



13-002



29 May, 2013

**PERFORMING A PMT ADJUSTMENT ON A NO/NO<sub>x</sub> ANALYZER**

**I. PURPOSE:**

The purpose of this service note is to outline the steps necessary to correctly perform a PMT Adjustment on the M200E/T200, M200EM/T200M, M200EH/T200H, M200EH/T200H and the M200EU/T200U analyzers.

**II. TOOLS:**

1. Phillips Head  screw driver
2. Fine tip Flat Head  screw driver

**III. PARTS:**

N/A

**IV. PROCEDURE:**

The PMT Adjustment adjusts the slope of the **PMT** output when the Instrument's slope and offset values are outside of the acceptable range, and should only be performed when all other more obvious causes for this problem have been eliminated.

To perform a PMT Adjustment, the **NORM PMT** value must be adjusted to a calculated value based on the span gas concentration. There are two different equations for calculating your **TARGET NORM PMT** value, one for the Low Physical Range and one for the High Physical Range. The equation used is dependent on the analyzer range as seen on the front panel display. See the Physical Range Chart (*Table 1*) to verify which Physical Range your analyzer falls into. Using the **TARGET NORM PMT** Equation (*Figure 1*) and the information from the Physical Range Chart (*Table 1*), calculate your **TARGET NORM PMT** value. **IF YOUR ANALYZER IS SET FOR DUAL RANGE, PERFORM THE FACTORY CALIBRATION ON THE HIGH RANGE USING THE HIGH RANGE SPAN GAS.**

ANALYZER	PHYSICAL RANGES		MULTIPLIER	
	Low	High	Low	High
M200E/T200, M200EU/T200U	0-2ppm	0-22ppm	2	.18
M200EM/T200M	0-20ppm	0-220ppm	200	18
M200EH/T200H	0-500ppm	0-5500ppm	8	.72

**Table 1. - Physical Range Chart**

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**CONCENTRATION** = Span Gas in **PPB** for M200E/T200 and M200EU/T200U  
 Span Gas in **PPM** for M200EM/T200M and M200EH/T200H

$$\left( \frac{\text{CONCENTRATION}}{\text{MULTIPLIER}} \right) = \text{TARGET NORM PMT}$$

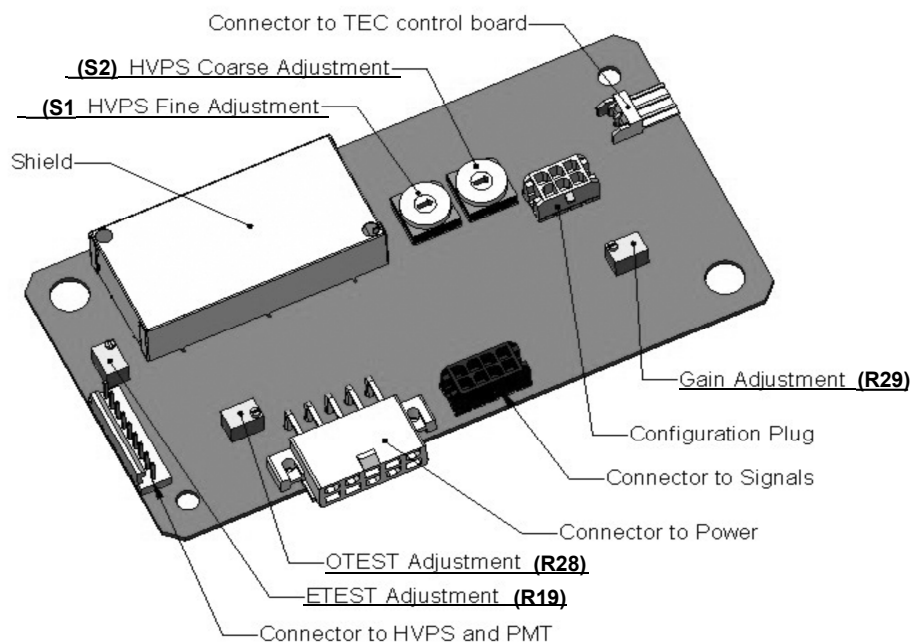
**NOTE**

If your analyzer is on a dilution probe system, you will need to divide the span gas value by your dilution ratio factor and use this number as your concentration value in the formula above.

**EXAMPLE** 450PPM span gas ÷ 150 dilution ratio = actual concentration of 3ppm

**Figure 1. -Target NORM PMT Equation**

1. Perform a full zero calibration using zero air.
2. Locate the Preamp board (see figure 2) and the following components.
  - HVPS Coarse Adjustment switch (S2), note full range 0-9, then A-F
  - HVPS Fine Adjustment switch (S1), note full range 0-9, then A-F
  - Gain Adjustment potentiometer (R29), note full scale is 12 turns



**Figure 2. – PREAMP Board Layout**

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3. Turn the R29 gain adjustment potentiometer 12 turns **clockwise** to its maximum setting, then 5 turns **counter-clockwise** to put it near the center of the potentiometer range.
4. Feed span gas to the analyzer and wait until the **STABIL** value is below 1.0. Press the **TST** buttons on the front panel and scroll to the **NORM PMT** value. This value is what you are going to adjust to get a slope of 1.000.
5. Using the HVPS Coarse Adjustment switch (S2), set your **NORM PMT** slightly higher than your calculated **TARGET NORM PMT** voltage.
6. Using the HVPS Fine Adjustment switch (S1), set the **NORM PMT** value as close as possible to the **TARGET NORM PMT** value. It may be necessary to go back and forth between coarse and fine adjustments if the target value is at the threshold of the min/max fine setting.

**NOTE**

**DO NOT OVERLOAD THE PMT BY INADVERTENTLY SETTING BOTH ADJUSTMENT SWITCHES TO THEIR MAXIMUM SETTING. THIS CAN CAUSE PERMANENT DAMAGE TO THE PMT.**

7. Using the Gain Adjustment potentiometer (R29), adjust the **NORM PMT** value to reflect the **TARGET NORM PMT** value. **THE GAIN ADJUSTMENT POTENTIOMETER IS A VERY SENSITIVE ADJUSTMENT, AND IT IS NOT RECOMMENDED TO BE TURNED MORE THAN ½ TURN AT A TIME.** After adjustment, the **NORM PMT** value may take up to 5 minutes to stabilize. After the **NORM PMT** has stabilized, you may need to re-adjust the Gain Adjustment potentiometer achieve the **TARGET NORM PMT** value.
8. Allow the analyzer to stabilize for one hour, then review the slope and offset values. The slopes should be  $1.000 \pm 0.100$ , and the offset values should be -20 to +150 mV.

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