



## **Allen-Bradley Absolute Encoder Module**

(Cat. No. 1771-DE)

### Documentation Update

#### **Use this document with:**

Absolute Encoder Module Product Data, publication 1771-2.80, November, 1985.

This documentation update revises the above publication. Keep this update with your product data.

#### **New Write-data Throughput Time**

Refer to the module specifications listed on page 12. The New Write-data Throughput Time (worst case) is 4.7 ms.

#### **Offset Feature**

Offset is a new feature of the Absolute Encoder Module (cat. no. 1771-DE, revision B). Revision A modules do not have this feature.

Offset is the difference between the 0 position of the absolute encoder and the 0 position of the machine shaft to which the encoder is connected. You can program this value to compensate for such factors as machine wear or improper mechanical setup. You do not have to disconnect your equipment to realign the 0 position of the machine shaft with the 0 position of the absolute encoder.

### Determining the Offset Value

You can find the offset value using either of two equations, depending on whether you use the 0 machine position or the 0 encoder position as your reference.

To calculate an offset value from a 0 encoder position, use this equation:

$$N - M = S$$

where N = number of encoder positions, M = machine position at encoder 0, and S = offset.

To calculate an offset value from a 0 machine position, use this equation:

$$E - N = S$$

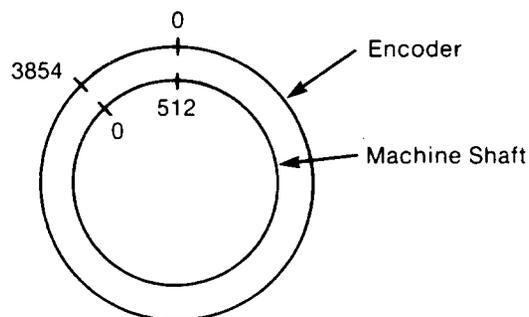
where E = encoder position at machine 0, N = number of encoder positions, and S = offset.

Let's look at an example finding the offset value with reference to 0 encoder position and 0 machine position. Assume the following:

- You have a 0 to 4,095-position encoder (4,096 positions)
- The machine shaft is at position 512 when the encoder is at position 0
- The encoder is at position 3,584 when the machine is at position 0

In this example, the 0 machine position is “ahead” of the 0 encoder position. Depending on which equation you use (your reference point), the offset value is either positive or negative.

### Offset Value From 0 Encoder Position and From 0 Machine Position



At encoder position 0, machine shaft position is 512.  
The offset is +3,584.

At machine shaft position 0, Encoder position is 3,584.  
The offset is -512.

The equation (from 0 encoder position) is:

$$4,096 - 512 = 3,584$$

The offset is +3,584.

The equation (from 0 machine position) is:

$$3,584 - 4,096 = -512$$

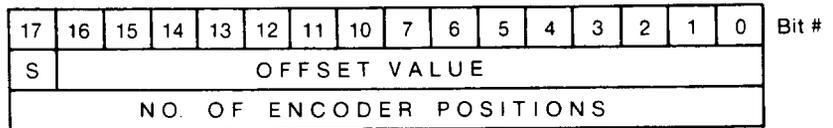
The offset is -512.

You get the same result from programming either +3,584 or -512.

### Offset Words

Once you determine the offset value, you need to program two write-block transfer words. These are the last two words of the write-data block that you send to the absolute encoder module. You program them in BCD, as you do the preset values.

### Format of Offset Words



The offset words are the last two words of the write-data block that you send to the absolute encoder module.

If you are controlling:

2 outputs  
4 outputs  
6 outputs  
8 outputs

The offset words are:

words 6 and 7  
words 11 and 12  
words 16 and 17  
words 21 and 22

S = sign bit. Set this bit if the offset has a negative value; reset the bit if the offset has a positive value.

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The first offset word contains the value of the offset. Bit 17 of this word is the sign bit. It indicates whether the offset is negative or positive. Set bit 17 if the offset is negative, reset it if the offset is positive.

The second offset word is the number of positions of the encoder. If you are using a 0 to 4,095-position encoder, your second offset work is 4,096.

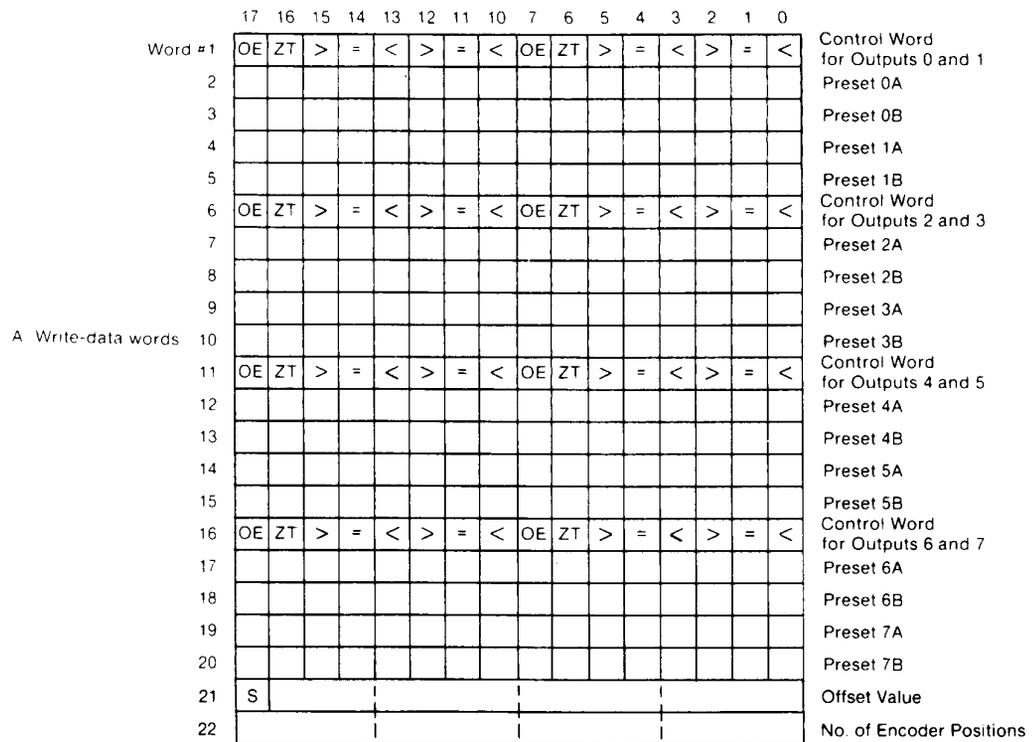
### Block-Transfer-write Data with Offset

The number of words you send to the module depends on the number of outputs the module controls. The offset feature adds two words to the total number of words you send to the module:

If the module controls:	You send:
2 outputs	7 words
4 outputs	12 words
6 outputs	17 words
8 outputs	22 words

If the module is controlling eight outputs, your block-transfer write data now looks like this:

### Format of Block-transfer-write Data with Offset



OE = Output Enable Bit  
 ZT = Zero Transition Bit  
 COM = Comparison Bits  
 S = Offset Sign Bit

### Block-transfer-read Data with Offset

The upper byte of word 1 indicates the status of the eight outputs controlled by the module. The module sets each bit when the corresponding output is turned on.

The lower byte of word 1 (by bit) is:

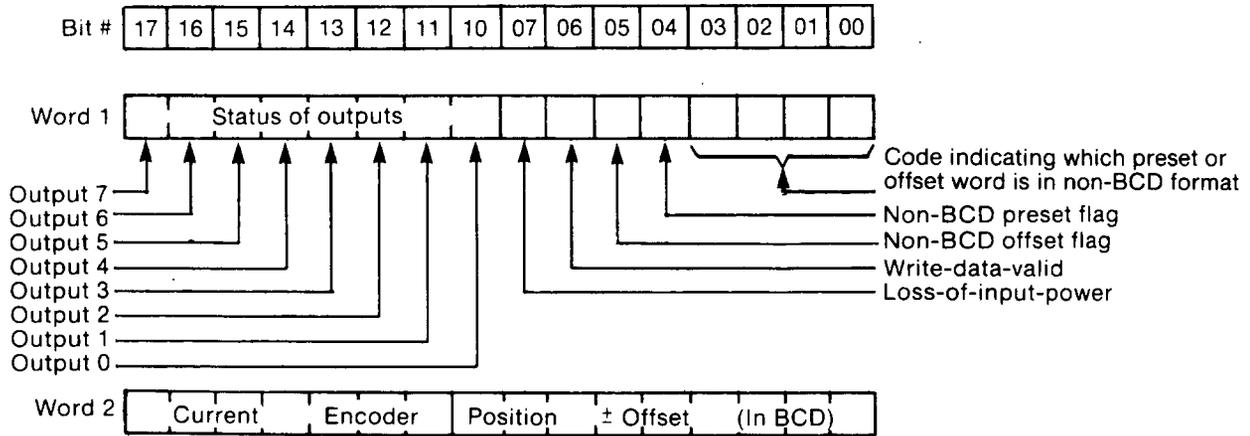
- Bit 7 is the loss-of-input-power bit. It is set when input power is lost; it is reset when power is restored **and** bit 6 is reset.
- Bit 6 is the write-data-valid bit. It is set at power-up and when the processor changes from the program mode to the run mode; it is reset when the module receives valid data in a block-transfer-write operation.
- Bit 5 is the non-BCD offset flag. See the description of bits 0 and 1 below to identify the type of offset error.
- Bit 4 is the non-BCD preset flag. It is set when a preset word is in non-BCD format.
- Bits 3 through 0 are a binary or hexadecimal code that indicates which preset word is not in BCD format. Refer to Appendix D of the User's Manual for the value of these bits.
- Bit 1, when set along with bit 5, tells you that the offset value is greater than the number of encoder positions.
- Bit 0 identifies which offset word is in non-BCD format when bit 5 is also set.
  - If bit 0 is set, the word containing the number of encoder positions is in error.
  - If bit 0 is reset, the word containing the offset value is in error.

The module identifies each non-BCD word in the order it finds them (one at a time). Once you correct the format of one word, the module continues to identify other non-BCD words.

Word 2 indicates the current position of the encoder, with the offset value, in BCD.

**Block-transfer-read Data with Offset**

**Format of Block-transfer-read Data with Offset**



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