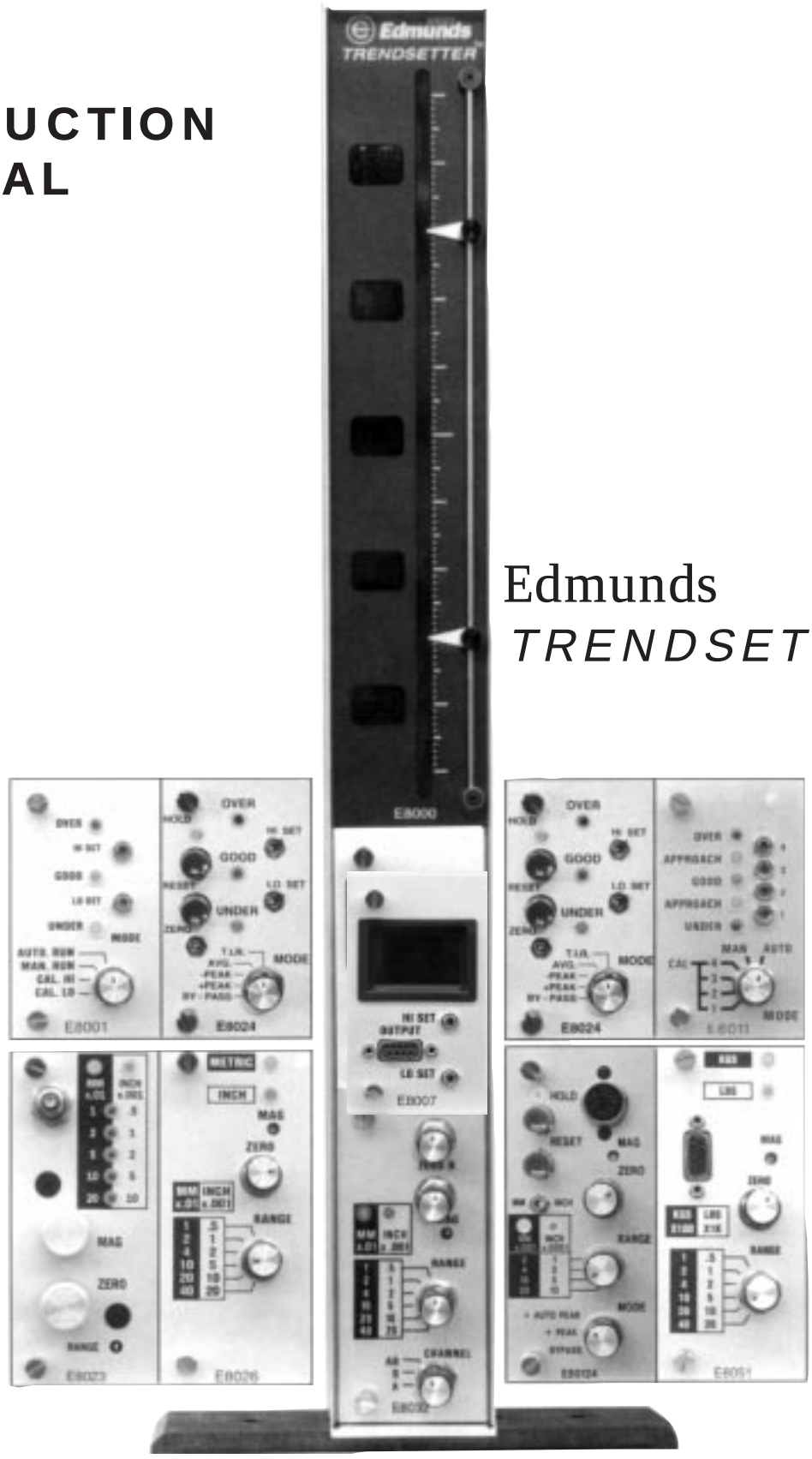
INSTRUCTION MANUAL



Edmunds
TRENDSETTER ™

GAGES Edmunds

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TRENDSETTER™

Ever since it's emergence in 1977, the Trendsetter™ gaging column has been the most reliable and technologically advanced column gage in the world. With both electric and air-to-electric capabilities, the Trendsetter™ is on the cutting edge of component and design technology while continuing to provide the user-friendly ease you've come to expect from all Edmunds products.

The overwhelming success of the Trendsetter™ reflects a company-wide commitment to continual technological improvement, technical integration, and customer satisfaction. This unique gaging-column has been, and will continue to be, a dynamic and evolutionary technological achievement; a reliable and responsive instrument perfectly suited to a constantly changing gaging environment.

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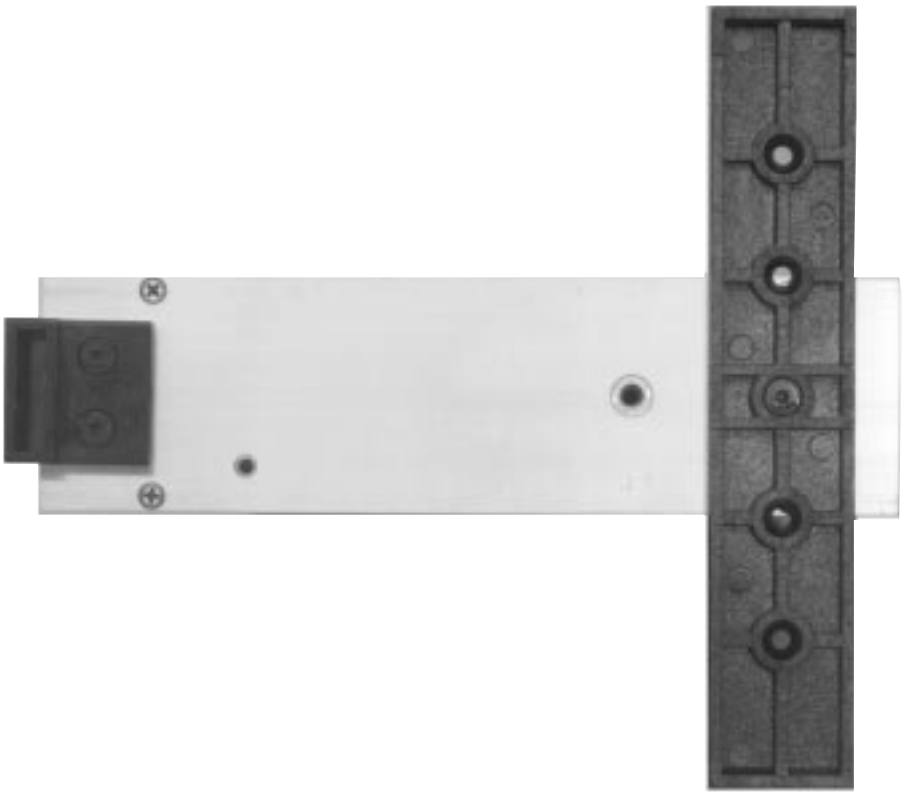
2.1 ELECTRONIC GAGING

2-1.1 *Preparing For Use - Electronic Gaging*

This opening description will be as brief as possible in an effort to minimize setup time. A more complete description of the column and it's modules will be found later in the manual. To form a firm three point support for the column, unscrew the front screw at the bottom of the long foot and remount the foot on the front screw. The foot should be perpendicular to the column. This foot will also serve as a connector for multiple column setups.

With the power switch off, plug in one or two gage probes into the A & B input sockets located in the rear of the column. Next, plug in the 100-240 VAC/50-60 Hz supply to the back of the column.



2-1.2 *Operation of Trendsetter™ with LVDT Electronic Probes*

Using the power switch located at the rear of the column, turn the unit on. Depending upon your application, select the input channel as required: A, B, or AB. Next, check the Inch, Metric, indicator light to see if the gage is set to the required measurement system. Depress the contacts on the probe to see if the column moves in the correct direction for the movement of the contacts; i.e., for an O.D. measurement, a large part will cause the probe tip to move in. Any depression on the probe tip should move the bargraph display in an upward direction. If either of these functions is incorrect, remove the module as follows: switch the column off, unscrew the two module retraining screws, and gently pull the module out. Do not touch the matrix I/O pin headers; the function of these units can be found later in this write-up.

Check that the Inch and Metric Pin Headers as well as the polarity switches are in their correct position. Replace the module by lining up the top and bottom edges of the board with it's card guides and sliding back until it locates in its electrical socket. Screw in the two module retaining screws to secure the module and switch power on. The full scale range of the readout should now be set.

To select a range, if it has not already been decided, it is best to select one that is two to three times greater than the tolerance being checked. This will allow for good approach and oversize range. If parts are being matched or segregated into classes and are all in tolerance, much more of the full scale range can be used.

Set the range knob to the desired value. The corresponding digital scale values will be shown alongside the bargraph scale. The setup is now ready for mastering.

2-1.3 *Mastering*

There are two basic approaches to mastering:

1.) Min. and Max. masters
2.) Mean or zero master

Setting to a Mean Master

Place the mean master in a fixture and turn the zero knob to bring the scale to zero or to the actual calibrated size of the master.

Setting to Min. & Max. Masters

Place the max. master in the gage and, with the zero knob, adjust the column to the upper limit reading. Remove the max. master and replace with the min. master. The reading should rise to the lower limit. If, due to a poor initial calibration (or a non 1:1 ratio in the lever arms of the gage), the lower limit is not achieved, the magnification should be altered.

2-1.4 *Front Panel Magnification Trim*

Place one master in the gage. Set one limit at the desired point with the zero knob. Apply the other master and, with a small screwdriver, adjust the recessed "mag" screw until the column moves to the desired point. Reapply the other master and, if necessary, readjust until both masters move the column the required amount. This front adjust screw will allow for a trim of approximately 20% and will change all inputs; A, B, and AB.

In some cases, where transducers other than Edmunds' gage probes are being used, or where levers change the 1:1 ratio of input to output, the rear adjustments on the circuit board may need to be used.

To insure the success of your mastering procedure and the stability of the gage, the set points should be re-checked with the masters at frequent intervals. The need for constant mastering will decrease as the Trendsetter™ and the gage demonstrate stability and repeatability. Frequent mastering will ensure that there are no loose contacts, and that the system is not experiencing any drift. These potential failures can be found only by frequent mastering under production conditions.

2-1.5 *Main Magnification Adjustment*

At the lower back of the column is an inspection panel held in position with two screws. Removal of this panel will expose calibration trim pot screws labeled Cal. A and Cal. B. Each input should be set independently, using some basic measuring means such as a micrometer drive, gage blocks, or if a single probe is being used in the fixture, this may be used with the master or with shims. Switch to Channel A on the front of the column and set probe A to its low limit. Adjust the front zero knob to the low column reading.

Move the probe tip the mastering distance by one of the described methods and turn the Cal. A pot to bring the column reading to the high position. Re-check, and if, necessary, repeat between master points to obtain the desired column movement between min. and max. master positions. Repeat this procedure for probe B with the front panel switch turned to Channel B. With both A & B set for magnification, replace the rear inspection panel. If both probes are being used as A & B, turn to Channel AB and do any final master trimming on the front pot as previously described.

2-1.6 *Balance*

One final word on calibration is the concept of balance. Balance is the final “trimming out” of all system magnification errors. It should be noted that balance only concerns differential measurements; when both probes are measuring a diameter for example. Also, lack of balance is one of the chief causes of poor system repeatability.

Balance is easily achieved and observed by the use of a simple mechanical balancing fixture. The fixture clamps the A and B probes in opposing positions, and with the use of a micrometer, moves the probes in exactly equal, but opposite directions. Such a fixture is available through Edmunds Gages as BG29412. To check balance, complete the calibrations as described in the previous sections. Mount the A and B probes in the balancing fixture. Adjust each probe to its mechanical zero as observed on the Trendsetter™ bargraph display. Then with the range switch set to desired application range, and the polarity/function switches set to A+B mode, rotate the micrometer head some convenient distance. This distance should not exceed 2x the selected range. Observe the bargraph, it should remain fixed at zero under these conditions. If, for example, the Trendsetter™ is set to the 0.005 inch range and the micrometer head is rotated thru 0.010 inch, the bargraph should remain exactly at its zero position. Any movement observed on the scale indicates the system is out of balance.

To achieve balance, a magnification adjustment is required to one channel only. First, reset the system back to its zero starting point. Next, offset the micrometer head and adjust the B channel mag through the rear cover. The initial amount of adjustment should be small, say no more than 1/4 turn on the B mag pot.

Observe the bargraph, did the error get greater or smaller? If greater, turn the mag pot in the opposite direction. If smaller, adjust the pot in the same direction until the bargraph remains on zero, with the micrometer rotated thru its range. To achieve a greater degree of balance, increase the systems sensitivity via the range switch. With a little practice and patience, balances in the order of 25 microinches or less are easily obtained!

When no further balance can be obtained from the system, restore the system to its initial state. Using masters, recheck the systems mag and zero. If magnification requires adjusting, use the front panel mag pot only, as any rear panel adjustment will nullify the balance procedure.

Balancing in a Gage Fixture

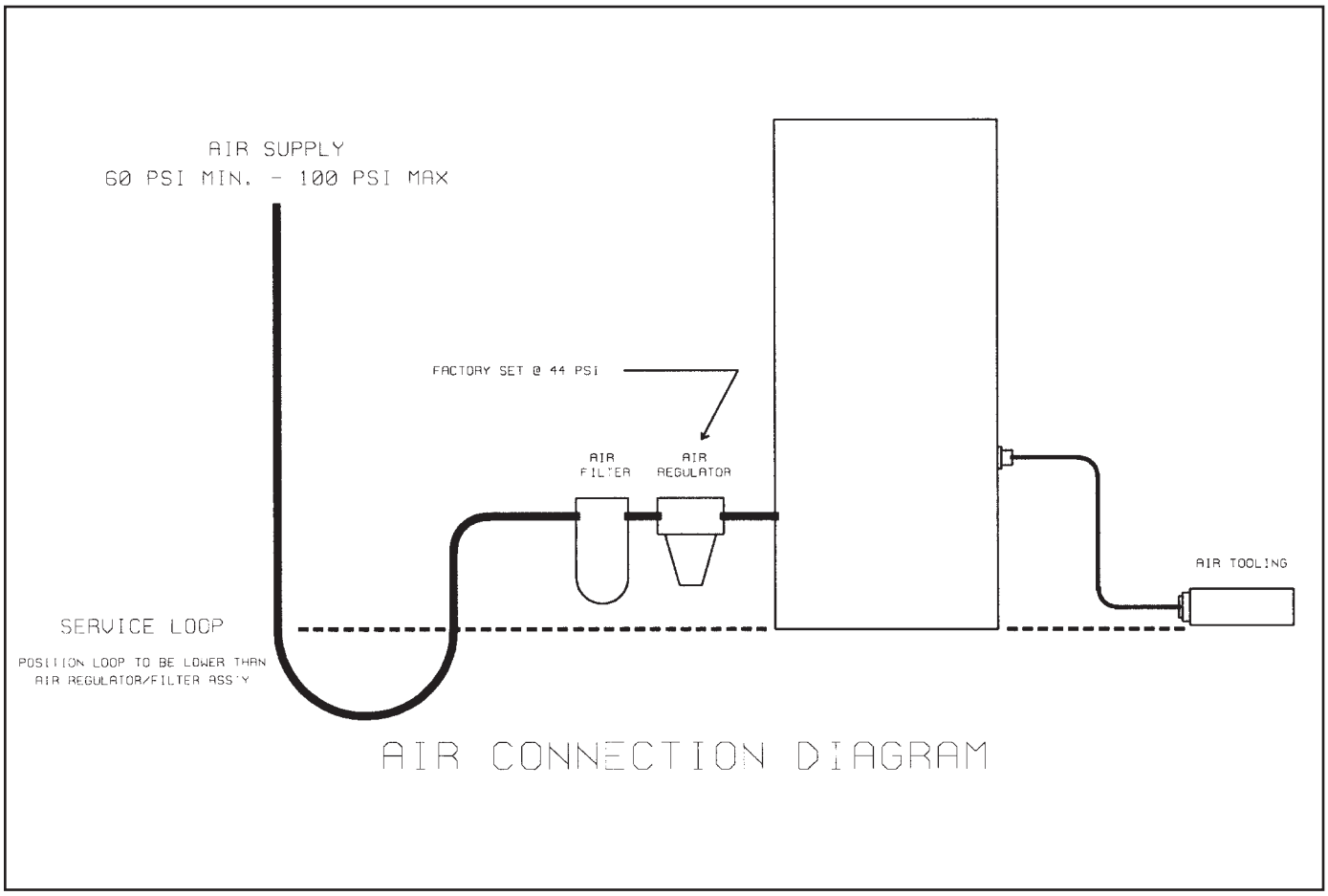
Balance may also be obtained in a gage fixture. The procedure is similar to the proceeding section except the max master and the gage fixture are used in place of the balancing fixture.Place the max master in the gage fixture, adjust the Trendsetter™ display to zero, push the master in a direction which is parallel to the plane that the gage probes are mounted in. The Trendsetter™ readout should remain fixed at zero. If any movement is observed, adjust one rear panel mag pot as described in the preceding section. Repeat the procedure several times until no movement is observed on the Trendsetter™ display. Restore the system to its original settings, and recheck calibration with max/min masters. Remember to use the front panel mag only, as any further rear panel adjustment will nullify the balance procedure.

2.2 AIR/ELECTRONIC GAGING

2-2.1 *Preparing For Use - A/E Gaging*

Before operation, the front foot should be set at 90° to column as described before. The air regulator and filter should be mounted on the column. Unscrew the two screws holding the back foot and turn 180° allowing the regulator and filter bracket to be mounted as shown. See photo on page 8 for correct installation.

Connect the short hose from the regulator output connector to the hose connector labeled 44. Next, couple the tooling hose to the front gage connector. Be sure that the small plastic sleeve is positioned correctly to insure a good seal clamp on both hoses. Tighten the brass nuts.

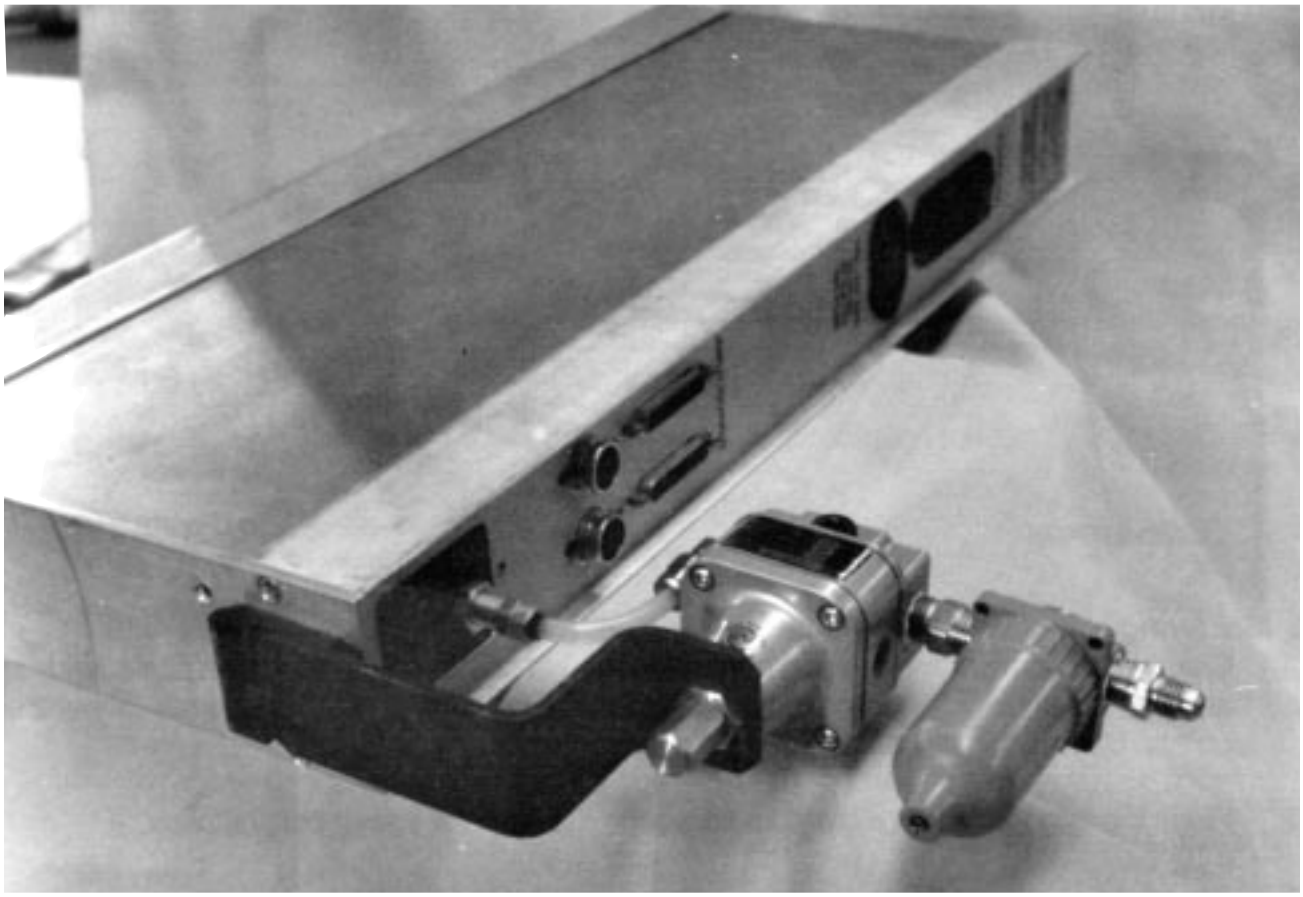


Connect the main air supply (60 PSI min) to the filter input. A turn off valve or a quick disconnect should be used for this connection to enable the air line to readily be disconnected from the column. Connect the readout power connector to 100-240 VAC/50-60 Hz supply. Turn the power on, turn the air supply on.

Air Consumption
Typical air consumption for Edmunds tooling is as follows; 1.50 CFM per nozzle with the air tool inserted into a working piece part or 1.67 CFM per nozzle when the air tool is vented to atmosphere.

2-2.2 *Setting the Air Reading*
The air unit has three air amplification ranges: low, medium and high. It can be run in inch or Metric units with the high and low readings either at the top or bottom of the scale. The pin headers to control these functions are located on the A/E module and are not readily accessible to the operator. To gain access to the air amplification, inch/metric, and polarity pin headers, the module should be removed with the main power switch and air supply turned off.

1.) Remove both air lines from regulator and tooling.
2.) Unscrew the two front panel screws and carefully pull the module out.
3.) Select the proper headers and reinsert the module.

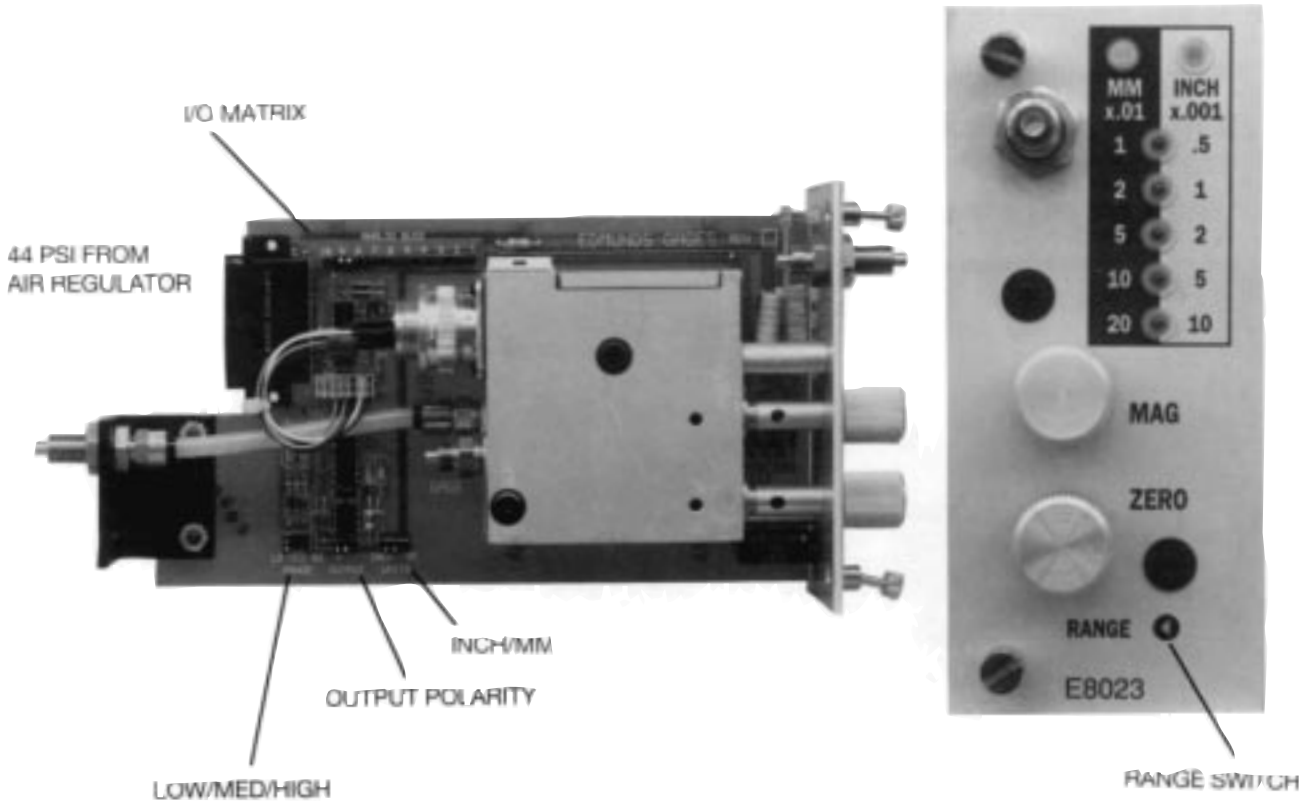


All Edmunds air tooling is marked with the full scale range for which it is intended to operate. Since overall range of air gaging is limited, the tooling is designed to operate on one scale only.

Unauthorized switching of ranges may affect the performance and linearity of the tooling. The tooling should be used with the following magnifications:

Marked Range	**Air Amplification**
.010” /0.2mm	Low
.005” /0.1mm	Low
.002” / .05mm	Med
.001” / .02mm	Med/High
.0005”/ .01mm	High

To set the range of the module on the bargraph, turn the front panel range switch to required position using a small screwdriver inserted thru the front panel.



2-2.3 *Mastering*

1.) Check the two master sizes and determine the set points on the bargraph scale. With an air plug, the smaller size is on the bottom. Set the pointers on the side cursor to the 2 set points. Usually this will be with zero in the middle.

2.) Place the large-sized, or maximum ring gage master over the air plug nozzles.

3.) Adjust the top knob (M) to align the column with the to pointer.

4.) Place the minimum ring gage master over the air plug nozzle.

5.) Note carefully the deviation between the column position and the minus ("-") pointer position. Adjust bottom knob "Z" so that the column passes the minus ("-") pointer and overcorrects by a distance approximately 3 times the deviation just noted when using low amplification.
NOTE: Medium amplification has a correction factor of 10 times. High amplification has a correction factor of 30 times.

6.) Adjust the top knob "M" to align the column with the minus ("-") pointer.

7.) Repeat steps 2 to 6 until the maximum and minimum ring gage masters bring the column in line with the plus ("+") and minus ("-") pointers, respectively.

If the module has limit lights, adjust the Cal. high and Cal. low to the set points. These may also be used instead of the cursor points and should be preset before mastering the gage for ease of setup. (See *Setting Limit Lights*.)

2-2.4 *Setting to Tooling other than Supplied by Edmunds*

The Trendsetter™ will operate with just about any brand of air tooling, regardless of the system for which such tooling was originally designed. Use of the Trendsetter™ with tooling manufactured for a type of system other than Edmunds, may require some trial and error to determine the best air amplification choice for the most stable and linear readings.When tooling (from another system) is being used with the column, the scale and magnification must be altered to suit that particular tooling.

Flow system tooling, which has a very shallow nozzle drop, will show very high magnification when used on a Trendsetter™. This might necessitate a change to a lower air amplification on the 3 range pin header.

Differential type tooling will show a slightly lower magnification than the restriction bleed tooling, and may possibly require a high air amplification setting.

To setup these types of tooling, the following steps should help: gently close off the zero "bleed" knob and mag restriction knob; taking care not to screw in too tightly. With the max. master on the tooling, the column should be off scale at the bottom or top, depending on I.D. or O.D. readings. Slowly unscrew the mag knob until the column comes on scale. Stop at the mastering point on the scale. The gage has been set to its highest possible magnification for this tooling. Replace the max. master with the min. The column will move to a new position. If it is not at the min. mastering point, the magnification is not sufficient for this setup. In this case, shut the unit down, turn off air and electric supply, remove the module and switch to the next higher air amplification using the range pin header.

The maximum that either knob can be unscrewed is approximately five turns before the system becomes unstable. This may occur before, depending on the air flow required to operate the tooling, and will be clearly shown by column instability. None of these situations will occur when using normal restriction bleed type tooling, as provided by Edmunds. The air circuit is completely compatible with Edmunds E series air gages.

3.0 DETAILED DESCRIPTION
E8000 - MAIN FRAME ASSEMBLY

3-1 Functional Description - Rev. D.

The E8000 Main Frame Assembly is the focal point for the various plug in modules associated with the Trendsetter™ system.

The Main Frame provides mechanical support, interface wiring, I/O connections, power supplies and a bargraph readout.The Main Frame measures 21.25” high, 2.50” wide, 9.00” deep. Cabinet construction is aluminum.

An internal power supply generates +/- 15 VDC regulated at +/- 1 AMP, and + 5 VDC at 3.0 amps. These voltages drive the display board electronics, and any combination of plug in modules.

The power supply is of the universal type, in that it automatically adjusts to any line voltage from 100 VAC to 240 VAC, 50/60 Hertz.

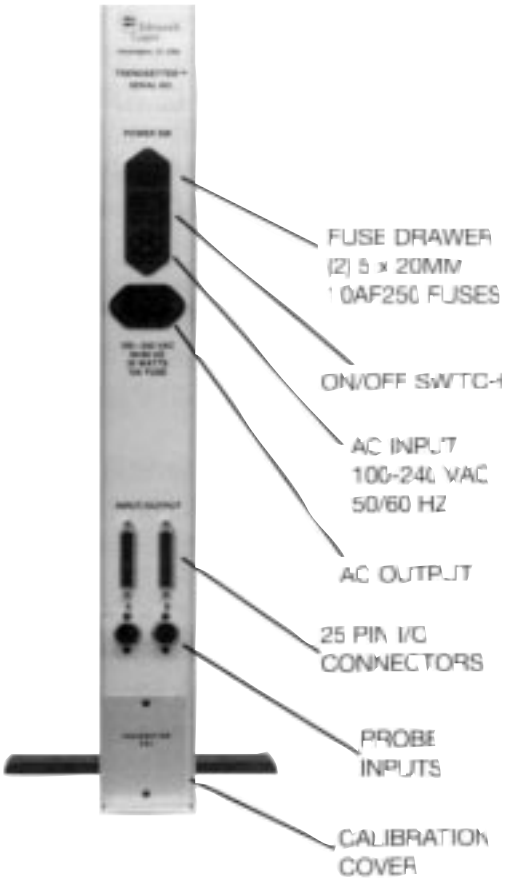
Power consumption is 35 watts maximum. 15 watts is more typical and will drive a full compliment of plug in modules.

A 10 inch, 101 point bargraph display is the primary means of readout. The 101 points give a readable resolution of 1%. Digital scale readouts are placed alongside the bargraph display for ease of interpreting scales. Range switches on various modules, have encoding logic which supplies range information to a numeric display library.

Additionally a 10 position dip switch, located inside the rear panel and adjacent to the I/O connectors, provides a simple means for enabling any lower bay high level output signal to reach the 10 line analog buss. The dip switch numbers correspond to user programmable lines 1-10.

Upper Bay Modules

If the gage is to be used without an upper module, a jumper must be installed from pin 13 to pin 15 on the upper 15 pin socket. However, if a module is to be installed, check that the jumper is removed.



CAUTION! ***OBSERVE HIGH VOLTAGES PRESENT WITHIN TRENDSETTER™ CABINET***

Main Frame Calibration

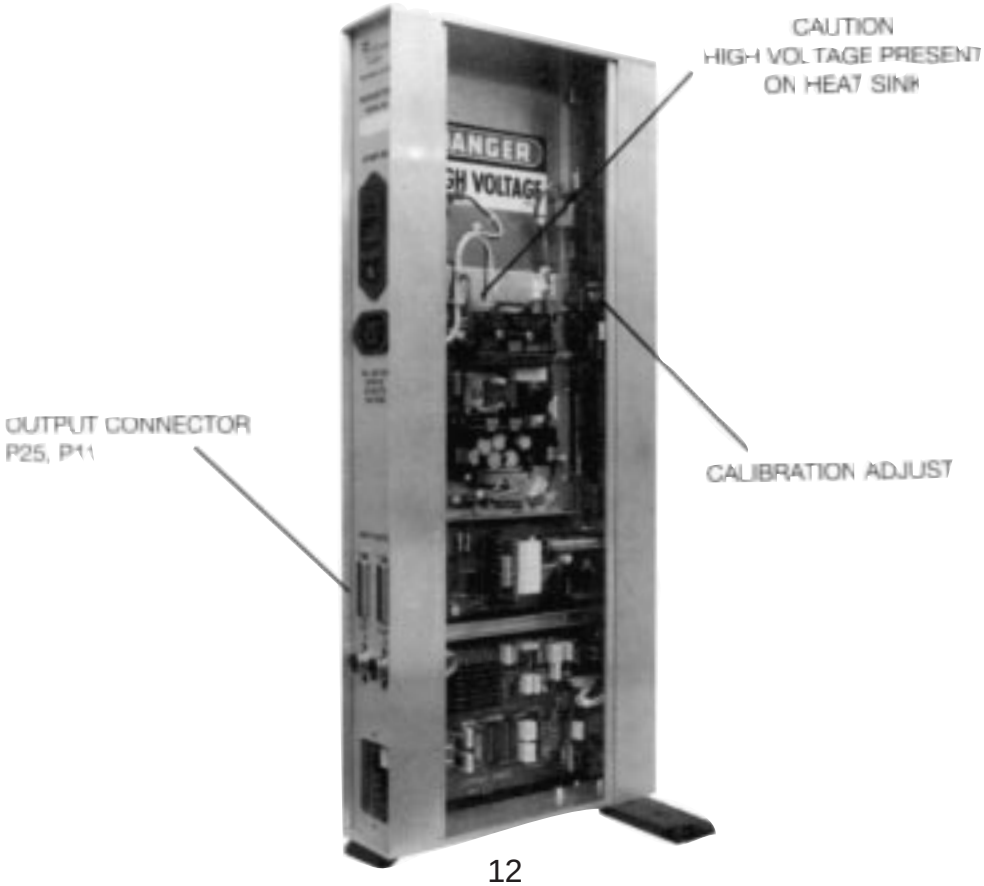
Calibration consists of furnishing a +/- 2.500 volt input to the display card, and adjusting the gain pot. Before attempting, remove all plug-in modules, and ***observe all high voltage safety precautions***.

1. Completely remove all AC power.
2. Facing the instrument, remove the top and left hand side covers.
3. Re-connect AC power.
4. Energize the instrument and allow to warm-up for a period of 5 minutes.
5. Apply + 2.500 volt signal to P25 of output connector, and D.C. common to P11, and adjust gain pot for full scale.
6. Repeat step 5 with - 2.500 volt, and readjust if necessary.
7. Repeat step 4-6 until +/- full scale and center zero have been set.

Repair

Most integrated circuit components located on the display card are socket mounted for ease of service. The seven segment digital readouts and bargraph displays are easily replaced should a failure occur. To replace these components:

1. Completely remove all AC power.
2. Remove top cover plate.
3. Remove 2 screws holding pointer rail assembly.
4. Slide out plastic display bezel.
5. Unplug connectors. Slide display assembly out of case.
6. Remove faulty component and replace with spare.
7. Re-assemble in reverse order.



The Common Buss

On an application that requires the output of a measuring head to be fed into more than one column for adding, averaging, checking clearance, etc., the output signal from the column is fed into a common buss wired to the 25 pin I/O connectors. A 25 pin connector cable is plugged into each of the columns and feeds the signal into all columns where it may or may not be used (as required). See matrix switching and examples.

Rear Panel 25 Pin I/O Connector Assignments

Pin Number	Input Connector	Output Connector
1	Analog Output 1	"
2	Analog Output 2	"
3	Analog Output 3	"
4	Analog Output 4	"
5	Analog Output 5	"
6	Analog Output 6	"
7	Analog Output 7	"
8	Analog Output 8	"
9	Analog Output 9	"
10	Analog Output 10	"
11	Analog Common	"
12	High Output Comparator	"
13	Good Output Comparator	"
14	Low Output Comparator	"
15	Write/Disable	"
16	Reset	"
17	NC	"
18	NC	"
19	NC	"
20	TIR Reset	"
21	NC	"
22	NC	"
23	NC	"
24	Isolated Common	"
25	NC	High Level Output

NC = No Connection

E8001 - LIMIT LIGHT MODULE

3-2 *Functional Description*

The E8001 limit light module electronically compares a lower bay input signal, against two operator calibrated set points. The E8001 module sorts the input signal into one of three classes.

1. **Over** — Input signal is greater than the high limit setpoint.
2. **Good** — Input signal is less than high limit, greater than low limit setpoint.
3. **Under** — Input signal is less than the low limit setpoint.

High Limit Setpoint

This control pot is located on the front panel and is adjustable using a screwdriver.

Low Limit Setpoint

Similarly, operator calibration of this control determines the low limit setpoint.

Mode Switch

The front panel mode switch has four functions.

1. **Cal Low** — When set to this position the readout displays the position of the low limit setpoint.
2. **Cal High** — When set to this position the readout displays the high limit setpoint.
3. **Man Run** — This is the most frequently used position of the mode switch. When in this position, the limit lights (over, good, under) follow the instantaneous value of the lower bay module. This position disables the remote interface.
4. **Auto Run** — This position of the mode switch is used in conjunction with semiautomatic gage fixtures and enables the remote interface.

Setting Limit Lights

The limit light module is common to the electronic and the air/electronic units and the same setting procedure applies. Be sure that the column range switch is set to the correct position. Determine the high and low limit points that are to be set. Set the mode switch to Cal. low and with a screwdriver, turn the low set adjust screw and bring the column reading up to the predetermined low limit size.

Turn the mode switch to Cal. high and, with a screwdriver, turn the high set adjust screw and bring the column reading up to the desired high limit size. The column limit lights are now set. If the Trendsetter™ is being used on a simple fixture, turn the mode switch to “manual run”. In this mode, the limit lights will go on and off as the Trendsetter™ passes the preset points.

Remote Interface — Two user control lines present on the I/O connectors located on the rear panel of the Trendsetter™ mainframe, allow an external controller to command four special operating modes. These modes are as follows:

1. **Reset** — All latches cleared, limit lights and logic outputs off.
2. **Follow** — Same as manual run, limit lights and logic outputs follow the signal input.
3. **Latch and follow** — Limit lights and logic outputs follow signal input and latch any over or under excursions. Latches are cleared by returning to either reset or follow mode.
4. **Hold** — Limit lights and logic outputs are locked into their present status, and ignore all signal input. This condition is cleared by returning to reset or follow mode.

To activate these special modes, turn the function switch to Auto Run position.
Determine the desired function and, using the truth tables, apply a 5-24 VDC command to the I/O pins listed. These signals must be positive with respect to user common P24.

0 = Off State
1 = On State

Truth Table - Rear Panel I/O

P15 Write Disable	P16 Reset	Function
Off 0	Off 0	Follow (default)
Off 0	On 1	Latch and Follow
On 1	On 1	Hold
On 1	Off 0	Reset

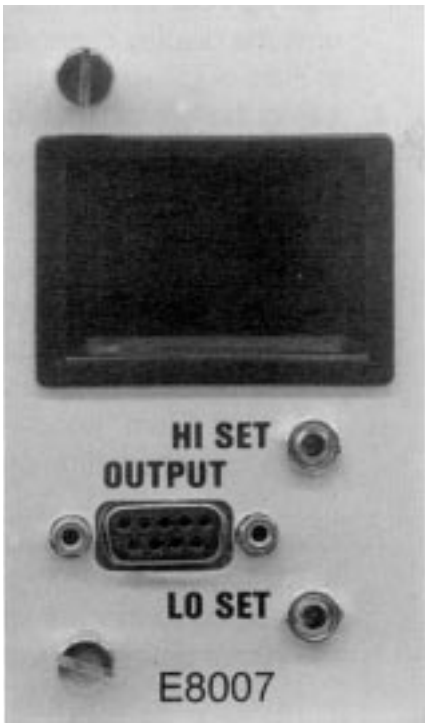
Outputs
Three optically isolated outputs, representing over, good, and under, are available to the user through the rear panel I/O connectors. The outputs are open collector NPN OPTO transistors, whose emitters are referenced to user common P24.

The transistors may be pulled to a maximum of 24 VDC. Their main function is to interface to the E8204 relay interface cabinet.

OUTPUT CODES REAR PANEL I/O

Condition	P12 Over	P13 Good	P14 Under
Under	Off 0	Off 0	On 1
Good	Off 0	On 1	Off 0
Over	On 1	Off 0	Off 0

3-3 *Functional Description*



The E8007 multipoint classifying module monitors analog data from lower bay signal conditioning modules and digitizes these signals into a two digit, seven segment display.

Input signals are conditioned using the high set, low set pots. This allows the user to compress or expand the specified display information over any portion of the Trendsetter™ scale.

A front panel output connector provides an interface to programmable controllers or external logic. The connector's output is custom programmed to a user specified code. The electrical output code is current sourcing and has a resolution of 8 bits. To utilize this function, a customer supplied external power source is required. The power supply's positive output is connected to Pin 9 of the module. The power supply ground is referenced to the load.

Controls

Adjustments

The Low and High set adjustments on the front of the E8007 module require the use of a small flat blade screwdriver. The Low Set adjusts the magnification or spread of the display and the High Set adjusts the zero position of the display.

Magnification is increased when the Low Set screw is turned in a clockwise direction, and is decreased when turned in a counter-clockwise direction. The numerical display of the E8007 does not reflect the change in magnification that occurs when the Low Set screw is turned. A trial and error method will be employed until the operator obtains a feel for the amount of adjustment required.

Set Up Procedure

1. Place either master into the gage.

2. Using the *"Zero"* knob on the Trendsetter™ lower bay module, set the bargraph display to the lowest position on scale where classifying is to begin.

3. Adjust the High Set screw to display the first classification character being utilized. Example: If **“0”** is the lowest classification point, adjust the display to read **“00”**. Rotate the High Set screw until the display changes to **“UU”**. Now rotate the High Set screw until the display changes back to **“0”**.

4. Using the *“Zero”* knob on the Trendsetter™ lower bay module, set the bargraph display to the highest position on scale where classifying is to end. If the character displayed on the E8007 is larger than desired, the magnification is too large. If the character displayed is smaller than desired, the magnification is too small.

5. Depending on the type of adjustment required turn the Low Set screw 5 turns in the respective direction required. (Clockwise to increase, Counter-Clockwise to decrease)

6. Using the *“Zero”* knob on the Trendsetter™ lower bay module, set the bargraph display to the lowest position on scale.

7. Using the *“Zero”* knob on the Trendsetter™ lower bay module, set the bargraph display to the highest position on scale where classifying is to end. If the character displayed is correct, no further adjustments are needed. If the character displayed is in error, repeat the above procedure until the display characters correspond to the bargraph settings.

Electrical Connections, Front Panel Connector

Pin	
1	Output Bit 1
2	Output Bit 2
3	Output Bit 3
4	Output Bit 4
5	Output Bit 5
6	Output Bit 6
7	Output Bit 7
8	Output Bit 8
9	+ External customer supplied power source

External logic signals may command the E8007 module to be placed into a holding mode, which corresponds to the hold command of the E8001, E8011, E8024 modules. (See below truth table)

0 = Off State
1 = On State

P15 Write Disable		P16 Reset		Function
Off	0	Off	0	Follow (Default)
Off	0	On	1	Hold
On	1	Off	0	Hold
On	1	On	1	Hold

E8011 - FIVE POINT LIMIT LIGHT MODULE

3-4 *Functional Description*

The E8011 module compares four precalibrated setpoints against a lower bay signal and sorts the signal into five classes. The five classes are defined as follows:

1. **Over** — input signal is greater than high limit.
2. **Approach** — input signal is between good and high limits.
3. **Good** — input signal is between approach limits.
4. **Approach** — input signal is between good and under limits.
5. **Under** — input signal is less than under limit.

Logical outputs representing the status of the limit lights are connected to the 25 pin I/O buss.

Controls

High, low, approach setpoints are located on the front panel and adjusted with a screwdriver. To calibrate a setpoint, select the desired setpoint using the mode switch. With a small screwdriver adjust the associated 22 turn pot. The bargraph display will indicate the position of the setpoint.

To ensure a successful operation: the low setpoint must be less than the low approach setpoint, the low approach setpoint must be less than the upper approach setpoint, the upper approach setpoint must be less than the high setpoint.

Mode Switch

The front panel mode switch has six positions.

1. Cal. Low - see above
2. Cal. Low approach - see above
3. Cal. Upper approach - see above
4. Cal. High - see above
5. Man. Run - This the most frequently used position of the mode switch. When used in this position, the limit lights follow the instantaneous value of the lower bay module. This position disables the remote interface.
6. Auto Run - This position of the mode switch is used in conjunction with semiautomatic gage fixtures.

Remote Interface — Two user control lines present on the I/O connectors located on the rear panel of the Trendsetter™ mainframe, allow an external controller to command four special operating modes. These modes are as follows:

1. **Reset** — All latches cleared, limit lights and logical outputs off.

2. **Follow** — Same as manual run. Limit lights and logic outputs follow the input signal.

3. **Latch** — Limit lights and logic latch the most positive and excursion of the analog input. Latches are Follow cleared by returning to reset or follow modes.

4. **Hold** — Limit lights and logic are locked into their present status and ignore any signal input. This condition is cleared by returning to reset or follow mode.

To activate any of these special modes, turn the function switch to the auto run position. Determine the desired function and, using the truth table, apply a 5-24 VDC command to the I/O pins as listed. These voltages must be positive with respect to user common P24.

0 = Off State
1 = On State

Truth Table Rear Panel I/O

P15 Write Disable	P16 Reset	Function
Off 0	Off 0	Follow (Default)
Off 0	On 1	Latch
On 1	On 1	Hold
On 1	Off 0	Reset

Outputs
Three optically isolated outputs, representing over, good, under, and approach are encoded and available to the user through the 25 pin I/O connectors (See Table). The outputs are open collector NPN OPTO transistors whose emitters are referenced to user common P24 of the I/O connector. The transistor may be pulled to a maximum of 24 VDC.

Output Codes Rear Panel I/O

Condition	P12 Over	P13 Good	P14 Under
Under	Off 0	Off 0	On 1
Under Approach	Off 0	On 1	On 1
Good	Off 0	On 1	Off 0
Over Approach	On 1	On 1	Off 0
Over	On 1	Off 0	Off 0

3-5 *Functional Description*

The E8023 Air/Electronic module converts pneumatic pressure from air gage tooling, into a calibrated electrical signal.

The module contains an air/electronic transducer assembly, three selectable fixed gains, polarity reversal, inch/mm selection, a 10 position pin header allowing access to the I/O busses, and a 5 position range encoding switch to signal the readout display.

Two 3/8” bulkhead fittings provide a convenient means for attaching the air supply and air gage tooling to the module.

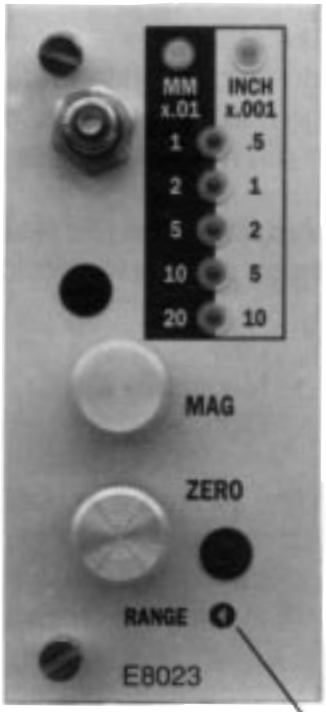
Controls

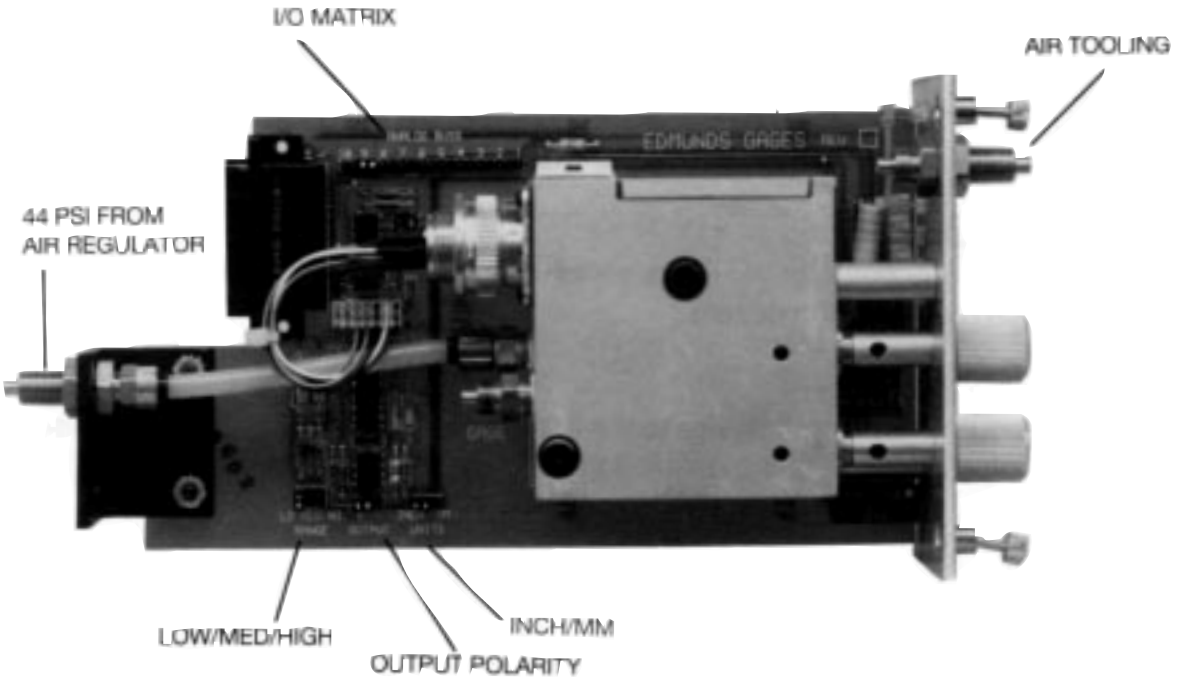
Mag Adjustment

Mag adjustment is carried out by means of a pneumatic needle valve assembly which is part of the A/E transducer assembly. The needle valve has a useful travel of 5 turns.

Zero Adjustment

Zero adjustment is also a needle valve assembly, with a useful travel of 5 turns.





Range Switch
The range switch is a front panel screwdriver adjustable control that provides an encoded range signal to the Trendsetter™ mainframe, and illuminates one of five front panel range indicators. The switch has no stops and may be rotated through 360° of travel. The E8023 module has 5 inch/5mm full scale ranges. They are as follows:

.0005 inch/.01mm
.001 inch/.02mm
.002 inch/.05mm
.005 inch/.1 mm
.010 inch/.2 mm

Unlike other signal conditioning modules, the range switch of the E8023 has no effect on the modules magnification. Rotation of this switch results in different display presentations only. Magnification and zero are controlled by the mag and zero needle valves and the 3 position gain pin header.

Air Amplification Pin Header
The gain pin header provides three fixed stages of amplification.

Low - 1 x
Medium - 2 x
High - 5 x

The low and medium positions of the gain pin header will allow calibration of most air tooling. As a rule of thumb, attempt to calibrate the air tooling in the low position. If you are unable to set the magnification or if the dynamic response of the air signal is too slow, use the medium position to obtain the desired characteristics.

The high position is reserved for special high mag applications and should be used with caution, as it may be impossible to calibrate standard applications. (See chart on page 15 for normal suggested air amplification settings)

Polarity Pin Header
Increasing air pressure at the tooling will cause the readout to move upwards when the polarity pin header is in the (“+”) position. The opposite occurs with the pin head in the (“-”) position. This switch is useful for setup changes between inside and outside diameters applications.

Inch/MM Pin Header
This header in conjunction with the range switch determines the presentation of display readout. It has no effect on magnification or zero.

Buss Enable Pin Header
The E8023 module is an output device to the I/O system buss. A 10 position pin header is provided to make the output of the E8023 available to the 10 line system buss.

3-5.1 *Air/Electronic Maintenance*

Maintenance of the A/E transducer may be required if there is extreme difficulty in setup or erratic readings on the Trendsetter™.

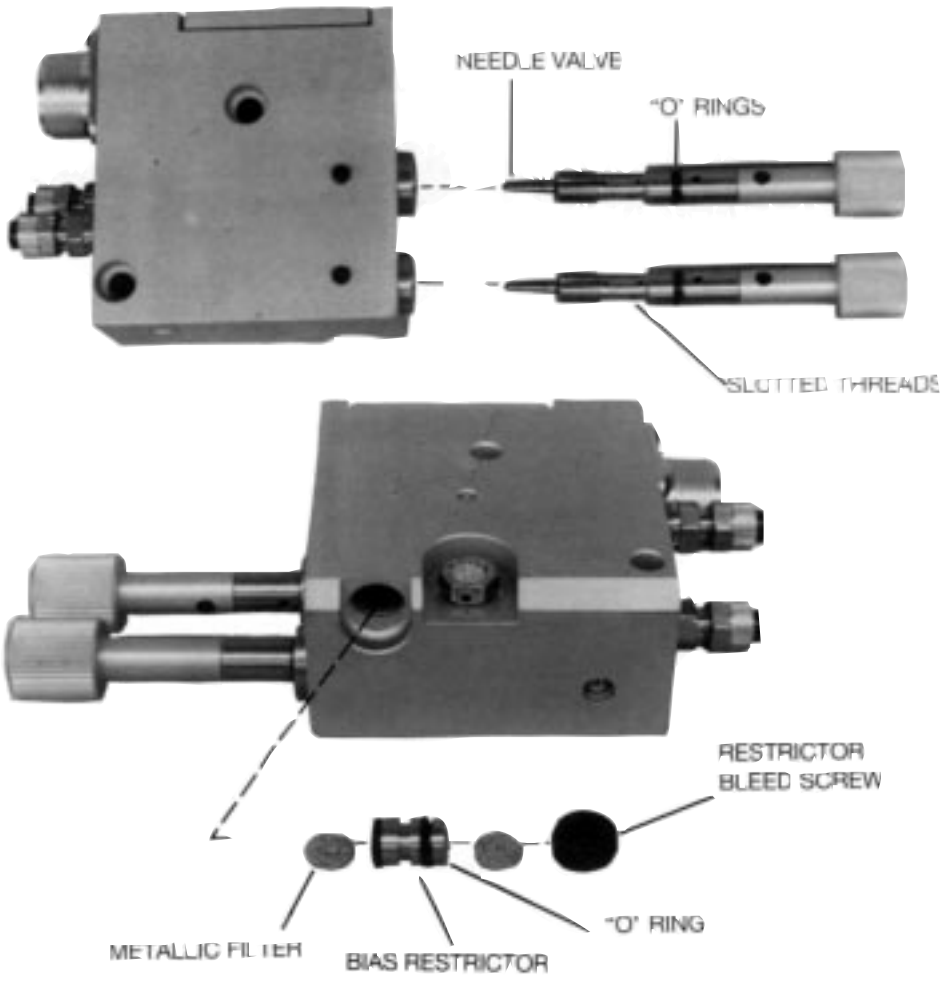
Mag & Zero Needle Valves

If oil is present, it is helpful to clean out each needle valve. With the gage set on a master, unscrew the mag knob (M) and remove. Allow the air to blow freely. Inspect the “O” ring on the needle valve body: replace if necessary. Reinsert the mag needle valve and screw down until the point on the Trendsetter™ scale comes back to the master point. Repeat the procedure on the zero knob. By only cleaning one needle at a time, the gage setting is not lost. Re-check the mastering points before gaging.

Bias Restriction

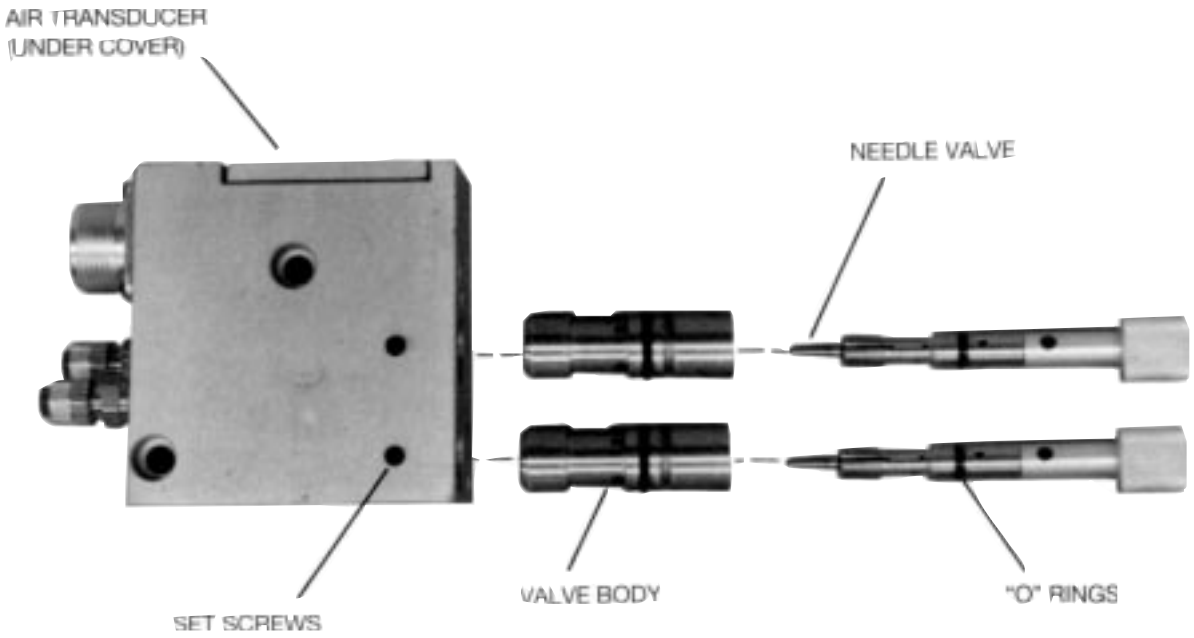
Remove bias bleed screw and metallic filter. Insert #1/4-28 screw into dropping resistor and pull out restrictor assembly. Remove bottom metallic filter. Wash out in cleaning spirits. The dropping resistor holes may be cleaned out (very carefully) with a sharp toothpick if necessary. Blow dry from central hole in restrictor assembly, and reinsert components in reverse order.

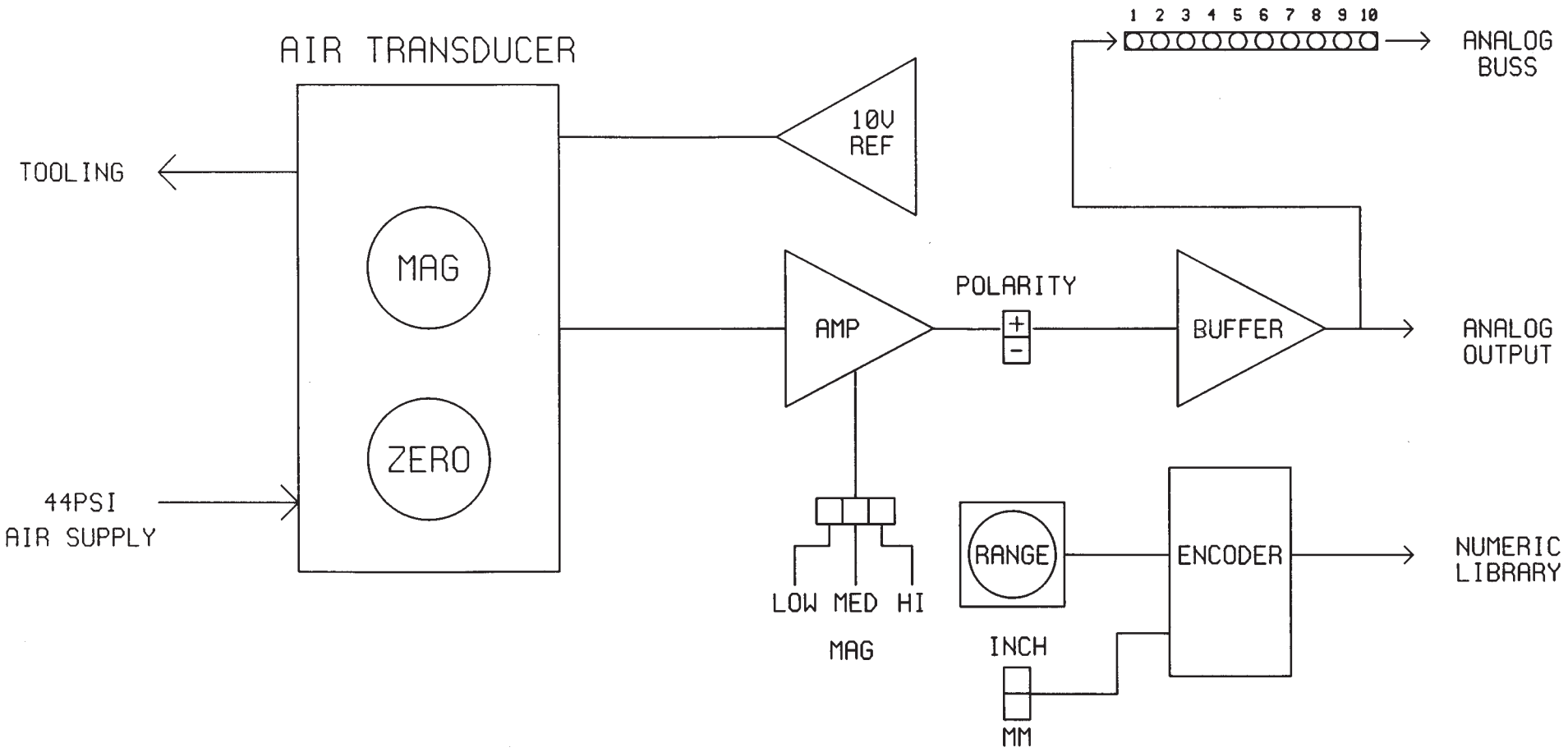
When an extremely dirty air condition is encountered, it may be necessary to remove the needle valve assembly and clean it. Unscrew the set screw holding the valve assembly. Pull out the complete valve assembly. Unscrew the needle body, clean and inspect the “O” ring. Check the “O” ring on the outer valve body and also at the bottom of the bore in the aluminum restriction block. If they have deteriorated, replace.



Re-assemble the needle to the body. If the threads appear to be loose, carefully spring the split threads open. This is best done using the wedge effect of the screwdriver tip. Pick one so that the spread is only slightly larger than the existing slot and do not over bend.

With the valve assembled and all “O” rings in position, reinsert the valve, taking care to go slowly so as not to nick the top “O ring, as it passes the set screw hole. If pressure is felt to build up and suddenly release during insertion, the “O” ring may possibly be cut. Pull out, inspect and replace if necessary. Push assembly down hard to seat the bottom “O ring, tighten the set screw to retain.



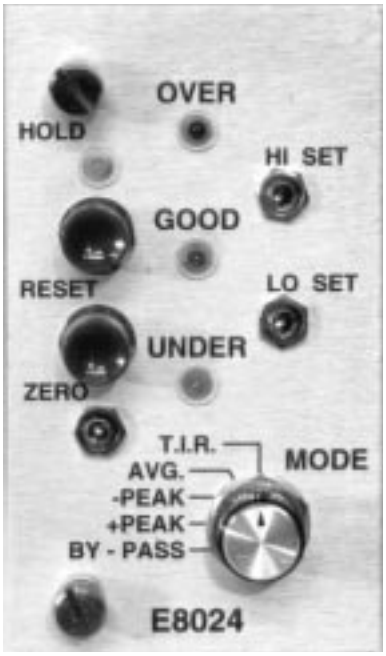


BLOCK DIAGRAM E8023 AIR/ELECTRONIC MODULE

E8024 - PEAK DETECTOR, TIR MODULE WITH LIMIT LIGHTS

3-6 *Functional Description*

The E8024 peak detector, average, TIR module, accepts a lower bay signal source and stores its value as a peak or TIR in analog memory. The contents of this memory are then displayed on the bargraph readout.



In addition, the E8024 module has “Good”, “Under”, and “Over” limit lights, which detect signals that have exceeded the calibrated set point.

This module is installed in the upper bay and will operate with any lower bay module.

The E8024 is used on applications which require a measurement of a dynamic signal such as concentricity, out of round, etc., and is usually read as a total indicator reading (TIR). A TIR signal on a basic Trendsetter™ column will cause the bargraph to move up and down, requiring the operator to note the highest and lowest readings and calculate their difference to determine if the part is within tolerance.

With the E8024 TIR module, the column bargraph will rise from the preset bottom starting point and will remain at its highest reading, showing the total reading. As this total reading is displayed, the limit lights can also be utilized to facilitate the decision making process for the operator.

Along with the ability to display the total reading of a runout, the E8024 can be used to display either a “+” or “-” peak signal. This feature is equally useful as TIR and is typically used as follows:

In matching an I.D. and an O.D., out of round is always present to some extent. The E8024 module will take into account the mininum bore size and maximum shaft size caused by any out of round condition and will enable the correct clearance to be computed for the maximum material condition. The roundness reading will, of course, depend on the gage geometry and may require a three point O.D. check to eliminate the effects of three point lobing, etc.

In a typical setup, the I.D. and O.D. would be gaged in two fixtures, either air or electronic contact, and the values displayed on two columns operating in the “Peak” mode. Each part would be rotated once in the fixture. The I.D. column would latch on the minimum (“-” peak) reading, the O.D. column would latch on the maximum (“+” peak) reading. These two signals can now be compared in a third Trendsetter™ column equipped with a Sum & Difference module (E8026) and the actual clearance at maximum material condition can be displayed. This system will completely eliminate operator decision making in determining the actual maximum and minimum readings.

Controls

Mode Switch

Through the mode selector switch one of five operating modes may be selected. They are as follows:

1. **Bypass** — This mode allows input signals to pass from the various signal conditioners to the bargraph readout without any interaction from the E8024 module. This mode is used

utilized during gage setup and calibration operations.

2. **+Peak** — When in this mode, the module will store and display the most positive instantaneous value presented to its input.
3. **-Peak** — When in this mode the module will store and display the most negative instantaneous value presented to its input.
4. **Average** — When in this mode, the module will store and display the average value of the signals presented to its input.
5. **TIR** — When switched to the TIR mode, the module will store both the "+" and "-" peaks. The two peaks are then algebraically summed together and displayed as TIR on the bargraph. A logic signal is also transmitted to the E8000 mainframe which calls out a special zero bottom TIR scale.

Zero Control Potentiometer

The zero control is active during the TIR mode only. Its purpose is for repositioning the bargraph display to its new TIR "Zero" which has been electronically shifted to the bottom of the scale.

Hold Push Button

When activated, the hold push button will latch a peak or TIR signal into memory. The hold mode is indicated by the yellow LED above the hold push button. This feature is disabled in the bypass mode.

Reset Pushbutton

Depressing the reset push button clears the module memory of all information and resets the hold mode logic.

Setting the E8024 Module Zero

Connect the Trendsetter™ column to the gaging fixture. Turn the mode switch to the "Bypass" mode. Using the max and min masters, set the magnification and zero as previously described. Install one of the masters in the gage fixture so that the bargraph is on scale. Rotate the Mode Switch to the TIR position. The bargraph scale "Zero" will automatically move to the bottom position. This will allow for maximum scale utilization as the reading of TIR by definition cannot be negative. Push the Reset Push Button to clear the memory of the module. Insert a small blade screwdriver into the Zero Control Potentiometer and rotate it to set the scale to the desired start point. The start point is the point to which the display will return upon pushing the Reset Push Button, and also the starting point from which the TIR reading is taken. The start point is normally set to zero, but can be set to any point on the scale as desired.

In operation, as the signal can start anywhere on the part, the positive signal will drive the bargraph display upwards. Any negative signals are inverted and also displayed as a positive signal. Thus the bargraph display will always move up from the set point and will stop at the highest point.

Setting The E8024 Limit Lights

Rotate the Mode Switch to the "Bypass" mode. Install the maximum master in the gage fixture. Rotate the zero knob on the lower signal conditioning module until the bargraph displays the maximum limit point. Insert a small blade screwdriver into the Hi Set Potentiometer and rotate it until the Red limit light is lit. Install the minimum master in the gage fixture. Rotate the zero knob on the lower signal conditioning module until the bargraph displays the minimum limit point. Insert a small blade screwdriver into the Lo Set Potentiometer and rotate it until the Amber limit light is lit.

E8024 TIR Operation

Install a part into the gage fixture. Press the Reset Push Button. Rotate the part 360 degrees. The bargraph display will rise and stop at the maximum TIR reading. If the reading is in excess of the maximum limit light set point, the Red indicator will illuminate. Otherwise the Green indicator will remain illuminated.

+/- Peak Operation

When utilizing either the + and - peak modes, rotate the Mode Switch to the desired position. The gage is set up the same as the TIR operation. Operation in the peak modes is the same as the TIR mode, except the bargraph display will have a center position zero. Press the Reset Push Button to clear the module memory. Rotate the part 360 degrees. The displayed readings will be either the maximum (+ peak) or minimum (- peak) reading obtained during part rotation.

Average Operation

When utilizing the Average mode, rotate the Mode Switch to the Avg. position. The gage is set up the same as +/- Peak operation. Operation in the average mode is the same as the +/- Peak mode. Press the Reset Push Button to clear the module memory. Rotate the part 360 degrees. The displayed readings will be the average of the readings obtained during part rotation.

Remote Interface

Two user control lines, present on the I/O connectors located on the rear panel of the Trendsetter™ column allowing an external controller to command four special operating modes as follows:

1. **Reset** — All latched readings cleared, limit lights and logic outputs off.

2. **Follow** — Normal operation, limit lights and logic output follows the signal input.

3. **Latch & Follow** — Limit lights and logic output follow the signal input and latch on any over or under excursions. Latched readings are cleared by returning to either Reset or Follow Mode.

4. **Hold** — Limit lights and logic output are locked into their present status and ignore any signal input. This condition is cleared by returning to either Reset or Follow Mode.

The remote interface is active for all positions of the Mode Switch. To use, determine the function use the Truth Table below. Apply 5-24 VDC to the I/O pins listed. These commands must be positive with respect to the user common Pin 24.

0 = Off State
1 = On State

Truth Table - Rear Panel I/O

P15 Write Disable		P16 Reset		Function
Off	0	Off	0	Follow (Default)
Off	0	On	1	Latch & Follow
On	1	On	1	Hold
On	1	Off	0	Reset

Outputs

Two optically isolated outputs, representing over and good are available to the user through the I/O connectors located on the rear panel of the Trendsetter™ column. The outputs are open collector NPN OPTO transistors whose emitters are referenced to user common Pin 24. The transistors may be pulled to a maximum of 24 VDC.

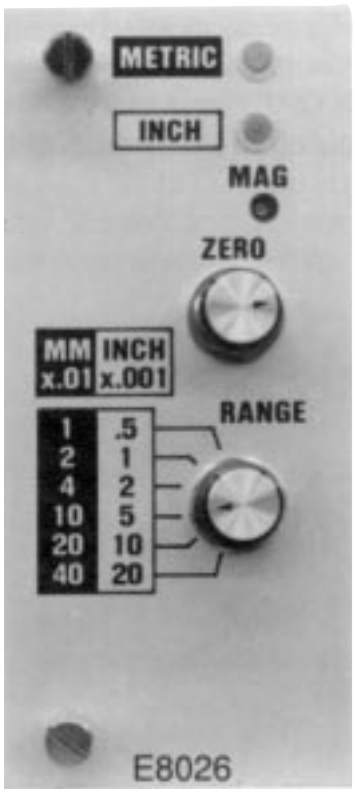
OUTPUT CODES REAR PANEL I/O

Condition	P12 Over	P13 Good	P14 Under
Good	Off 0	On 1	Off 0
Over	On 1	Off 0	Off 0
Under	Off 0	Off 0	On 1

E8026 - SUM AND DIFFERENCE MODULE

3-7 Functional Description

The E8026 is a 6 input, 6 range sum and difference module. The unit accepts input signals from the I/O analog buss and is capable of processing signals from different sources.



Sum and Difference Module

This unit is specifically designed to accept signals from other columns; process them, and display the result. This module mounts in place of the electronic amplifier or air/electronic module. It can be used in conjunction with the signal lights or TIR module.

A typical application would utilize heads A and B on one column so as to measure diameter as AB. The A and B outputs are then fed into a sum and difference module and displayed as A-B. This would then provide a concentricity reading. The sum difference module is also used in match gaging here the I.D. and O.D. signals from each of two columns are fed into the sum and difference module and the result displayed as clearance.

The inputs are divided into 2 groups of three (A and B) and controls provide the following functions.

A+B
A-B
-A+B
-A-B

Other controls include front panel magnification and zero, inch/mm selection, and analog I/O switching.

Each input is adjustable, and inputs 1 and 6 have long attenuation spans.

Additionally, a switchable low pass filter is included, to limit interference which may be inadvertently injected into the measurement circuitry. Figure 1 shows the jumper configuration to de-activate the filter, while figure 2 shows the jumper configuration activated.

Controls

Range Selector Switch

This switch selects one of six inch/mm full scale ranges. They are as follows:

.0005 inch/.01 mm
.001 inch/.02 mm
.002 inch/.04 mm
.005 inch/.1 mm
.010 inch/.2 mm
.020 inch/.4 mm

Zero Control

This ten turn control allows for nulling out electrical offsets.

Figure 1

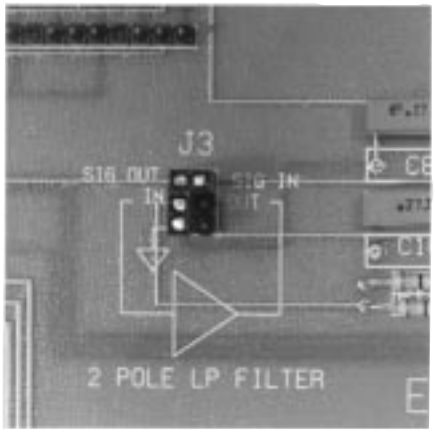
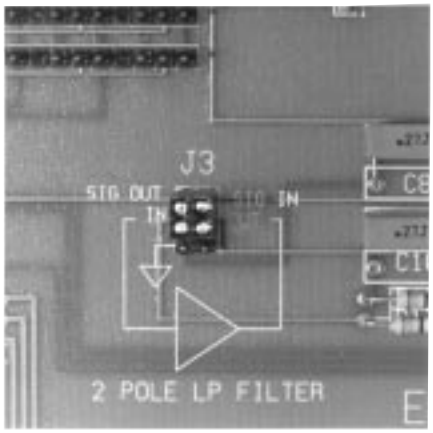
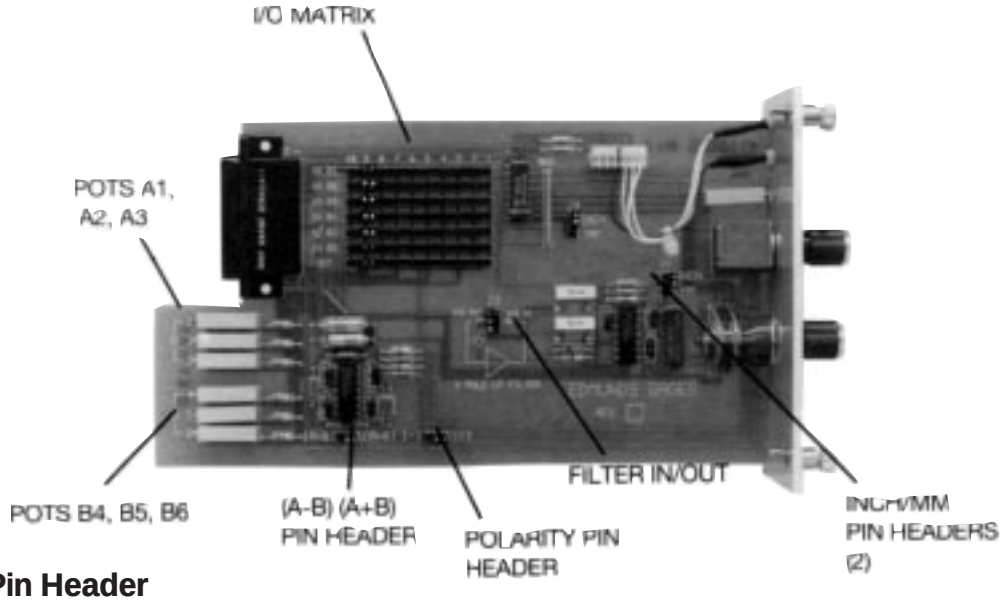


Figure 2



Front Panel Mag Adjustment

The front panel mag adjustment allows for attenuation or boost of total module gain.



(A-B) (A+B) Pin Header

This pin header determines whether the A and B input groups will be summed together (A+B), or operated in the difference mode (A-B). When used in conjunction with the polarity pin header, any of the four combinations listed below, may be established. (A+B), (A-B), (-A+B), (-A-B)

Polarity Pin Header

The polarity pin header is used for system reversals. All inputs may be inverted or presented to the system in their normal formats.

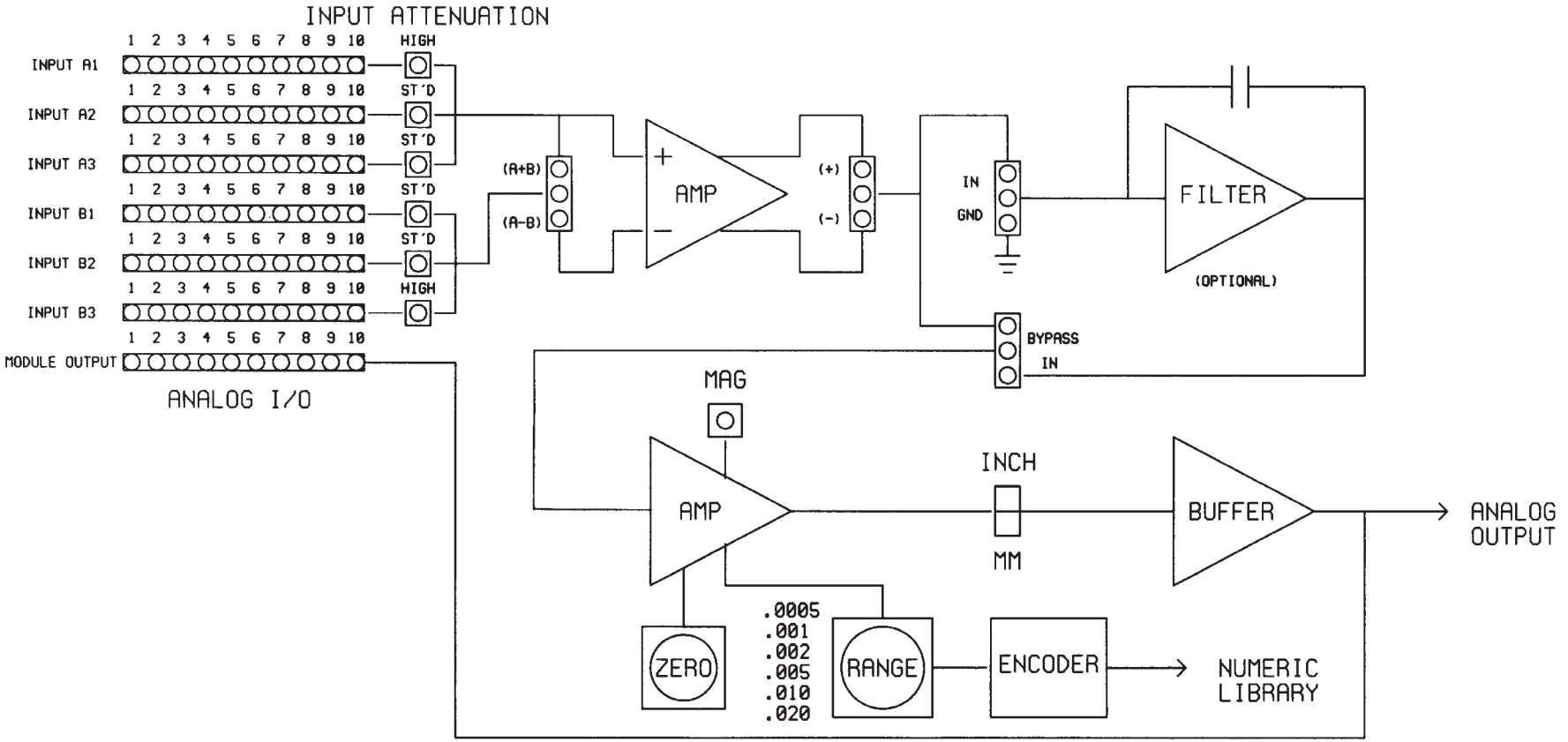
Inch/MM Pin Header

The inch/mm pin header determines the physical units in which the module will operate.

Input Mag Pots

As stated in the description, a 20 turn mag pot is connected to each of the six inputs of the module. The mag pots have an attenuation of 25:1, this allows for mixing of signals with wide differences in their magnifications or formats.

Pin Header		Function	
1	A1 Group	Input *	
2	A2 Group	Input	
3	A3 Group	Input	*Pot set for 10 times greater attenuation configurations i.e. Air/Electronic signals
4	B1 Group	Input	
5	B2 Group	Input	
6	B3 Group	Input *	
7	Combined Signals	Output	



BLOCK DIAGRAM E8026 SUM/DIFFERENCE MODULE

E8032, E8032B - LVDT SIGNAL CONDITIONING MODULES

3-8 ***Functional Description***

The E8032, E8032B are designed to supercede, the E8012, E8022, or E8022B electronic modules. Each module has a single or dual channel LVDT signal conditioning circuitry with six inch and six millimeter ranges. The units are user programmable with a variable selection setting the following conditions:

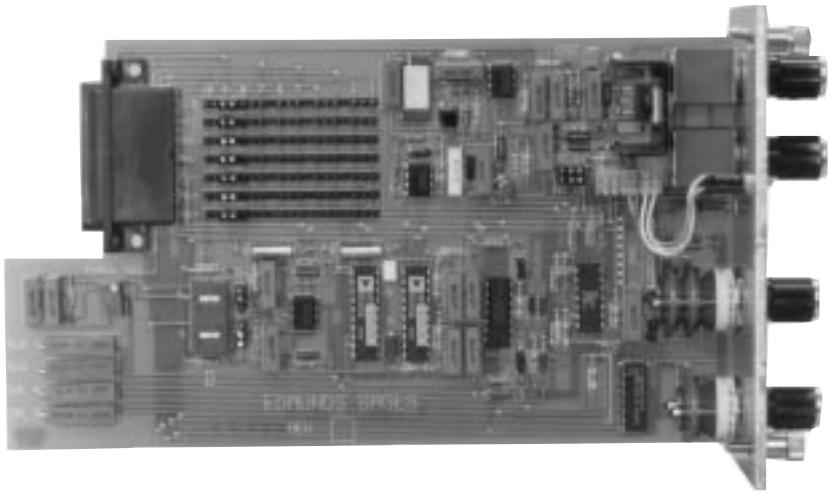
Front Panel Controls

Channel selection - A only, B only A&B combination
Range Selection:

E8032	E8032B
.0005 inch/.01mm	.005 inch/ .1mm
.001 inch/.02mm	.010 inch/ .2mm
.002 inch/.04mm	.020 inch/ .4mm
.005 inch/.10mm	.050 inch/1.0mm
.010 inch/.20mm	.100 inch/2.0mm
.020 inch/.40mm	.200 inch/4.0mm

Zero Controls A&B: The two; ten turn zero controls provide independent zeroing of the A and B channels. This function is useful when using the E8032 module to gage two unrelated setups simultaneously.

Mag Adjustment: The front panel mag adjust allows for a 20% change in the overall system magnification.



Circuit Board Level Selection

LVDT Polarity: Two toggle switches are provided to determine the direction the bargraph will travel when the LVDT cartridge is depressed. Pushing in against the plunge is, by definition, considered (+) positive displacement. Reversals are accomplished by placing these switches in the (-) negative mode.

Channel On/Off: Two pin/cap type connectors are provided to turn off/on each channel. If the E8032 is to be used solely as a single input readout it is recommended to turn the other channel off to isolate any electrical noise.

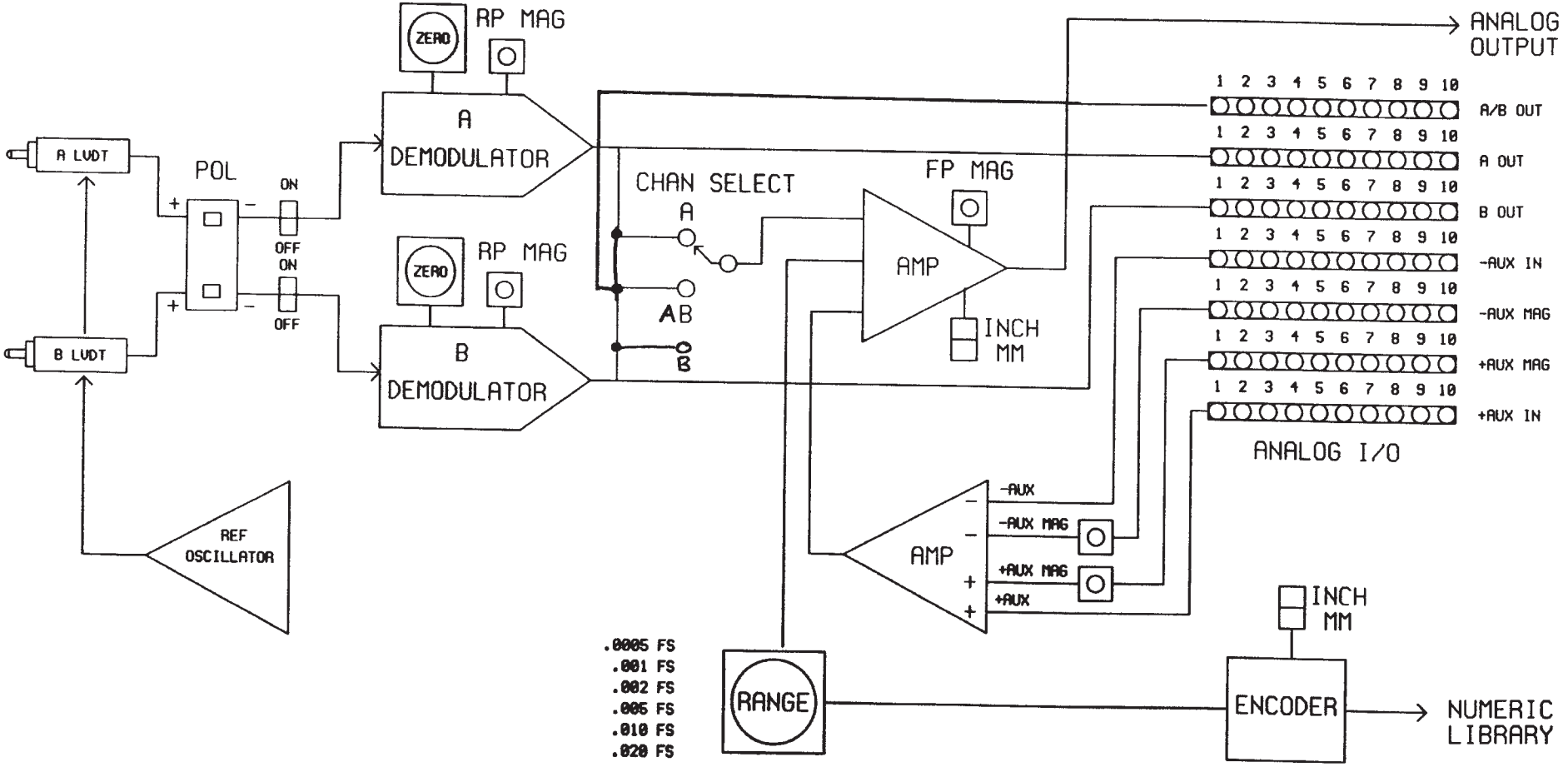
Inch/Millimeter: Two pin/cap type connectors are provided to convert the display to inch or millimeter units. It is important that both pin/cap connectors are set to the same unit of measure.

Matrix Bussing: A seven line array of pin/cap type connectors are provided to control the flow of analog information between neighboring Trendsetters™ over a common set (10) of I/O lines. Combinations can be assigned by connecting the cap to straddle any two of three pins with the signal being present on the center pin (see pin/cap example). Unused caps should be stored over a single pin only.

Available Signal	Function
A&B Channel	Output
A Channel	Output
B Channel	Output
-Aux Fixed	Input
-Aux Variable	Input
+Aux Variable	Input
+Aux Fixed	Input

Cal A, Cal B Pots: These (20) turn pots set the primary magnification of the “A” or “B” amplifier The pots affect the LVDT in the respective channel, and the respective channel output signal to the matrix switch.

Aux +, Aux - Pots: These (20) turn pots control the magnification of input signals from the I/O analog buss. They have a wide dynamic range of 25:1 which allows mixing of air/electronic signals with LVDT signals.



BLOCK DIAGRAM E8032 2 CHANNEL LVDT MODULE

E8051 - STRAIN GAGE SIGNAL CONDITIONING MODULE

3-9 *Functional Description*

The E8051 module is a single channel, strain gage signal conditioning amplifier, compatible with the Trendsetter™ mainframe. The module provides the necessary environment to signal condition a load cell or any basic 300 OHM bridge with a 2 millivolt full scale sensitivity. Included are a stable +10 volt excitation source, a high gain instrumentation front end, range, scaling, and zero control. The unit is calibrated in either pounds or kilograms.

Front Panel Controls

Range Selection
500 lbs/ 100 kg
1000 lbs/ 200 kg
2000 lbs/ 400 kg
5000 lbs/1000 kg
10,000 lbs/2000 kg
20,000 lbs/4000 kg

Zero Control

A single (10) turn zero control provides for nulling the bridge circuit of the strain gage to some convenient reference point.

Mag Adjustment

The front panel mag adjustment allows for 20% change in the overall system magnification. The control has a span of (20) turns for precise mag setting.

Circuit Board Level Selections

Polarity Reversal Jumpers

Two pin/cap jumpers are provided to select the output polarity of the strain bridge. When the jumpers are selected for normal operation, positive pressure applied to the load cell, will cause the bargraph display to move in a positive or upscale manner. Reversing the pin/caps causes the negative or downscale action.

Pounds/Kilograms Jumpers

Two pin cap jumpers select the measuring units of the system. The first jumper sets the appropriate system amplification, whereas the second jumper sets the correct digital scale presentation. The jumper sites are labeled lbs, kg.

Matrix Bussing

A single (10) position pin header allows the scaled output of the module to be interfaced with the (10) line Trendsetter™ analog buss. Stencils adjacent the pin header denote buss lines 1 through 10. Placing a pin/cap on the appropriate pin header selects the desired buss line.

CALIBRATION

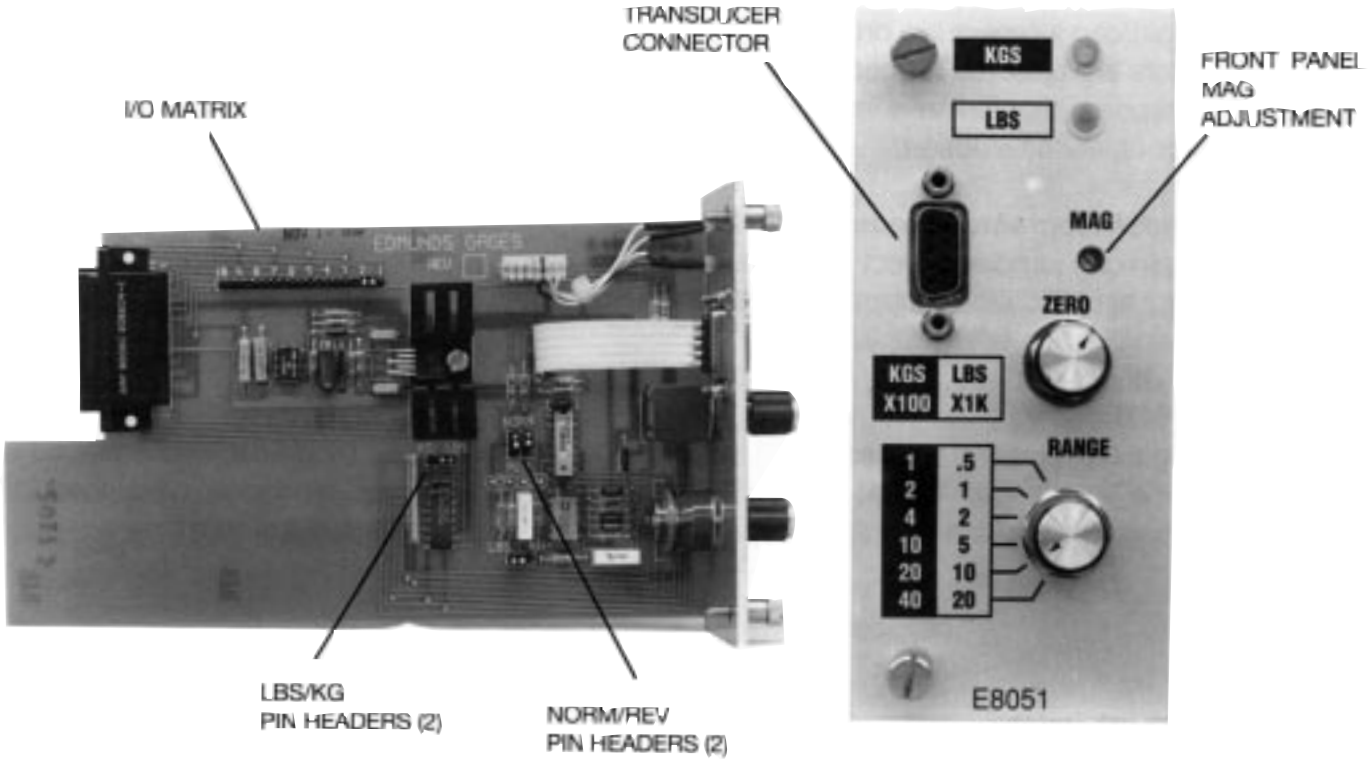
The module assumes that a 2 millivolt full scale bridge transducer is properly connected to the input (see connector wiring) with no load applied to the strain transducer. The zero adjustment should have control and be able to position the bargraph anywhere along its scale.

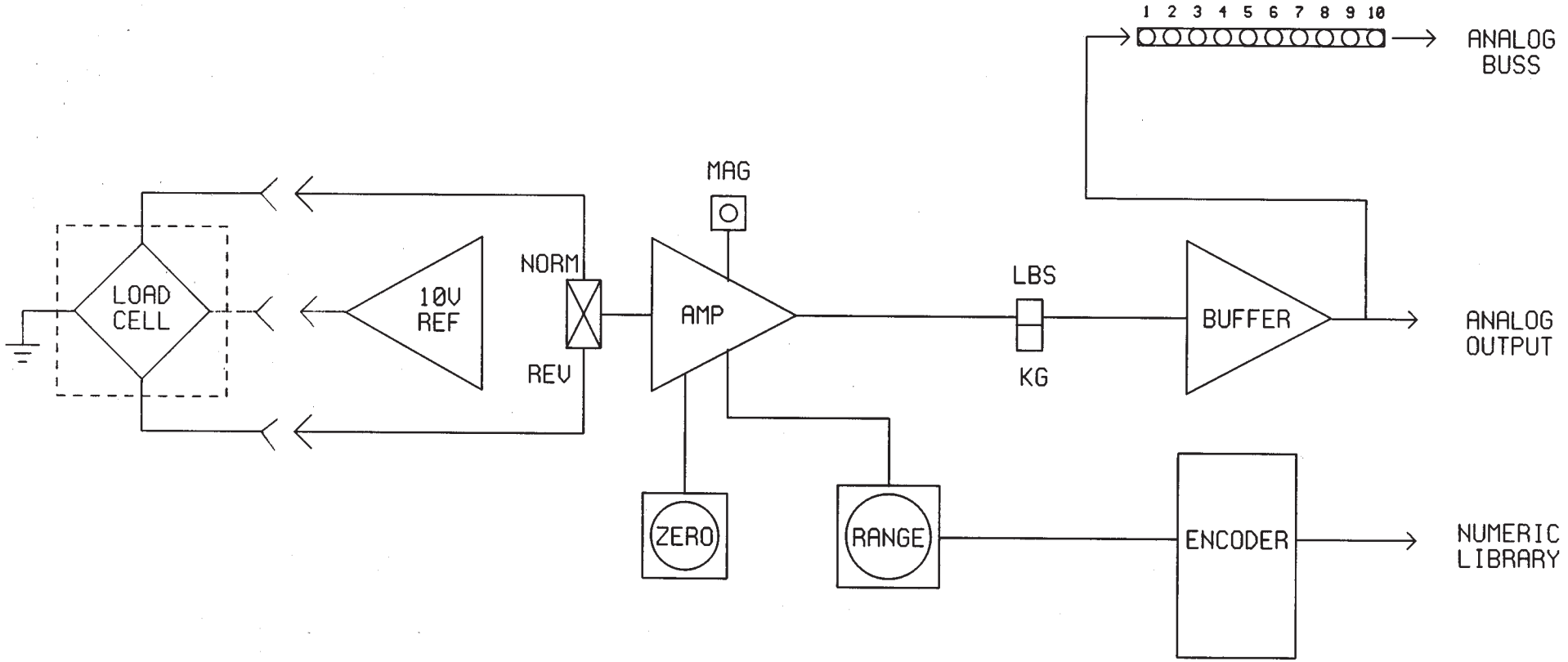
1. Select appropriate range
2. Select appropriate measure units (i.e. lbs or kg.)
3. Select polarity (i.e. norm or rev.)
4. Set the display to zero on bargraph
5. Place a known calibrated mechanical load onto the transducer bridge and observe:
   (A) Did the bargraph move in the proper direction? If not, reverse the norm/rev pin caps.
   (B) Did the bargraph deflect to the proper calibration point? If not, adjust the mag control to display the proper reading.
6. Repeat steps 4 and 5 several times to insure proper calibration has been set.

Strain Bridge Connections

9 pin front panel connector ref: DE5805101 (see schematic)

Pin	
1	(-) sense excitation
2	(-) excitation
3	GND
4	GND
5	(+) sense excitation
6	(+) excitation
7	(+) load cell output
8	(-) load cell output
9	GND





BLOCK DIAGRAM E8051 LOAD CELL MODULE

3-10 *E80124 - HIGH SPEED O. D. MODULE*

Functional Description

The E80124 module is a design specifically tailored for the rapid measurement of outer diameters of cylindrical pieces. It is optimized for use in the Edmunds Trendsetter™ column in conjunction with an Edmunds Single Head, Hi-Mag or DA-6 Comparator.

In operation, cylindrical pieces (Needle bearings, discs, etc.) are swept past the measuring stylus of the comparator and the high speed signal conditioning circuitry detects and captures the dynamic peak of the piece.

Included with the module:

* Single input high speed front end.
* Positive polarity peak detector.
* Adjustable delay reset circuit.
* Data strobe signal for external data collectors.
* Four measurement ranges. (.001” through .0001” Full Scale)
* Inch/Metric operation.
* Zero control.
* Manual hold/Reset functions.
* Three operating modes.

CONTROLS

Mode Switch

Selects one of the three operating modes:

BYPASS — Allows the signal conditioning circuitry to bypass the peak hold function, useful in piece set up, calibration or when used in conjunction with other upper bay modules.

+ PEAK — Captures the most positive excursion of the signal conditioner’s output. The *Hold* and *Reset* switches become active for signal analysis.

+ AUTO PEAK — Identical to + *PEAK* with the addition of an adjustable timer which automatically resets the peak detector. The *Hold* and *Reset* switches will override the timer setting.

Range Switch

Provides four measurement ranges:

.001”/.02MM Full Scale - 10 μ Inch Resolution
.0002”/.004MM Full Scale - 2 μ Inch Resolution
.0005”/.01MM Full Scale - 5 μ Inch Resolution
.0001”/.002MM Full Scale - 1 μ Inch Resolution

Units Switch

Provides Inch/Metric mode selection.

Zero Control

Allows the electrical zeroing of the module to an arbitrary nominal size. Utilized in the *Bypass* mode for calibration and set up.

Mag Control

Provides adjustment to the modules amplification when setting to known reference standards. Utilized in the *Bypass* mode for calibration.

Reset Switch

Controls the operation of the onboard peak detector in both + *Peak* and + *Auto Peak* modes. Clears the peak detector to the initial condition. Overrides the *Time Select* function.

Hold Switch

Controls the operation of the onboard peak detector in both + *Peak* and + *Auto Peak* modes. Prevents any further data from being accumulated by the peak detector.

Time Select

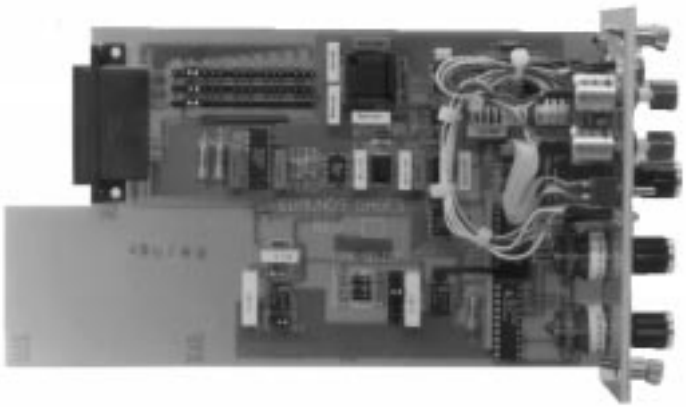
Using the internal jumper, selects the time interval the peak detector will hold the measured results before automatically resetting. Selectable from 1, 2, 3 or 5 second intervals or user programmable by resistor selection. ($Time_{(SEC)} = R_{(OHMS)} \times 1 \times 10^{-6}$)

Polarity Select

Controls polarity of the data collector RST pulse. STD position provides a positive going pulse. REV position provides a negative going pulse.

OUTPUT JUMPER MATRIX

Selectable by using the internal jumpers.



STD — Outputs the high speed conditioned signal to the 10 line user interface of the Trendsetter™.

+ PK — Outputs the peak detector to the user interface.

RST — Outputs a polarity selectable, TTL compatible, 0.375 second strobe pulse to the user interface. This pulse is compatible with the foot switch inputs of many popular data collectors and is properly timed to strobe the + *Peak* detector data to these devices.

4-0 *TRENDSETTER™ SYSTEM PROGRAMMING DIAGRAM*

The Trendsetter™ system diagrams are documents noting the positions of every programming option within each module of a complete column for a specific application.

The Trendsetter™ programming diagram denotes a general overview of the function modules and their programming options. The sheet is intended primarily for this single column gage user to record switch settings and calibration values.

The Trendsetter™ system programming diagram, whose functions are listed below, provides a convenient table for recording corrections, switch settings, and mathematical formulas for multiple column gage setups.

The boxes at the left side of the page defines a function. A brief explanation of each follows:

CABLES — symbol between any of the columns within an application is representative that an interface cable (#4550200) is required between these columns. In the event of a special cable, an Edmunds part number for such cable will be listed.

CHECK — A description of the measurement to be displayed within a given column.

SIGNALS An algebraic gaging formula for the measurement within a given column.

HIGH LEVEL — A ten position switch located at the rear of the mainframe behind the upper module bay, enables the high level outputs of the lower bay signal conditioning module be transmitted or bussed on any of the 10 matrix buss lines, dependent on the switch closed. For example, closing switch #1 outputs the display signal on matrix line #1. The display output voltage is +/- 2.5 volts full scale.

FUNCTION — Where applicable, the position to set the selector switch for the upper module when measuring parts.

MODULE — The Edmunds part number for the upper bay module. If suffixed with an “S”, the module is considered special and is labeled internally with a specific engineering control number.

MATRIX — Symbols xx-1 thru xx-10 are used to identify which lines in the matrix buss are to be committed to lower bay module signals. For example, if the AO signal of an E8032 module is to be outputted on buss line 3, insert the symbol AO-3 in the designated block. Also note that since line 3 is now committed it cannot be used by other modules which output a signal, this includes any signal from a hi level port. However, this signal may be used by any module which inputs a signal.

MODE — Where applicable, will indicate which channel(s) are to be selected A, B, or AB, or on E8026 modules, sets the operation of the module as (A + B) or (A - B).

RANGE — Indicates the full scale range to be used. In the case of air/electronic applications, the Low, Med, Hi pneumatic amplification constant is also indicated.

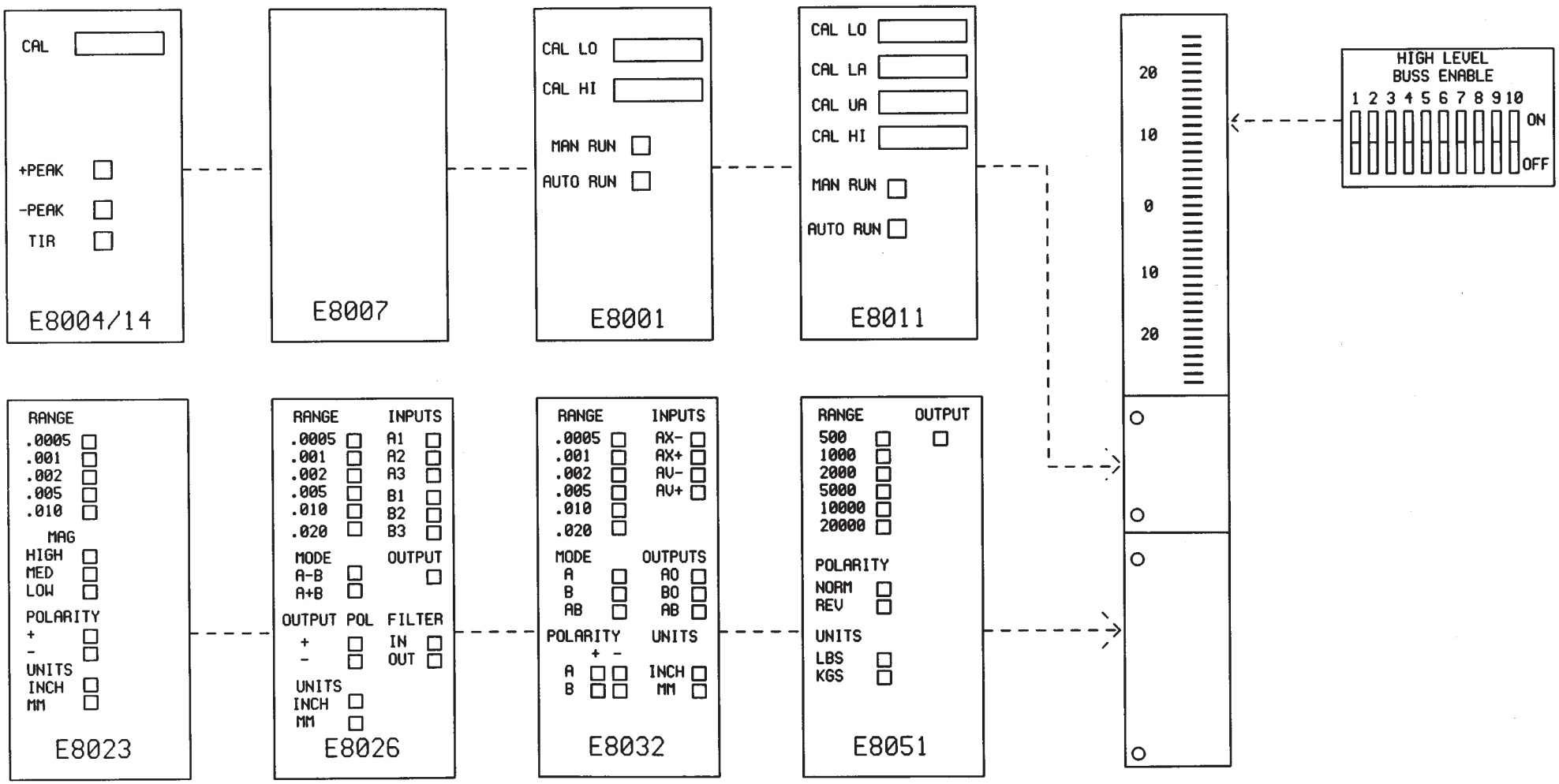
PROBES — Any inputs to a specific column are identified here. Inputs are numbered corresponding to the column number and channel that they are connected with. Example: Probe #2A is plugged in to column #2, channel A.

POLARITY — A (+) or (-) sign in parentheses identifies the polarity setting of each channel. If both channels are used, two independent polarity setting will be shown, even if they are the same.

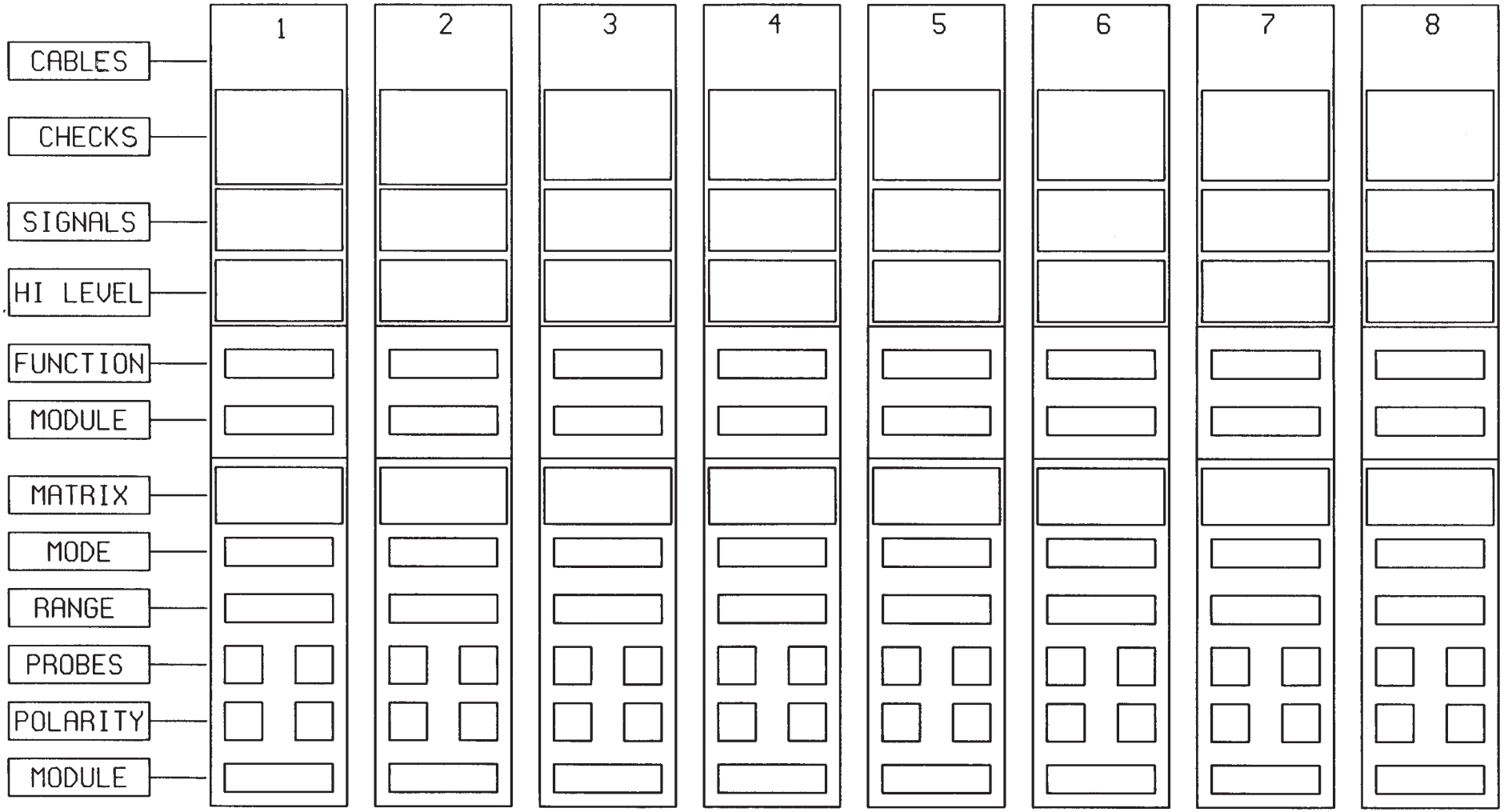
Using the E8023 module, the bargraph will rise with increasing air pressure at the tooling nozzles in the (+) setting.

Using electronic modules, the bargraph will rise when the tip of the probe is pressed toward the body of the probe in the (+) setting.

MODULE — The Edmunds part number for the lower bay module. If suffixed with an “S”, the module is considered special and is labeled internally with a specific engineering control number.



TRENDSETTER PROGRAMMING DIAGRAM



TRENDSETTER SYSTEM PROGRAMMING DIAGRAM

5.0 MATRIX PIN HEADER PROGRAMMING

5-1.1 Example 1 Clearance Comparator

It is desired to measure the clearance between a given I.D. and O.D. In this example, Air/Electronic modules will be used, but the same principles apply to any other module or combination of modules previously discussed. The setup will require three Trendsetter™ columns.

Column 1 Air/Electronic E8023 - O.D. Measurement
Column 2 Air/Electronic E8023 - I.D. Measurement
Column 3 Sum/Difference E8026 - Clearance

Column 1 will measure and display the O.D. of the piece part using an air ring. Likewise, the I.D. measurement will be displayed on column 2 using an air plug. Column 3 will subtract the I.D. from the O.D. and display the difference. This will be defined as clearance.

The first step will be to program the E8023. Column 1 is to measure O.D. As the piece part size increases, place the polarity pin head of the module, so as to cause the bargraph to move in a positive or upscale direction.

It is assumed that the E8023 mag, and zero have been calibrated to masters, and the inch/mm pin header is already set to the desired units. Because all of the ten I/O buss lines are unused, the output of this module (O.D.), will be arbitrarily placed on buss line 1 by placing a programming jumper over the matrix pin header stenciled with the number (1) and the center post between (1) and (2).

Column 2 is measuring I.D. As the I.D. of the piece part increases, place the polarity pin header so that the bargraph also moves is a positive upscale direction.

The I.D. signal of this module will be placed on buss 2 by placing a programming jumper over (2) and the center post between (1) and (2).

The O.D. signal is now on buss 1 and the I.D. signal is on buss 2. All that is necessary is to pick these signals off and route them to the proper input ports of the E8026 module.

Step 2

As stated in the above paragraphs, the I.D. will be subtracted from the O.D. The E8026 will be placed in the (A-B) mode of operation. In this mode all “A” labeled ports (A1, A2, A3) will be non-inverting. As a positive signal is injected into the port, the display will respond in a positive or upscale direction. Likewise, all “B” labeled ports (B1, B2, B3) become inverted. If a positive signal is injected into these ports, the display responds in a negative or downscale direction.Therefore the O.D. signal on buss 1 will be routed to the A group, the I.D. signal on buss 2 to the B group.

Since Air/Electronics are used, select high level inputs (A1) and (B6) to properly attenuate the signal. Reverse program the matrix pin header by placing a jumper between (1) and the center post of the group labeled A1. This programs the O.D. signal into port A1. Likewise, you are able to reverse program the matrix pin header labeled B6 by placing a program jumper between (2) and the center post. This places the I.D. signal into port B6. Leave unused pin headers in their open positions. This last move avoids programming errors, and completes the programming.

5-1.2 *Example 2 Squarness/Taper*

In this example a round part is to have its O.D. checked at it's top and bottom. The O.D. data will then be used to compute squareness and the taper of the part. Four Trendsetter™ columns will be used in this example.

Column 1 - E8032 LVDT module, diameter 1 (A+B) - top of part

Column 2 - E8032 LVDT module, diameter 2 (C+D) - bottom of part

Column 3 - E8026 Sum/Difference module - compute taper (A+B) - (C+D)

Column 4 - E8026 Sum/Difference module - compute squareness (A-C)

Column 1 will measure and display the top diameter of the part. The E8032 module will be programmed for A+B LVDT transducer operation. It will be assumed that mag, zero, range and inch/mm units have been selected and calibrated.

Column 2 will measure and display the bottom part diameter. It will be setup and calibrated like column 1.

Column 3 will receive (A+B)-(C+D) information across the system buss. The E8026 module will be: programmed for (A-B) operation, receive the four inputs, and display the result as taper. Likewise, it is assumed that the mag, zero, range, and inch/mm units have been selected and calibrated.

Column 4 will receive signals A and C across the system buss. Like column 3 the E8026 will be programmed for (A-B) operation, receive 2 inputs, and display the result as squareness.

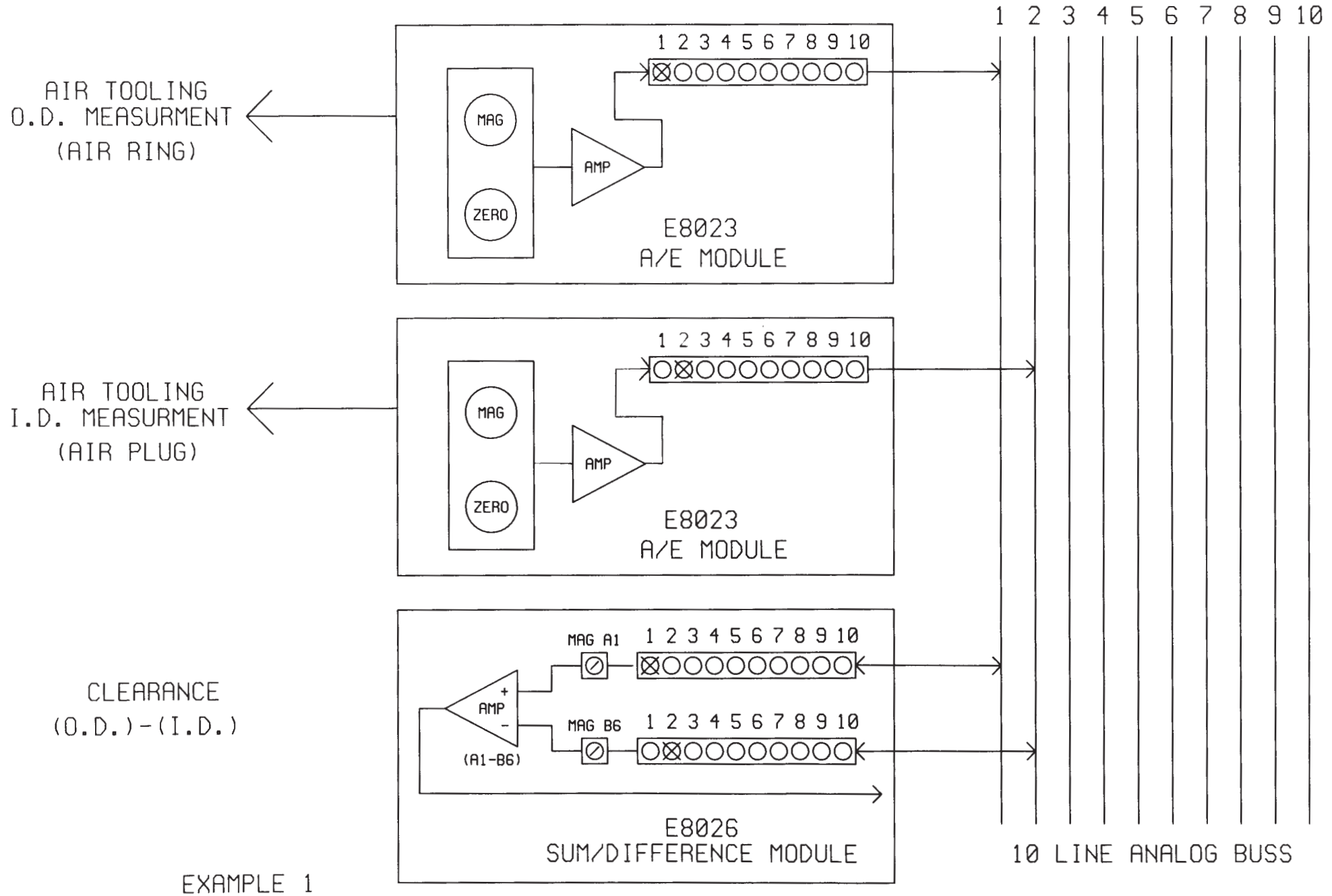
The first step is to program column 1 matrix pin headers. Program matrix pin headers (AO) and (BO) onto the system buss by placing programming jumpers on (1) of AO and (2) of BO on the E8032 module. This operation places the A and B LVDT transducer signals on I/O buss lines 1 and 2.

Step 2 is to program column 2. Again program AO and BO onto the system buss by programming jumpers on (3) of AO and (4) of BO of column 2. This places the C and D LVDT transducer signals on I/O busses 3 and 4.

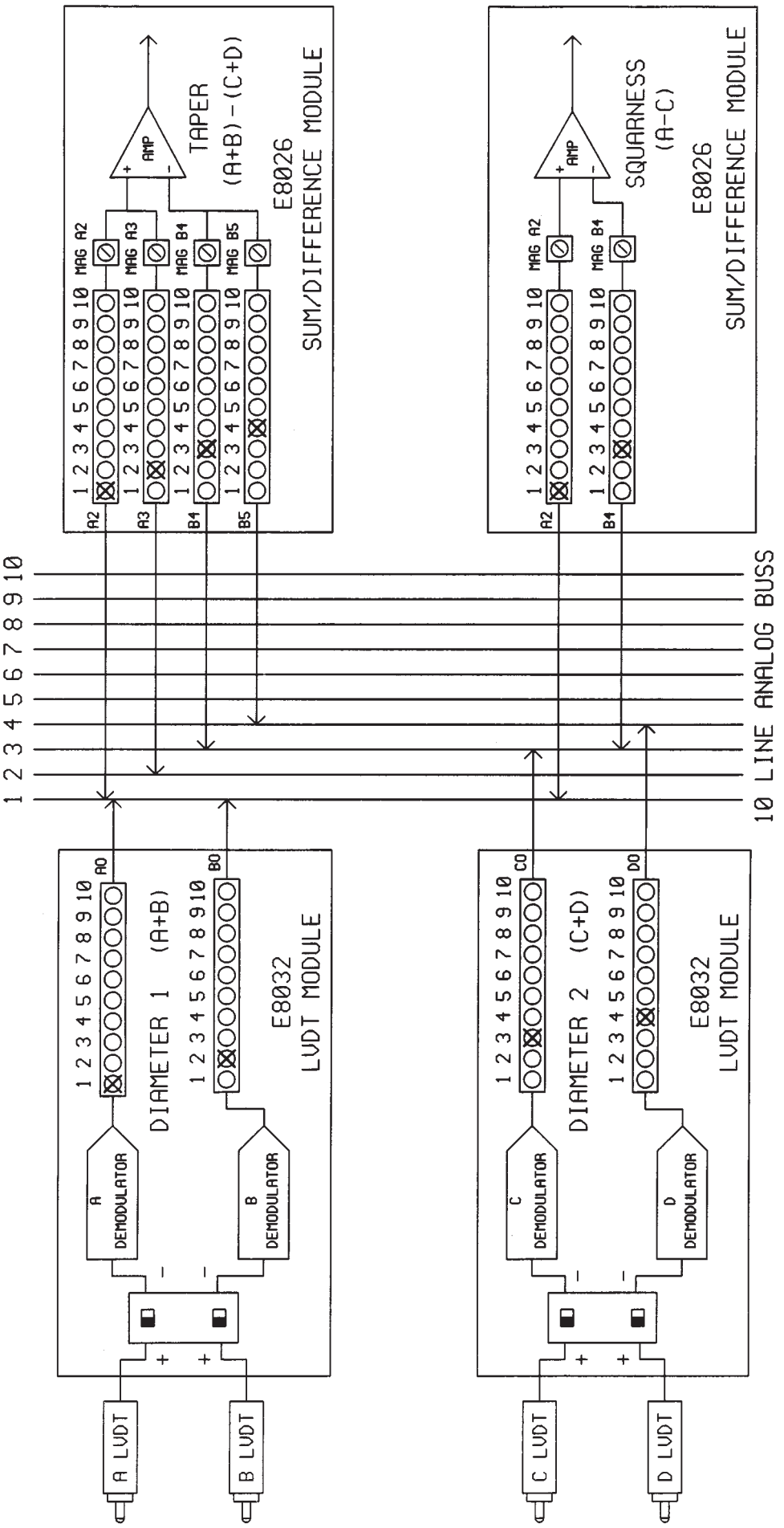
Step 3 is to program column 3 to receive taper information. Set the E8026 module into the differential mode by placing the mode pin header to the (A-B) position.

Next, reverse program inputs 2, 3, 4, and 5. Program jumper A2 to (1), A3 to (2), B4 to (3), and B5 to (4). This operation picks signals A and B off the system buss and places them into the summing inputs A2, A3 of the E8026 module. Also signals C and D are picked off and routed to the difference inputs B4, B5. The column will now display taper (A+B)-(C+D).

The final step is to program column 4 to receive squareness data. Again set the second E8026 module to its differential mode by placing the module pin header to (A-B). Again, program in reverse order, input A2 set to (1) input B4 set to (3). This completes the programming and the column will now display squareness.


1 2 3 4 5 6 7 8 9 10
AIR TOOLING
O.D. MEASURMENT
(AIR RING)
MAG
ZERO
AMP
E8023
A/E MODULE
AIR TOOLING
I.D. MEASURMENT
(AIR PLUG)
CLEARANCE
(O.D.)-(I.D.)
MAG A1
MAG B6
+
AMP
-
(A1-B6)
E8026
SUM/DIFFERENCE MODULE
10 LINE ANALOG BUSS

EXAMPLE 1


E8032
LVDT MODULE
DIAMETER 1 (A+B)
A DEMODULATOR
B DEMODULATOR
A LVDT
B LVDT
E8032
LVDT MODULE
DIAMETER 2 (C+D)
C DEMODULATOR
D DEMODULATOR
C LVDT
D LVDT
E8026
SUM/DIFFERENCE MODULE
TAPER
(A+B)-(C+D)
AMP
MAG A2
MAG A3
MAG B4
MAG B5
E8026
SUM/DIFFERENCE MODULE
SQUARNESS
(A-C)
AMP
MAG A2
MAG B4
1 2 3 4 5 6 7 8 9 10
10 LINE ANALOG BUSS

EXAMPLE 2

E8204 - RELAY INTERFACE CABINET

6-1 Functional Description

The E8204 Relay Interface Cabinet is an auxiliary Trendsetter™ component used to buffer and amplify the limit light outputs of the E8001, E8011, E8014 and E8024 modules.The need frequently arises where these outputs must be interfaced to relays, machine controls, external lamps, etc. The relay interface cabinet receives the status of these outputs, decodes the status, displays the status with its own three limit light display and then drivers operate power relays within the cabinet. The contacts associated with the power relays are brought out to a user's connector for ease of interfacing to external equipment.

Front Panel Features

Power On indicator lamp
Over, Good and Reject indicator lamps
Reset push button

Power Requirements

120 VAC (240 VAC optional)

Operation

The E8204 is supplied with a power jumper cable, a 25 pin I/O cable and a mating connector for the user's interface wiring. To operate, connect one end of the 25 pin I/O cable to the Input/Output connector located on the rear of the E8204 cabinet and the other to the input or output connector of a Trendsetter™ column. Select the appropriate power cable and energize the cabinet. The E8204 cabinet will now follow the commands of the limit light module.

It should be noted that several limit light modules may be chained together. In this mode of operation the E8204 decoder circuitry examines all Under, Good, and Over conditions. If any Under or Over conditions exists, the appropriate Under and Over limit lights on the cabinet will display the status and the corresponding Under and Over relays will be activated and the Good relay will be deactivated. Master Accept or master Reject may be implemented by this feature.

Connections for access to the semiautomatic features of the E8001, E8011 and E8024 modules are possible through the user's interface connector. 12 VDC @ 100MA is present at this connector for this purpose.

Interface Connector Connections

Pin	Description	Function
A	Write/Disable	Input to limit light control module
B	Common	Common contact - under relay
C	N.O.	N.O. contact - under relay
D	N.C.	N.C. contact - under relay
E	Common	Common contact - good relay
F	N.O.	N.O. contact - good relay
G	N.C.	N.C. contact - good relay
H	Common	Common contact - over relay
I	N.O.	N.O. contact - over relay
J	N.C.	N.C. contact - over relay
K	+12VDC @ 100MA	Auxiliary power
L	Reset	Input to limit light control logic
M	TIR Reset	Input to TIR modules reset line
N	Isolated Common	Common return

Relay contacts are rated at 5 Amp, 120 VAC resistive load.

Other Edmunds Gages Products and Services

Cylindrical Gages We offer a complete line of inch or metric plain ring gages, setting discs plus plain, progressive, or reversible plug gages in AGD classes Z through XXX. Choice of materials, including steel, chrome or carbide.

Air Gage Tooling Air gaging is one of the easiest and most accurate non-contact measurement methods. We make tooling for our own and other air gaging systems. We offer many tooling styles in standard and special designs, plus system accessories.

Electronic Bore Plugs Our durable, highly precise LVDT plugs are available in a choice of styles. They are ruggedly designed for demanding production use.

Column Readouts We manufacture columns for air and electronic gaging. Our Accu-Setter™ is a microprocessor-based column featuring single-button operation, L.E.D. digital alphanumeric display and 3-in-1 column capability allowing simplified operation, reduced setup time, and at-a-glance monitoring of part measurement.

The Trendsetter™ column has quickly interchangeable plug-in modules for a variety of gaging needs. The ten-inch scale has digital scale values and a choice of inch or metric ranges. It works with most every make of air or electronic tooling.

Gage Heads Compatible with all Edmunds electronics, our LVDTs are available in cartridge, lever, and reed float styles.

Computer Aided Gaging (CAG™) Microprocessors Our CAG™ system offers a computer-based readout and SPC data gathering ability in a convenient unit designed for industrial environments. This proven system can be applied to manual or automatic gages requiring up to 32 inputs. The ultimate CAG software provides closed-loop feedback when networked with CNC machine tools, providing continuous process control.

The Micro CAG™ is a similar and smaller version of the same menu-driven, easy-to-use CAG with up to 8 inputs.

Gage Block Comparators We offer single-head and twin-head caparators, capacities up to 20", and resolution to .0000001". Unique functional features, such as "click stop" for rapid head positioning and auto zeroing save time.

Universal Comparators The standard of accuracy, our comparator is universal for comparative ID, OD, and length measurement with a resolution of .000001". Auto zeroing eliminates time-consuming setting of meters. The preferred instrument in most calibration labs.

Custom Design and Build Whether you need a single- or multi-dimensional fixture, a special hand-held gage or a completely automatic gaging system, Edmunds can furnish it. We have produced over 35,000 different designs from cylindrical gages to fully-automatic, computerized, post-process gaging systems.

Edmunds GAGES

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