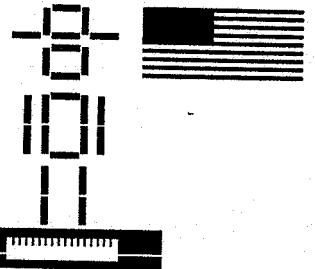
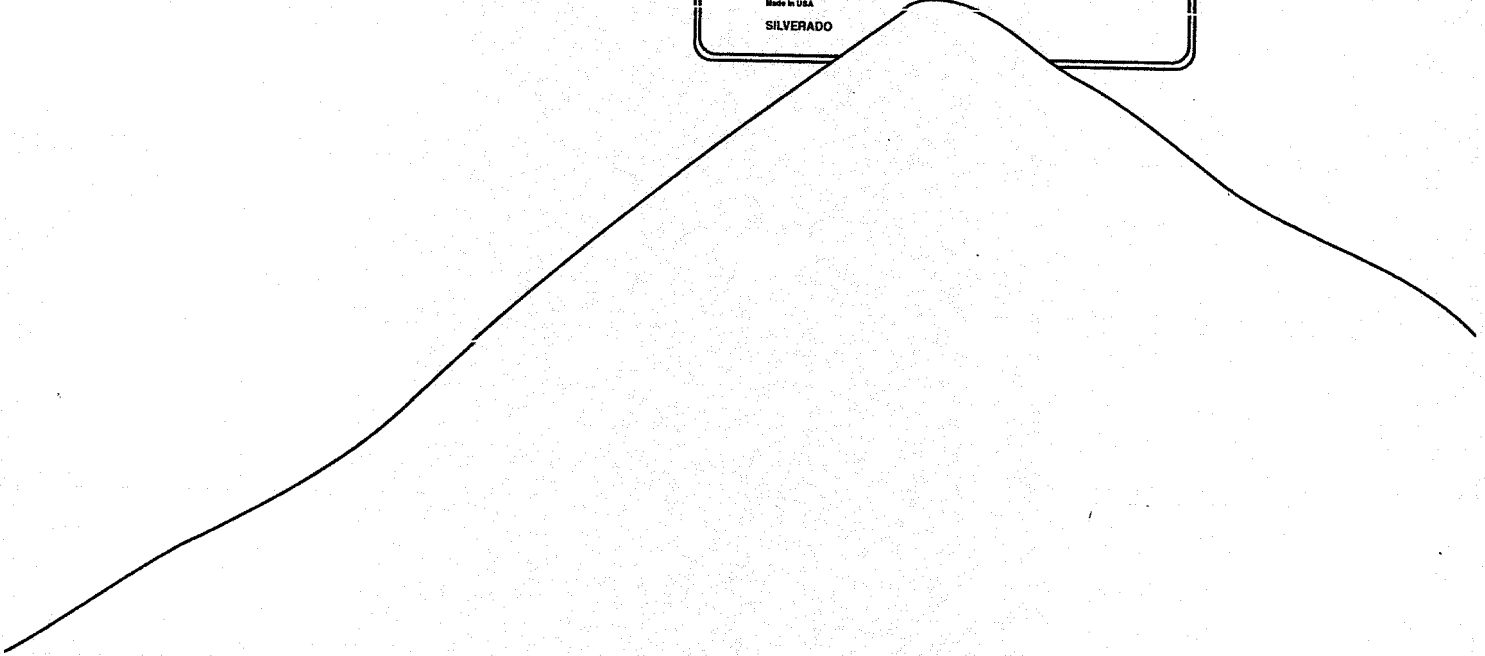
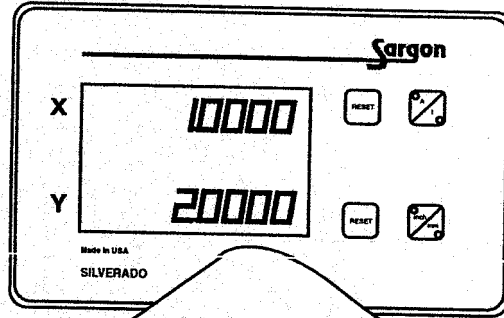




# SILVERADO



Precision linear measurement systems since 1979



## instructions manual

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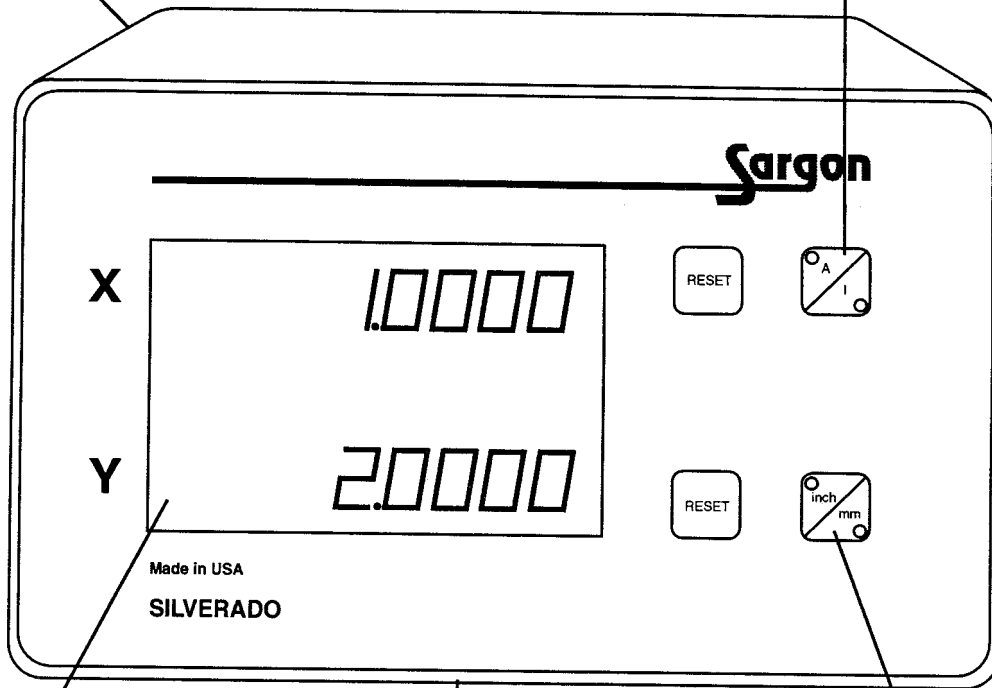
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# → Features

→ obtain accurate measurements with machine error compensation

→ switch between absolute and incremental modes

+ press and hold after power up for easy setups via keypad for resolutions and scale directions



→ bright efficient LED display with a wide viewing angle

→ built-in non-volatile memory which maintains data in case of power loss

→ inch/mm

**Warning: Use extreme caution!**

**Hazardous voltages!**

**All required electrical work should be performed by a qualified electrician.**

**Mount the display arm a minimum of 12 inches ( $\approx 30$  cm) away from any  
motors.**

# Installation

## *Display*

Remove the large "eye-bolt" located on top of the milling machine column (see Figure 1). Mount the arm onto the machine and the display onto the arm with the 5/16-18 bolt provided in the Sargon hardware kit (see Figure 1).

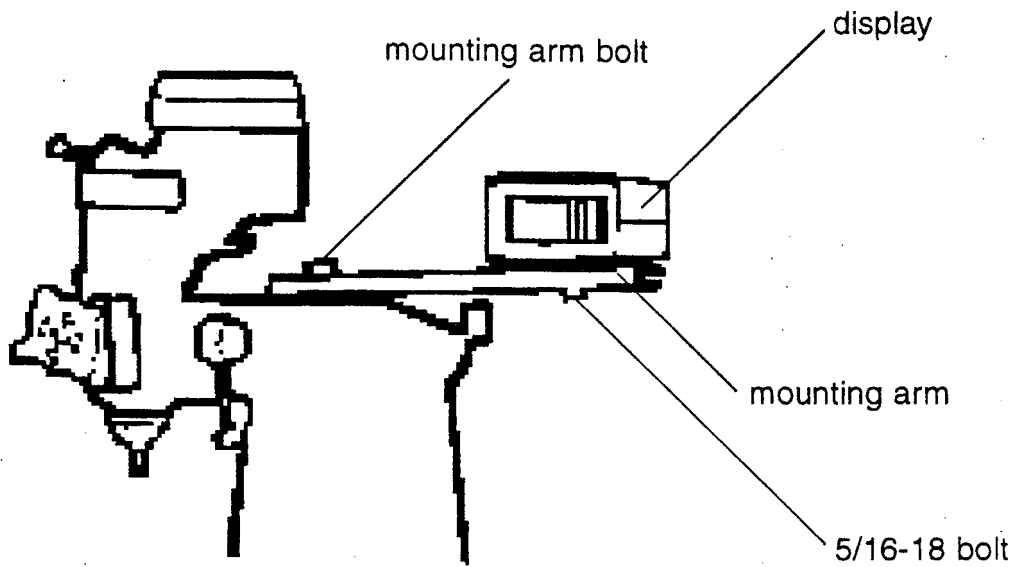


Figure 1: Display on a milling machine (normal configuration)

## AC Ground

The AC socket used should be a three prong grounded outlet (as per Article 250 of the US National Electrical Code). If a three prong outlet is not available, use a grounded adapter and verify that the adapter is grounded.

**Note:** Verify that the machine is grounded; if it is not, a ground must be installed.

Install a 14 AWG stranded wire (customer provided) from the ground lug on the back of the **SILVERADO** to the machine power ground connection. If this is not possible, locate an alternate place on the machine, then drill and tap. Use star or split washers to secure the ground wire to provide an adequate connection. Use an approved anti-oxidation compound on the connection where the paint was scraped.

## AC Power Connection

Do not connect the **SILVERADO** to an outlet which is also used to power a *machine*; use a separate outlet. If an outlet is not available, one should be installed near the display mounting location.

The AC power outlet should be of the same voltage indicated on the identification/serial number on the back of the display.

Use the power cord supplied. Do not modify the power cord.

Connect and secure the scale cable connectors to the display. Using tie-wraps, secure the scale cables and *dress* any excess slack. Do not wrap any AC power lines together with the scale cables. Maintain a minimum of 12 inches ( $\approx 30$  cm) from AC lines and cross them at right angles.

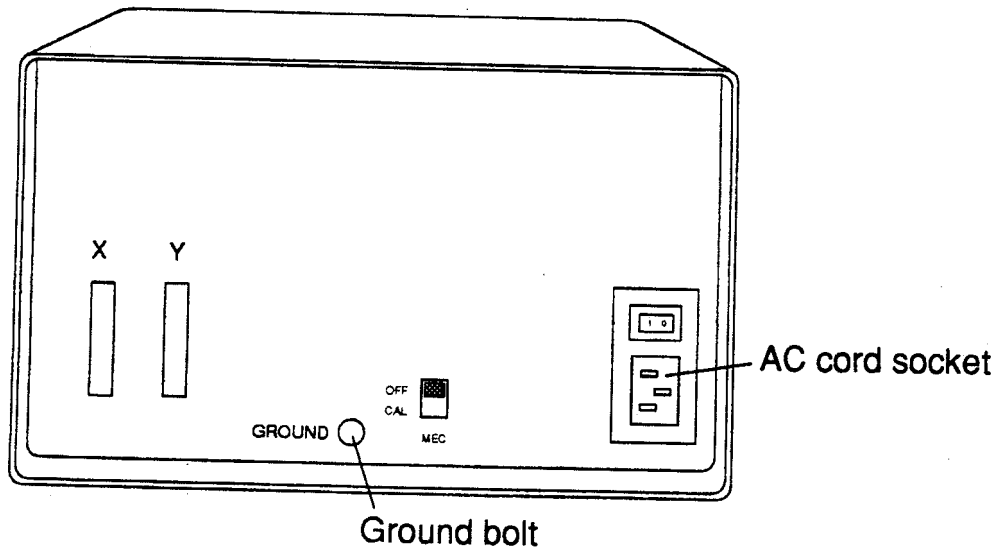


Figure 4: Power cord, AC outlets, ground bolt

# Power Up

Turn the unit on using the power switch located on the back of the display (see Figures 5 and 6). The DRO will display and flash "8.8.8.8.8.8.8.8."

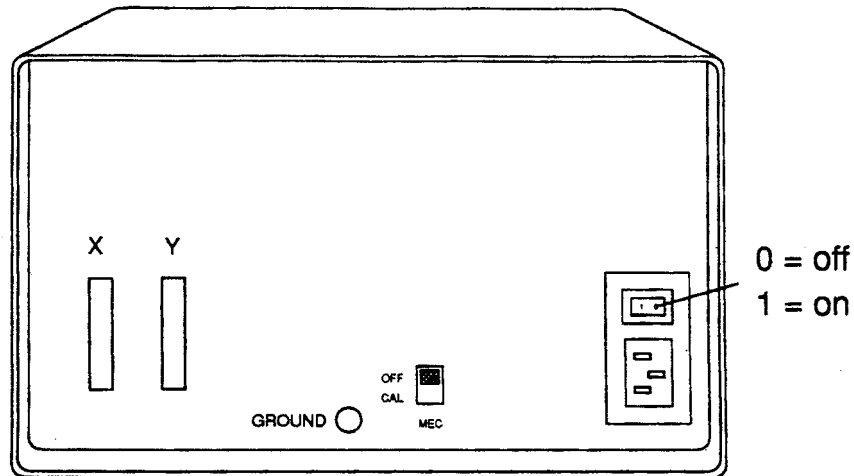


Figure 5: ON/OFF switch

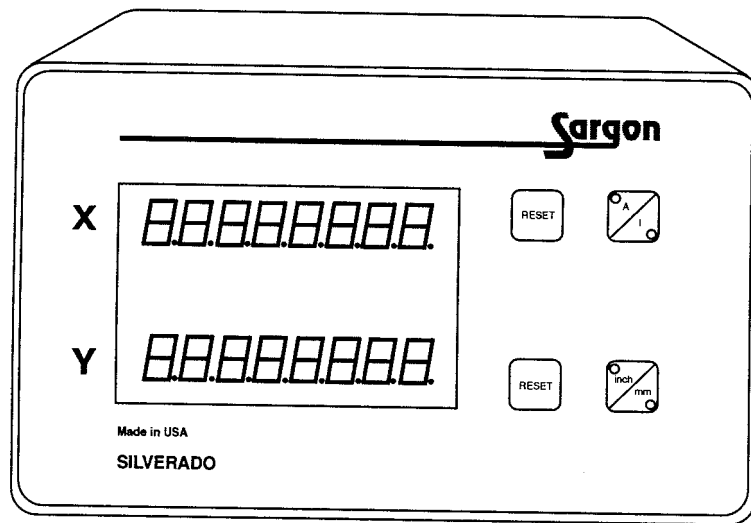


Figure 6: Flasing 8's (initial display)

The flashing 8's, will remain until you press a button. If you press and hold the A/I button, the display will enter the setup screens (see next page). If you press any other key, the display will enter the normal mode.

## Setup Screens

After power up when the display is still flashing "8.8.8.8.8.8.8.", press and hold the A/I button to enter the setup screens (see Figure 7).

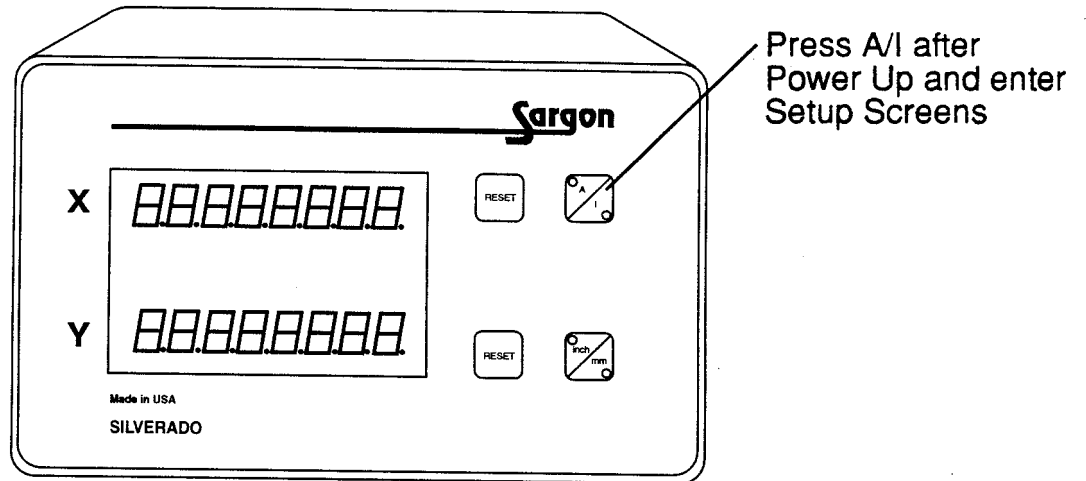


Figure 7: Entering Setup Screens

In the setup mode, there are 2 screens that enable you to select:

1. Scale Resolutions
2. Scale Directions



## 1. Scale Resolutions

While in the setup mode, press inch/mm until the DRO displays the following (see Figure 8):

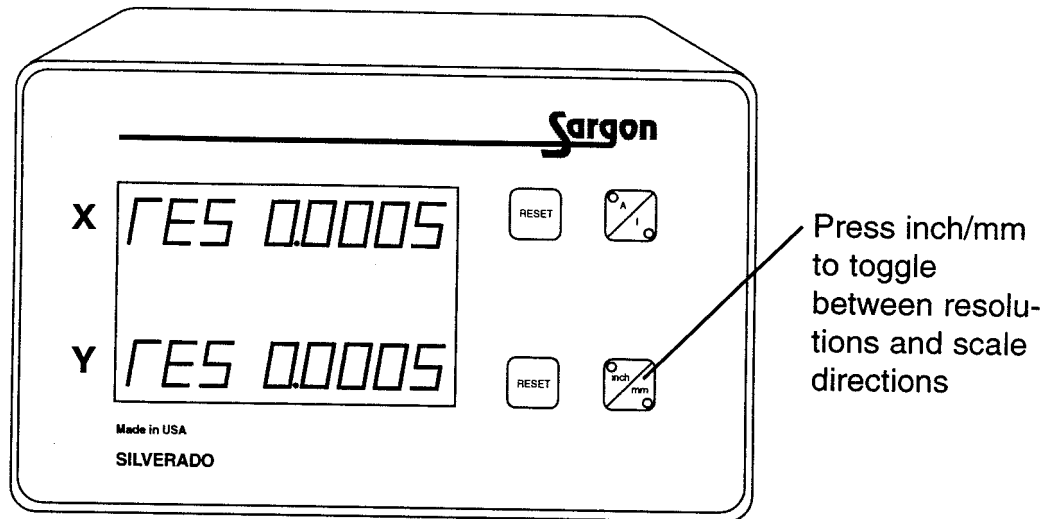


Figure 8: Scale Resolutions

Press the RESET button of the desired axis to toggle through available scale resolutions. When the appropriate scale resolutions are displayed, press A/I to exit to normal mode or press inch/mm to toggle between the setup screens. The last displayed value(s) and setting(s) will be saved automatically.

**Note:** The scales determine the system resolution, not the DRO. This screen allows the DRO resolutions to match the scale resolution for each axis.

## 2. Scale Directions

While in the setup mode, press inch/mm until the DR $\bar{O}$  displays the following (see Figure 9):

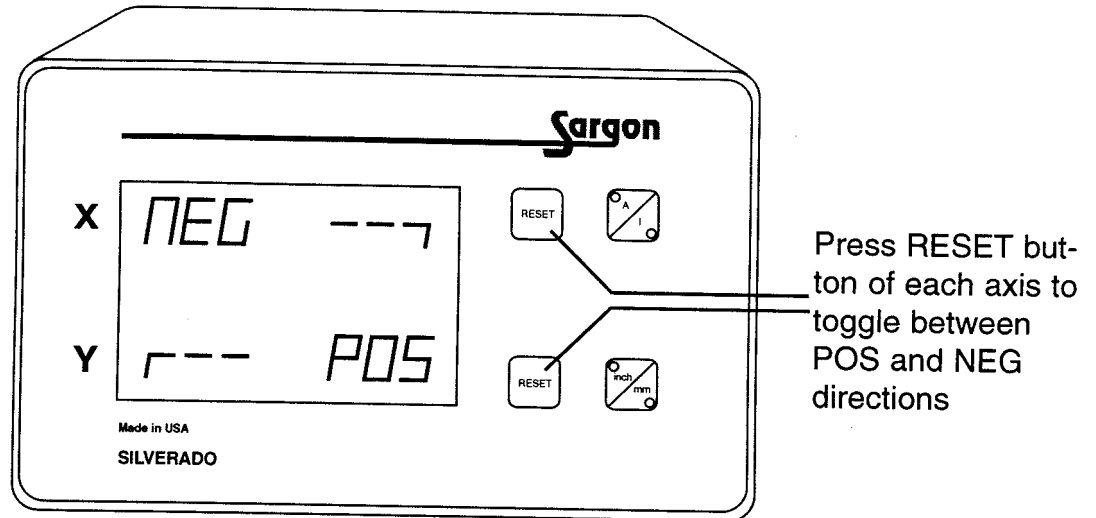
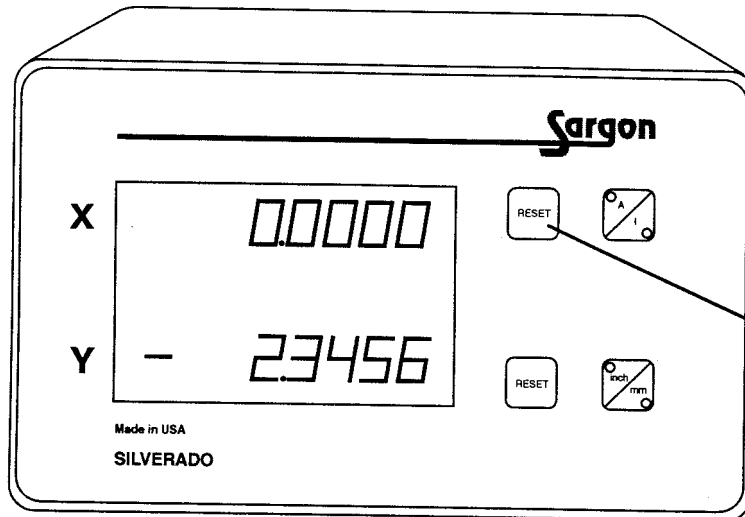


Figure 9: Scale Directions

Press the RESET button of the desired axis to toggle between positive and negative scale directions. When the appropriate scale directions are displayed, press A/I to exit to normal mode or press inch/mm to advance to the next setup screen. The last displayed value(s) and setting(s) will be saved automatically.

## Resetting the Incremental Coordinates

To reset an incremental value, press the RESET button of each axis you want to reset (see Figure 10).



Press the RESET button for the each axis to set the incremental value of the same axis to zero.

Figure 10: Resetting Incremental Coordinates

## Resetting the Absolute Coordinates

Using the A/I button, toggle to the Absolute Mode (A). Then press and hold the A/I button until the unit displays ZERO ABS (see Figure 11). At that point press the relevant RESET button(s) to reset the corresponding absolute coordinate(s) to zero.

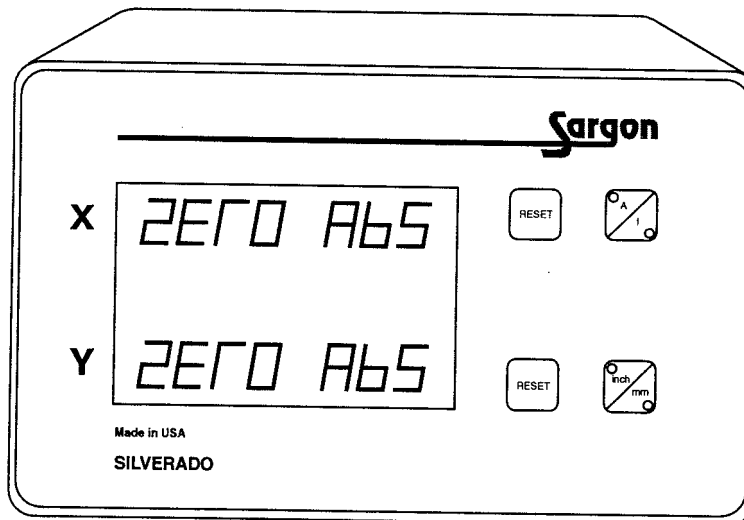


Figure 11: ZERO ABS

## Machine Error Compensation (MEC)

A standard vertical milling machine would not have any error if its table movements followed perfectly straight lines. This, however, is not the case. There will always be some finite transfer error.

Machine error can be seen as the difference between the actual length of a standard gauge block and the value displayed by the digital readout. This error will also be present in any workpiece machined in that axis.

Machine Error Compensation (MEC) multiplies the internal display count by a conversion factor so that the displayed value will be correct. This factor is stored in the display's non-volatile memory and is set at the factory to a 1:1 ratio.

**Example:** A standard 10.0000 inch gauge block is measured on a knee mill using proper machine shop practices, but yields a result of 10.0050 inch on the display. MEC is used to re-proportion the dimension so that the display indicates the correct measurement of 10.0000 inches of travel. The 0.0050 inch error is displaced within the 10.0000 inches of travel.

MEC factor range is from -0.999999 to +0.999999.

$$\text{MEC Factor} = \frac{\text{Measured Value} - \text{Gauge Value}}{\text{Measured Value}}$$

MEC should be a one time job. However, an operator may wish to recalibrate for a particular area on the machine table where a particular work is performed.

Although MEC can compensate for machine table problems, it is not intended as a substitute for proper machine maintenance.

### Note:

1. The MEC procedure is performed one axis at a time.
2. For best results, the display should be calibrated in units in which it will be used (inch or mm).
3. ABS and INC modes always have the same calibration factor for a given time.
4. Standard machine shop procedures are used for gauge block set up and measurement.

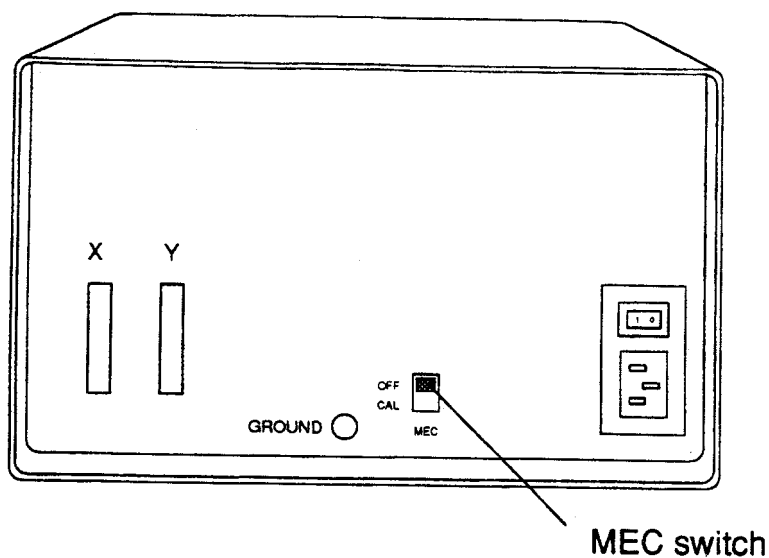


Figure 12: DRO back illustration with MEC switch

### ***Clearing the MEC Factor***

Set the MEC switch to CAL, press RESET for the selected axis to clear the MEC factor, then turn the MEC switch to OFF.

### ***Calibrating MEC***

Clear the MEC as described above. Also, set the inch/mm switch to the units in which you will perform your work.

Enter the actual certified gauge block length by moving the table until the SILVERADO displays the numerical value of the length. This is simply a method to enter numerical data without the use of a numeric keypad. Set the MEC switch to CAL and press the RESET for the selected axis.

Move table until the gauge block measurement is displayed. Set MEC switch to OFF. The value displayed should now be corrected to the certified gauge block length entered.

Repeat gauge block measurement to ensure unit is properly calibrated for that axis.

Repeat procedure for the remaining axes.

### ***Viewing the MEC Factor***

Set the MEC switch on the back of the display to CAL and hold the A/I button (see Figure 12). The MEC factor will then be displayed. When finished, move the MEC switch back to OFF.