L8300 COLUMN GAGE
LVDT and AIR Signal Conditioning

OPERATING MANUAL

MANUAL REFERENCE

L8300-M-001

Revision 01

LANCE INSTRUMENTS INC.

WINDSOR ONTARIO

L8300 COLUMN GAGE

OPERATING MANUAL

1.00 INTRODUCTION

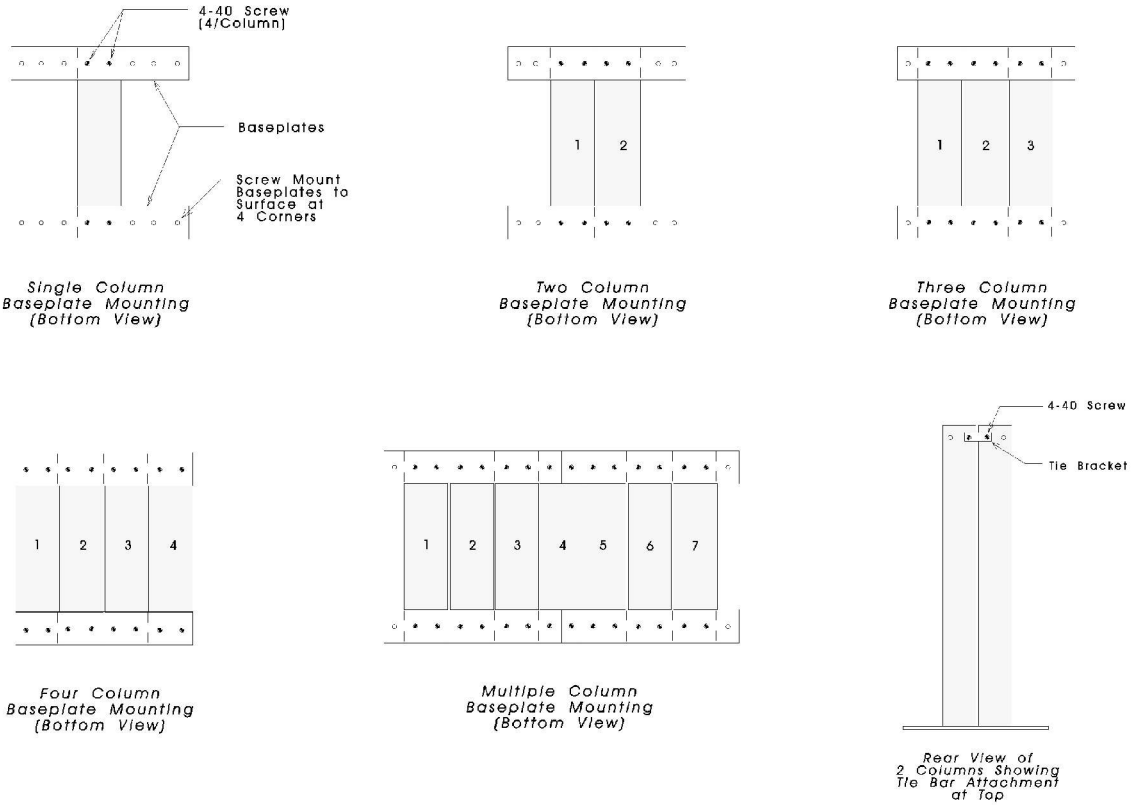
1.10 GENERAL

The Model L-8300 Gaging Column has been designed to provide a means of accurate dimensional gaging utilizing a variety of probe types, combined with the easy readability of a 10-inch LED bar display. Depending on the application, the unit can be supplied for operation with either Linear Variable Differential Transformer (LVDT) probes, or back pressure air gage systems.

The LVDT model is dual-channel in that it will accept up to two gaging transducers at a time and display either one or both or any combination of the sum or difference of the two. Twelve ranges are provided, 6 Imperial and 6 Metric. These cover a full-scale deflection range of 50 thou inches down to one thou inch, in six ranges, and 1000 micrometers down to 20 micrometers in six ranges. Front panel controls consist of function and range DIP switches, a gain control, channel A-B balance, and a 10 turn scale zero control. Setup parameters include function, range, gain, channel A-B balance (LVDT), and zero.

The Air Gage model is designed to work with standard air tooling and with a nominal centre scale pressure of 20 to 24 PSI. Front panel controls include both 'zero' and 'spread' air valves. An electronic gain control is provided to enable the instrument to cover a wide range of tooling requirements. Included in the unit is an internal pressure regulator which supplies a nominal 40 PSI regulated air pressure. Service air requirements are 60 - 150 PSI.

In addition to the standard single channel air gage, a dual air gage module is available which provides two independent air channels which can be displayed either individually or in combination (Model L8300 only).



Single Column Baseplate Mounting (Bottom View)

Two Column Baseplate Mounting (Bottom View)

Three Column Baseplate Mounting (Bottom View)

Four Column Baseplate Mounting (Bottom View)

Multiple Column Baseplate Mounting (Bottom View)

Rear View of 2 Columns Showing Tie Bar Attachment at Top

Fig. 1-1 BASEPLATE MOUNTING DETAILS

1.20 SPECIFICATIONS

1.21 General

AC Input Voltage		120 VAC, 50/60 Hz
Power Consumption		20 W
Fuse		Type AGC, 1A, 1-1/4" x 1/4"
Display	- Type	LED Bar Type, 100 Segments
	- Height	10 inches
	- Segment Colours	Red or Green combinations
Accuracy		1% of Full Scale
Grading Lamps (Option)		
	- HI Limit	Red LED
	- OK	Green LED
	- LO Limit	Red LED
Remote Status Output (Option)		
	- Lamp ON Status	+ 5 VDC
	- Lamp OFF Status	0 VDC
	- Maximum Load	20 MA
Analog Output		+ 5 to - 5 VDC, 10 MA Max
Operating Temperature		50-100 degrees F, 10-38 degrees C
Dimensions		21"H x 2"W x 8.7"D
		(53.3 CM x 5.1 CM x 22.1 CM)
Weight		9.3 LBS (4.2 KG)

1.22 LVDT Signal Board

Sensor Requirements:

	Type	LVDT
	Excitation Voltage	2.5 - 5 VAC
	Excitation Frequency	5 K Hz
	Sensitivity	1.5 - 6.5 MV / V / .001"
	Maximum Burden	120 MA (Total all LVDT's)
	Connector Type	5-pin Din
Functions		A, B, -A, -B, A+B, A-B, B-A
Ranges:	Imperial	1, 2, 5, 10, 20, 50 thou inch
	Metric	20,50,100,200,500,1000 micrometers

1.23 Air Signal Board

Supply Pressure	60-150 PSI
Outlet pressure (max)	40 PSI
Pressure for centre scale	20 to 24 PSI
Signal Out (0 to full scale)	-5 to +5 volts DC

1.30 INSTALLATION

1.31 Mounting

Two custom, universal base mounting plates are available for mounting of the gaging column. These are designed to provide mounting support for the unit whether it is used as a single self-supporting column, or as part of a larger multiple column setup. Typical details for use of the mounting plate are shown in figure 1-1.
It is recommended that columns be fastened to a bench or stand by means of bolts through the mounting feet in order to avoid tipping.

A single rear-panel tie bar is also available as part of the mounting kit to provide upper panel support between the columns of a multiple column setup.

1.32 Power

The first unit in a series should be plugged through a cord extension into a standard 120 VAC, 3-wire, 15 A circuit. At the rear of each column is a 3-wire AC receptacle to provide power for an adjacent gage in a multiple-gage installation. A maximum of 24 gages should be connected together in this manner.

A warmup period of approximately 5-minutes is recommended prior to calibration and/or use.

If a signal module must be removed from the case for any reason, disconnect all AC power to the unit first. Remove the screws at the top and bottom of the module face plate and gently slide the unit out of its mating connector.

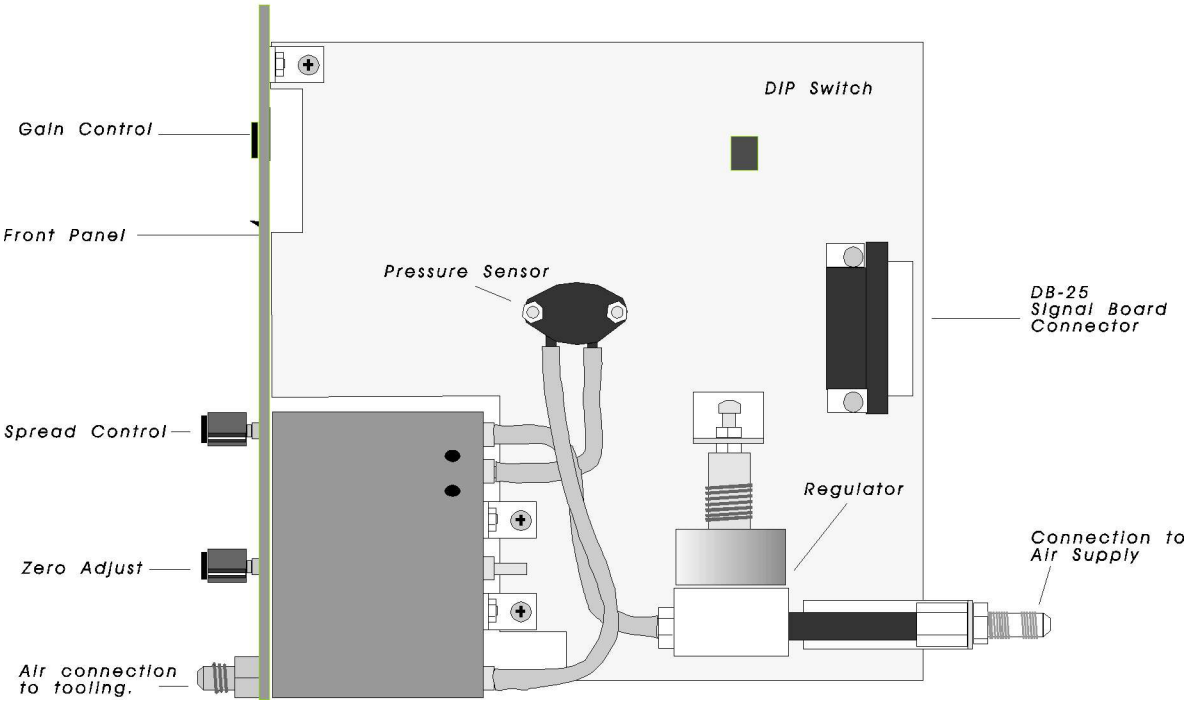
1.33 Scales

Centre-zero scales are provided with each unit to cover the more commonly used ranges available on the instrument. These are supported by the black U-channel running the length of the display. Scales are inserted from the bottom and lock into place as they approach the top of the display.

Scales are normally supplied in Yellow with Black lettering; other colour combinations are available on request.

In addition to the scales provided, the unit will accept custom scales of your own design prepared through any standard word processor. A clear plastic insert is available for protection of the label.

Air/Electronic Signal Processing Board Layout



L8300 Gage Interior Layout

Showing Air Module Inserted

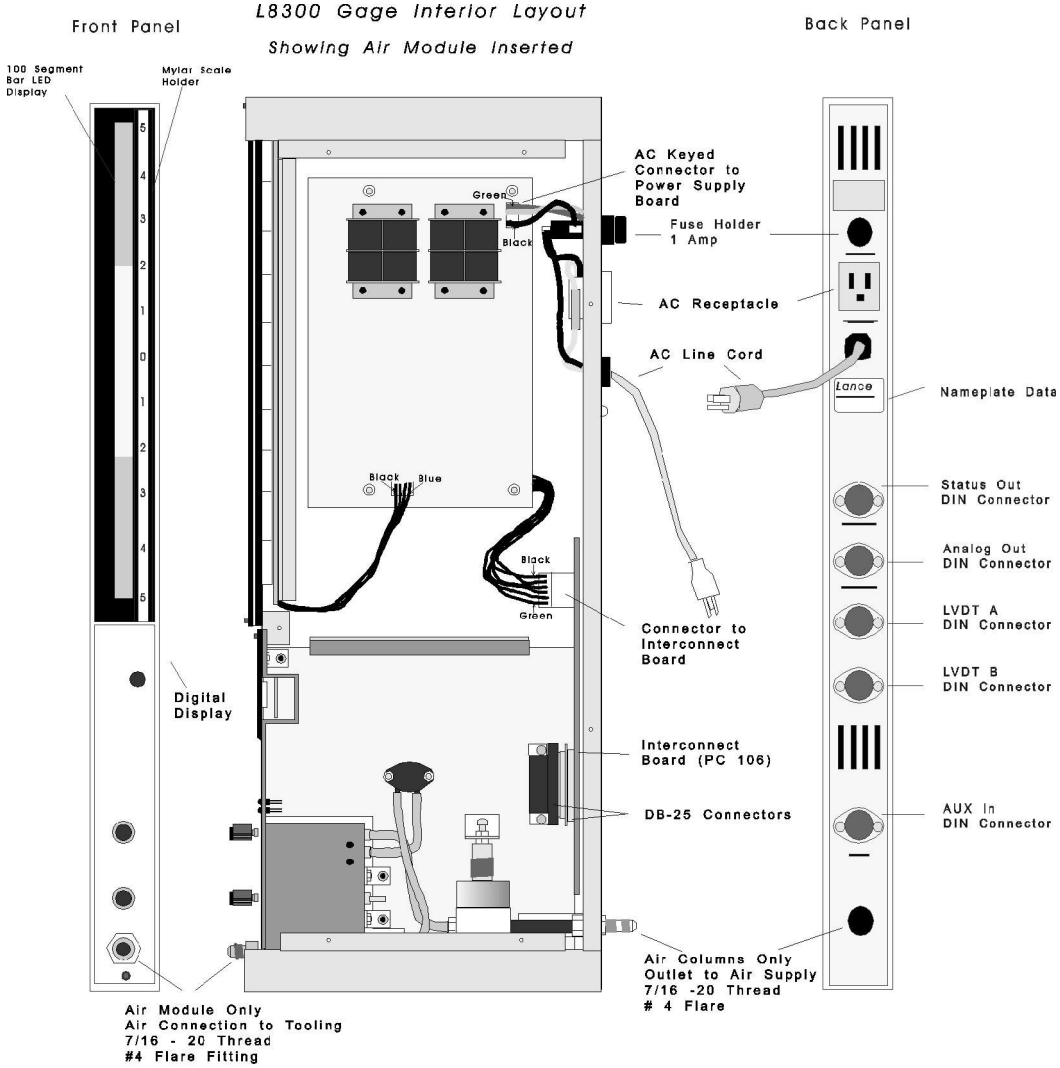
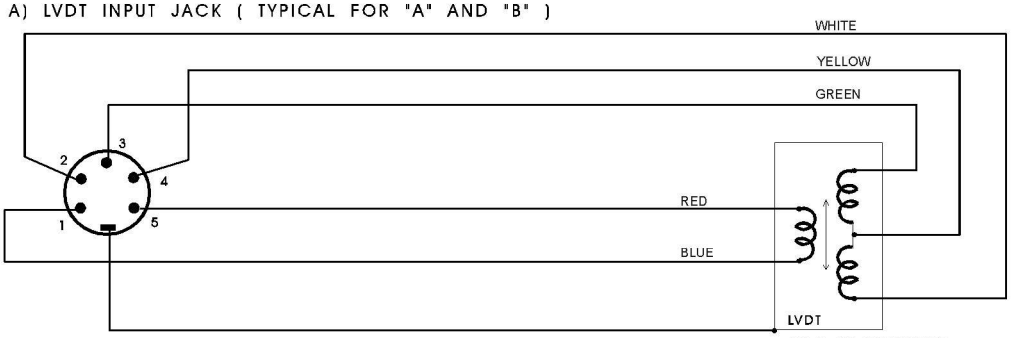


Figure 1 - 4

Fig. 1-5 SIGNAL INPUT/OUTPUT WIRING CONNECTIONS

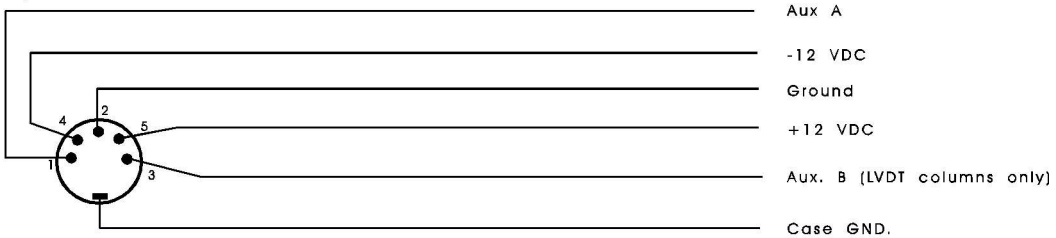
NOTE: ALL PLUGS SHOWN VIEWED FROM BACK OF GAGE CASE.

A) LVDT INPUT JACK (TYPICAL FOR "A" AND "B")

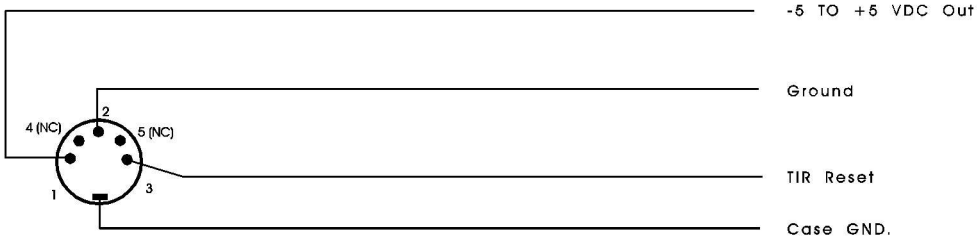


Note: See Appendix for Half-Bridge Transducer Configuration

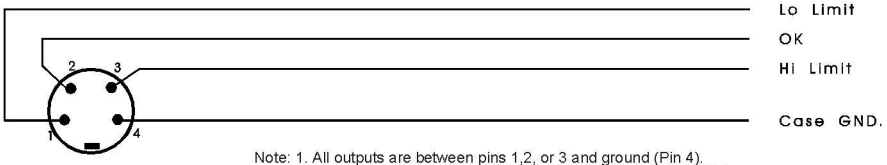
B) AUXILIARY INPUT JACK



C) ANALOG OUTPUT JACK



D) HI/LO LIMIT OUTPUT CONNECTIONS



Note: 1. All outputs are between pins 1,2, or 3 and ground (Pin 4).
2. Lamp ON status corresponds to + 5 VDC output. Lamp OFF corresponds to 0 VDC.
3. Optional output relays are available by special request. Configurations can be specified at time of ordering.

2.00 MODEL L 8300 LVDT SIGNAL MODULE

2.10 Description

The LVDT signal module , when combined with the L8300 Display and power supply frame will allow direct bar graph readout from up to two LVDT signal probes. Standard features include a +5 to -5 VDC analog output, electronic gain control and 10-turn zero adjust. Optional features include an internal 3-lamp grading unit with TTL status output.

2.20 Setup

The lower plug-in signal module is normally delivered installed. Insertion involves aligning the circuit board with the internal guides and sliding the module fully into position. Press the module in firmly to seat the connector and bring the front panel into direct contact with the mounts. Secure with two 6-32 x 3/8" socket head Cap screws at the top and bottom of the front panel.

LVDT probes are connected to the rear of the cabinet to 5-pin DIN connectors marketed SIGNAL-A and SIGNAL-B. Connections to the ANALOG OUT or STATUS OUT are made to their respective DIN connectors at the rear of the unit. Typical connections are shown in Fig. 1-5

2.30 Calibration

All adjustments for calibration of the unit are located behind the hinged front door, with the exception of the zero adjust. The desired polarities for channels A and B can be selected by the DIP switches marked as such. To select between Imperial and Metric ranges, the top switch on the lower DIP switch package is used. Select the appropriate range with the lower seven switches. Sliding the switch to the right selects that particular range. No more than one range should be selected at a time (ie. all other 'range' switches should be in the left-hand position).

If only one LVDT is required to feed the gaging unit, then connect it to channel 'A'. With the LVDT connected and mounted in a fixture, physically position the LVDT such that the display reading is as close as possible to centre scale with the reference standard in place. Following this, use the zero adjust to bring the scale centre exactly to zero. Now, with another reference standard, equal to the limit of the scale in place, adjust the calibration pot to achieve the correct reading on the bar graph display. Clockwise rotation raises the scale. Alternatively, lo limit and hi limit masters may be used for calibration.

If two LVDT's are to feed the gaging unit, then connect the first and mount it in the fixture such that the display reading is as close as possible to centre scale with the reference standard in place. Now connect the second LVDT and position it such that the display reading is as close as possible to centre scale. Adjust the zero pot so that the sum of both these inputs is exactly at the centre of the display. Adjust the sensitivity of channel B so as to match that of channel A by using the balance pot. You can then calibrate both channels simultaneously by turning the calibration pot.

2.50 Total Indicating Readout (TIR)

A Total Indicating Readout circuit is provided as an option for the LVDT signal conditioning board. With TIR, the gage will automatically record and store the minimum and maximum displacement values attained from a particular probe or combination of probes, and display the difference between minimum and maximum on the 100-segment LED display.

Before the TIR mode is selected, the probes used for the particular setup should be adjusted for their optimum centre-of-travel position. All of the normal gage adjustments (function, scale,zero, etc.) should also be made first.

The TIR is initiated by turning the TIR/NORMAL switch on the gage front panel to the TIR position. The reset button on the front panel is depressed and the 100-segment LED display should read centre zero (or any other reference point you select). The desired zero position of the display is adjusted via the 'TIR Zero' potentiometer on the board front panel. The system is now ready to record and display the total displacement for any part being measured. For special applications, a remote reset pushbutton is available as an option. This connects to the rear of the gage through the 3-Pin DIN connector and is wired as per the attached drawings.

3.00 L8300 AIR GAGING MODULE

3.10 Description

With the Air Gaging module (see Figure 1-4), fitted to the L8300 display and power supply unit, direct electronic bar graph display is made available from standard air gage tooling. Features include a +5 to -5 VDC analog output, adjustable electronic gain control, and, zero and spread air valve controls. The unit is equipped with an internal air regulator and utilizes a differential air circuit to further minimize the effects of input air pressure variation.

3.20 Setup

The unit is normally shipped so that increasing pressure creates a negative or downward direction of the display. If positive deflection is required, this should be set prior to mounting the air module (see Calibration). Installation of the air module involves aligning the circuit board with the card guides and sliding it carefully into position. Press the module in firmly to seat the rear connector, and bring the front panel into contact with its mounts. Secure the panel with two 6-32 x 1/2" Socket head Cap screws at the top and bottom of the front panel, and a 7/16 - 20 Hex nut on the rear panel Air Inlet Fitting. Tighten this nut snugly, but DO NOT OVER TIGHTEN.

Air gage tooling should be connected to the front panel air fitting and a clean dry air supply at 60 to 150 PSI connected to the rear Air Inlet Fitting. Connections to the Analog, Status or Signal Outputs should be made to their respective DIN connectors on the rear of the unit (see Connector figure).

3.30 Calibration

If required, the display polarity can be changed by setting the polarity switch on the air module circuit board to +A or -A (See Fig. 1-4 for location of DIP switch). On some modules, a removable jumper plug is used to provide the same function. It is suggested that calibration be started with the electronic gain control adjusted for minimum. This is accomplished by turning the gain control counter-clockwise 5 to 15 turns, or until a soft clicking is heard while turning the control.

With tooling connected, the ZERO valve open 1/4 turn, and SPREAD valve closed, apply AC power and turn on the air supply. Alternating between minimum and maximum masters, adjust the SPREAD valve to give the desired indication on the display. The ZERO valve is used to centre the scale. Adjustment is similar to conventional air gages with mechanical readouts to this point. Plunger-type probes are also calibrated using standard air gaging setup procedures.

If the SPREAD valve does not produce enough sensitivity, the electronic gain control should be advanced (clockwise) sufficiently to attain the required response. Increases in gain of up to four times are available with this control. Since the type of tooling and desired ranges varies greatly with the application, the three controls should be balanced in adjustment to provide maximum stability and accuracy with minimum air turbulence and quantity.

After gaging parameters have been set, install the maximum master and adjust the HI LIMIT control (on units so equipped) to give a transition from GREEN grading lamp indication to RED. Using the minimum master, repeat the adjustment for LO LIMIT, this time looking for a transition from GREEN to AMBER.

3.50 Total Indicating Readout (TIR)

As with the LVDT module, a Total Indicating Readout circuit is provided as an option for the Air signal board. When TIR is activated, the gage automatically records the minimum and maximum displacement values attained, and displays the difference.

Before the TIR mode is selected, it is essential that the fixture for the part, and all of the normal gage calibration and settings be correctly set up as per section 3.30 . Following this, the TIR is initiated by turning the TIR/NORMAL switch to the TIR position. The reset pushbutton on the front panel is depressed and the 100-segment LED display should read centre-zero (or any other reference point you select) . The desired zero position of the display is adjusted via the 'TIR Zero' potentiometer on the signal board front panel.

The system is now ready for operation. As with the LVDT version, a remote reset pushbutton for the TIR can be connected through the rear panel 3-Pin DIN connector.

Operation of the unit is similar to the Single Air module. The two independent channels (A & B) are selected via a 4 position Dip switch located on the signal board. The switch configuration has an ON and OFF position for each of the four possible configurations, (+ A, - A, + B, & - B). Through the selection of the 4 Dip switches, the unit will display either + or - A alone, + or - B alone, A + B, A - B, B - A, or -B - A .

In addition to the four air valve controls, an overall electronic gain control is provided on the module front panel; clockwise rotation of the 10-turn screw-adjustable control increases the gain of the unit, counter-clockwise decreases the gain.

A pushbutton channel B defeat switch is also provided on the front panel. Depressing the button temporarily defeats any signals originating from the 'B' air channel and is useful during setup and calibration of a dual channel configuration, without requiring removal of the signal module to achieve a signal channel operation for calibration purposes.

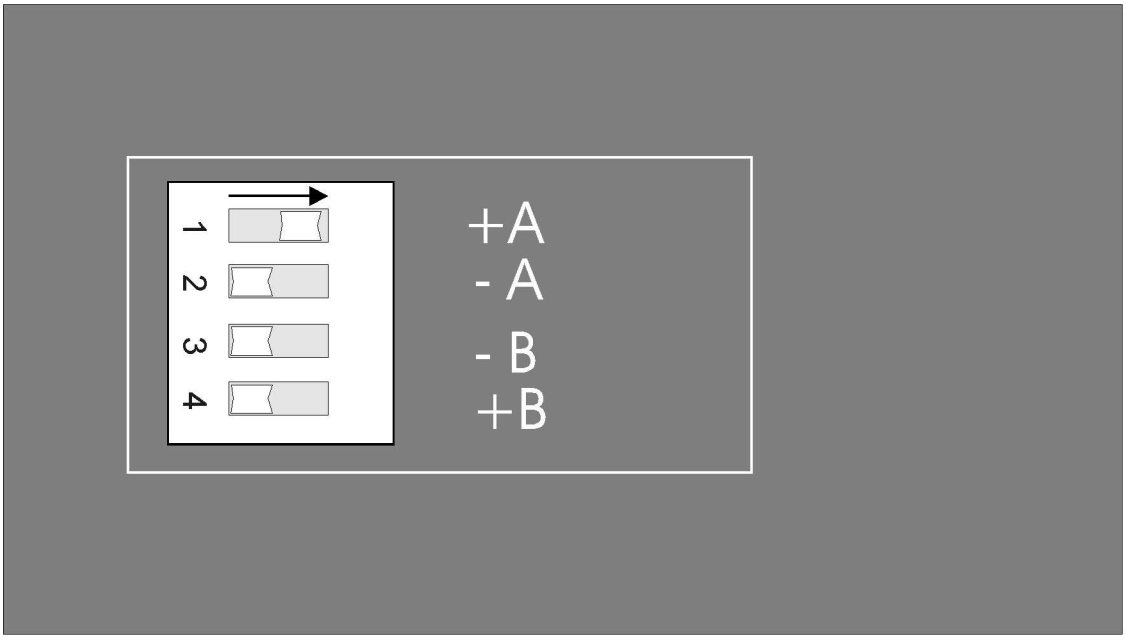
The Dual Air module is also available with both the TIR and Grading Lamp display options. Operation is similar to the Single air unit already described.

Polarity Selection on the L8300 Air Columns

- For + A input selection, push the top DIP Switch (# 1) to the rear of the module, and keep all other switches towards the front.

- For - A input selection, push the DIP Switch which is second from the top (# 2) to the rear of the module, and keep all other switches towards the front.

Rear of Signal Conditioning Module →



Shown above with input selected for + ve input.

"B" Inputs used only on Dual Air modules.

Polarity DIP switch is located on the top rear of the L8300 Air Signal Conditioning Module.