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Indirect Determination of Ellipsometer Retardation Using Standard Customer Software Which Reads from a Support.gsc File or from a Retard1.gsc File

Note: This procedure assumes that the compensator in the ellipsometer has already been set (aligned) properly.

- 1) Carefully , lower the polarizer and analyzer arms of the ellipsometer to 90° angle of incidence. If your ellipsometer is equipped with microspot optics, you will probably find it necessary to lower the (stage) sample table to about its lowest adjustment. It may also be necessary to rotate the sample stage 90° one direction or the other such that the tongue of the table can be positioned under either the microspot projector (polarizer side) or under the microspot receiver (analyzer side) to get clearance for the arms to be lowered.
- 2) Now, take a measurement using the standard customer software, most likely either the GEMP if using a Windows computer, or the STD program if using an older DOS-based computer. Note and record the DELTA data measured. If the retardation parameter being used in the software is accurate, then the DELTA measured should be about 0.00. (DELTA between 359.80 and 0.20 would be quite acceptable.)
- 3) If the DELTA you measure is not within the above stated tolerance, then you can edit/change the retardation parameter in the Support.gsc file (if Windows PC) or in the Retard1.gsc file (if DOS PC) by the appropriate increment to get the (dual-mode) measurement for DELTA as defined in step #2 above.

Example: An in-line measurement is taken per the procedure given in steps #1 and #2 above with the following results...

psi 44.95 delta 2.47

The Support.gsc file being used by the measurement software shows a value of **93.7** for the retardation. Since our measured

Delta is about 2.5 too high, we subtract this amount from the given retardation, so the **new retardation** we enter (edit) in the Support.gsc file is **91.2**.

To test our indirectly determined retardation, we perform a new in-line measurement and obtain the following results...

psi 44.95 delta 0.09

DELTA is now within the tolerance as stated at the end of step #2.

We must conclude that **91.2** is an accurate retardation for this particular ellipsometer.

COMPUTER CIRCUIT BOARD INSTALLATION

INTRODUCTION

NOTE: If the computer was supplied by Gaertner along with the L116C, then the circuit boards mentioned here were already installed. Ignore this and the next three pages.

These instructions are for installing the GPIO Interface Card and Cable assembly into the IBM and IBM compatible computers for use with the L116C Ellipsometer. The computer interface card DIP switch settings and installations are described here.

GPIO DIP SWITCH ADJUSTMENT

The GPIO Interface Card is shown in Figure 5-5. This card has three sets of DIP switches. The smallest set of DIP switches, close to the card connector on the far right, has six or ten tiny slide switches. On the six-switch unit, switches 1 and 2 are OFF and the other four slide switches are ON. On the ten-switch unit, switches 5 and 6 are OFF and the other eight switches are ON.

LASER RETARDATION

The other two sets of DIP switches are on a small board near the middle of the card. Each of these two larger sets of DIP switches has 12 tiny rocker switches, one unit (of 12 switches) is for the infrared/blue laser and one for the red. The rocker switch settings are different for each laser. The settings of the infrared/blue laser switches should be closed if the instrument has only a red laser.

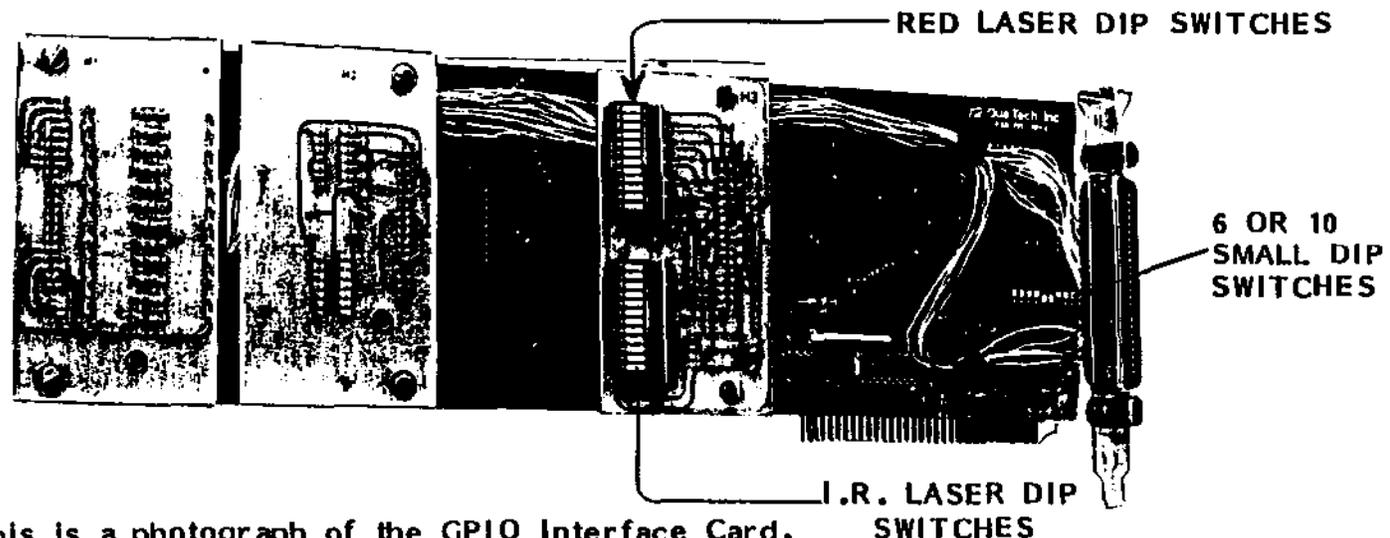


Figure 5-5 This is a photograph of the GPIO Interface Card.

LASER RETARDATION (continued)

Each set of 12 small DIP rocker switches is divided into 3 groups of 4 switches. Each rocker switch is assigned a weight (1, 2, 4 or 8) and a logic (switch setting: "ON"/open=1; "OFF"/closed=0). The logic multiplied by the weight and added to the products (weighted logics) of the other switches in a group determines a "place" digit. The laser retardation value is obtained by combining the 3 "place" digits. Rocker switches 1 to 4 determine the "tens place"; 5 to 8 determine the "units place"; and 9 to 12 determine the "decimal place". (In the case of 3-wavelength ellipsometers, the I.R. retardation value will be in the software program.)

Red Laser Retardation (See Figure 5-6)

Assume the red laser retardation is 96.6. Switch 1 is open; its logic, 1, multiplied by its weight, 8, gives a weighted logic of 8. Switch 4 is open (logic 1, weight 1); weighted logic is 1. Switches 2 and 3 are closed (logic 0); weighted logic of each is 0. The total weighted logic of switches 1 to 4 is $8+0+0+1=9$ ("tens place"). Switches 5 and 8 are closed; weighted logic 0. Switch 6 (weight 4) is open; weighted logic is 4. Switch 7 (weight 2) is open; weighted logic is 2. The total weighted logic of switches 5 to 8 is 6 ("units place"). Switches 9 and 12 are closed; weighted logic is 0. Switch 10 (weight 4) is open; weighted logic is 4. Switch 11 (weight 2) is open; weighted logic is 2. The total weighted logic of switches 9 to 12 is 6 ("decimal place").

1523 nm I.R./Blue Laser Retardation (See Figure 5-6)

Assume the I.R./blue retardation is 103.9. Switches 1 (weight 8) and 3 (weight 2) are open; switches 2 and 4 are closed. Total weighted logic is 10 ("tens place"). Switches 5 and 6 are closed; switches 7 (weight 2) and 8 (weight 1) are open. Total weighted logic is 3 ("units place"). Switches 9 (weight 8) and 12 (weight 1) are open; switches 10 and 11 are closed. Total weighted logic is 9 ("decimal place").

830 nm I.R./Blue Laser Retardation

For the diode (Infrared) laser, the value of retardation will be lower (around 70).

Figure 5-6:

