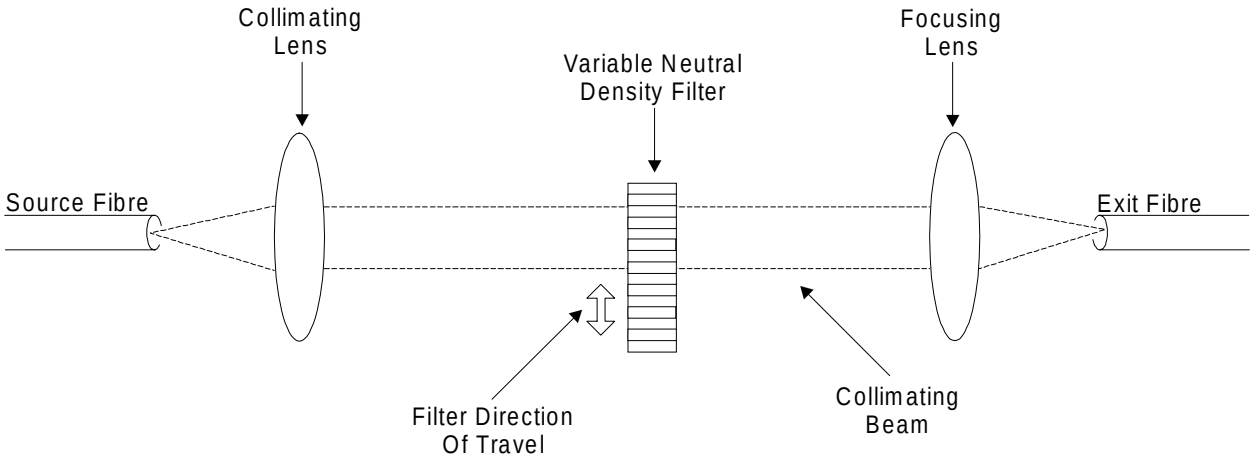


Figure 2

Calibration

The unit employs an open-loop concept to achieve the optical attenuation. Each unit is individually calibrated as it comes off of the production line. The range of attenuation is measured and the results permanently programmed into the units' look-up table memory. As such, the DA-100 provides repeatable, accurate settings over the lifetime of the product.

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DA-100 Display And Keyboard

Figure 3 illustrates the front panel of the DA-100 Digital Variable Attenuator.

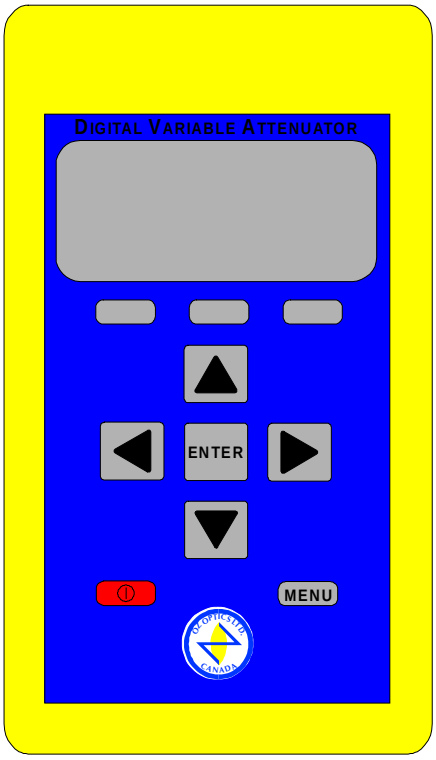


Figure 3

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DA-100 Connections

The DA-100 incorporates either the blocking type or neutral density filter type attenuator mechanism with a Motorola MicroController providing the intelligence. The DA-100 is a fully integrated handheld instrument providing convenient variable optical attenuation at the push of a button. Figure 4 illustrates the typical connections with the DA-100.

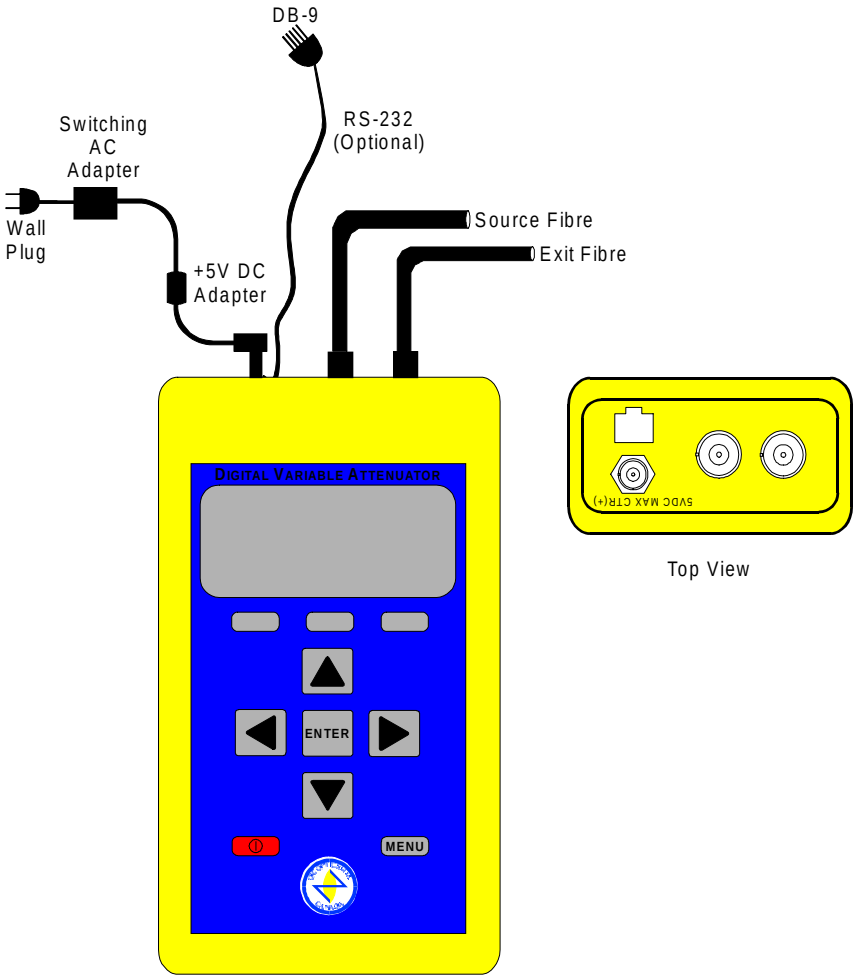


Figure 4

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FUNCTIONALITY

The DA-100 is a simple to use device. The user interface takes the guess work out of setting precise and repeatable optical attenuations in the lab or the field.

The DA-100 can operate in a direct entry mode via the built-in keypad. This mode allows the user to program the wavelength in nanometers and attenuation level in dB with just a few keystrokes.

The DA-100 can also allow the user to operate the device in a convenient Increment/ Decrement mode. In this mode the user simply presses the UP and DOWN arrow keys on the keypad to change the optical attenuation level. The amount by which the attenuation level changes is pre-set by the user upon initial entry into this mode of operation.

Finally, the user has the option to control the DA-100 remotely by a Host computer via the built in standard RS-232 interface. This mode allows the DA-100 in essence to be programmed by the user to perform various automated attenuation settings. It also allows the device to be setup and operated remotely in situations where the physical presence of an operator may be difficult.

RS-232 OPERATION

As mentioned earlier, the DA-100 can be controlled via the built in RS-232 interface. To establish a physical connection between the DA-100 and the Host computer you will require a DB-9 to RJ-11 cable (ask OZ for information on how to order this cable). Figure 5 illustrates the pin assignments for the RJ-11 jack on the DA-100;

Pin No.	Reference	Acronym
1	Ground	GND
2	Ground	GND
3	Transmit	TX
4	Receive	RX
5	Ground	GND
6	Ground	GND

Figure 5 RJ-11 Pin Assignments

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RS-232 Command Set (ASCII)

The command set used by the host computer to control the DA-100 via the RS-232 interface is summarized in Figure 6;

When the DA-100 is first powered-up (the ID is 00), a banner message will be displayed on the PC identifying the unit and the S/W version, for example;

```
OZ OPTICS Variable Attenuator
Version: 10-Dec-98 01:00
>
```

From the prompt (>), the following commands are available on the PC:

<n>	set attenuation to <n>
w <n>	set wavelength to <n>
step <n>	set step size for the INC/DEC mode
+	increment by step amount (no <cr> required)
-	decrement by step amount (no <cr> required)
baud	set baud rate (2400…38400)
id	set unit ID between 0 and 99
rehome	have the motor locate its' HOME position
h	shows list of commands (no <cr> required)
<cr>	displays "Now at W1550: 20.00 dB"

Figure 6 RS-232 Command Set Summary

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ORDERING INFORMATION

Figure 7 shows the information required for ordering the DA-100:

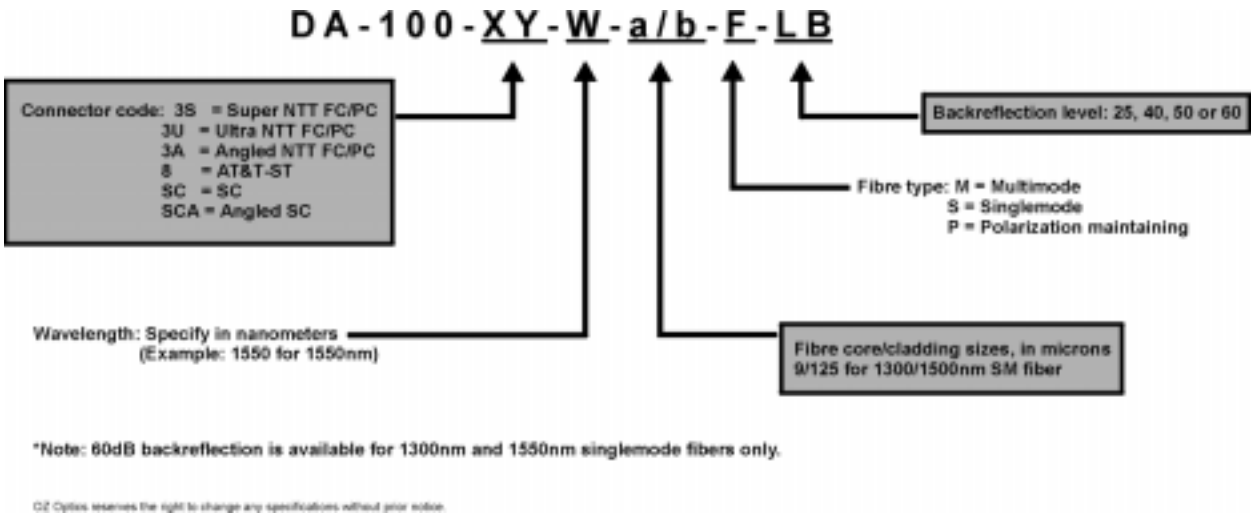


Figure 7

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