INSTRUCTION & MAINTENANCE MANUAL

EDMUNDS TOL 2200

TWIN HEAD ULTRA PRECISION DIGITAL DISPLAY

#5202200

EDMUNDS GAGES
Farmington Industrial Park
Farmington CT USA 06032
TEL (860) 677-2813
FAX (860) 677-4243

TABLE OF CONTENTS

INTRODUCTION

The TOL2200 precision gage block readout cabinet is a twin transducer, third generation, high stability, low noise, solid state amplifier employing recent advances in signal conditioning technology.

FEATURES INCLUDE:

- Twin or single transducer operation.
- One tenth of a microinch digital resolution.
- Analog meter with low, medium and high sensitivity selection
- Inch/Metric selector with LED indicator.
- Error A and B LED indicators for individual out of range conditions for each transducer.
- Auto zero switch with LED Indicator.
- Serial printer port with front panel print switch.
- Rear panel print connector for optional foot switch.
- LVDT polarity available, protected inside the cabinet.

SPECIFICATIONS

Size	6.00"H x 8.50"W x 9.25"D
Weight	4.5 lbs.
Temperature Range	18^0C - 27^0C (64^0F - 81^0F)
Display	7 digit .500" High LCD
Range	(+/-) .0016" (.040 mm)
Auto Zero Range	(+/-) .0016" (.040 mm)
Zero Control Sensitivity	(+/-) 20 microinch
Meter Sensitivity	0.5" characters (+/-) .0005/.012mm
	(+/-) .00025/.006mm
	(+/-) .00010/.0025mm
Resolution	1 tenth microinch, .01 micrometer
Stability	(+/-) 1 microinch @ 68^0 24 hr. period
Non linearity	0.25%< full scale
Line Voltage	85-240 VAC @ 50-60 Hz
Power	10 Watts
Fuse Type	5 x 20 mm - 2 Amp
Transducer Excitation	2.000 VRMS @ 5000 HZ
Recommended Transducer	Edmunds #5010100
Printer Output Connector	DB15S
Baud Rate	9600 Baud
Bits/Character	8
Start Bits	1
Stop Bits	1
Parity	None

TOL 2200 FRONT

TOL 2200 REAR

TOL 2020 INTERNAL

INSTALLATION

Carefully unpack the readout. Plug the power cord into the receptacle located on the back of the TOL readout and connect to an 85-240 VAC 50/60HZ power supply. Plug the gage heads into their respective ***"LVDT"*** receptacle located on the rear of the TOL readout. Turn the power switch ***"ON"***. When power is first applied to the unit, the onboard micro controller performs a self-check of the external display components. The LCD display is indexed through its numeric range and the LED indicators are turned on/off in sequence.

AMPLIFIER POLARITY

The TOL 2200 amplifier is shipped from the factory with its internal polarity jumpers set to the positive displacement mode. By definition, positive displacement occurs when the upper gage head is depressed upward and the lower gage head is depressed downward. This will cause the digital display and analog meter to reflect a positive change in readings. If for any reason negative displacement is required, it is necessary to reverse the position of jumpers ***J7*** & ***J8*** for both the ***"A"*** channel and ***J10*** & ***J11*** for the ***"B"*** channel. These are located on the internal motherboard of the display. Access to these jumpers requires the disassembly of the cabinet. Cabinet disassembly is performed on a soft surface with the cabinet placed on its top. Remove the (4) Phillips head screws from the bottom of the cabinet. Turn the unit over and remove the top. The jumpers are located near the face of the front panel. (See photo TOL 2200 Internal for reference).

OPERATION

The TOL2200 has two modes of operation:

1. Calibration mode
2. Measurement mode

CALIBRATION MODE

A ten-minute warm up period is recommended before any calibration is attempted.

Your unit, if new, will be shipped from Edmunds with the bottom sensor set to the correct anvil position. If your unit is already in service, see the mechanical description to properly set the bottom transducer.

The calibration procedure begins by checking the position of bottom transducer located in the base of the gage block stand.

Bottom Transducer:

Set the TOL2200 readout cabinet to the ***"CAL"*** mode using ***"METER"*** switch. Set the ***"A-B"*** switch to the ***"A"*** mode. Place a 0.100" reference block onto the comparator anvil and lower the upper transducer into measuring position using the elevating hand wheel and adjust the upper transducer until the analog meter points to the green calibrate dot. Switch to the ***"B"*** mode and observe the analog meter. If the meter hand doesn't point to the green dot, mechanical adjustment of the bottom transducer is required (see mechanical section). If the meter hand points to the green dot, the bottom transducer is correctly set and the primary magnification of the system may now be set.

Primary Magnification Check:

With the 0.100" reference block in position on the anvil, set the ***"METER"*** switch to ***"Lo"***, ***"M"***, or ***"Hi"*** position. Set the ***"IN/MM"*** switch to ***"INCH"*** mode. Using the ***"A-B"*** switch, set the mode to ***"A-B"***. Push the ***"ZERO"*** switch. The digital display should indicate 0.000000. Remove the 0.100" reference block and replace with a 0.101" block. The digital display should indicate +0.0010000. If not, adjust the front panel ***"MAG"*** control using a small blade screwdriver until the digital display matches the block size. It may be necessary to repeat this sequence several times to get the desired magnification.
This setting need only be approximate at this time.

Balance Procedure:

Remove the reference gage blocks from the stand and locate balance fixture B5020041. Unclamp the stand and using the elevating handwheel, raise the upper transducer to a position that just clears the balance fixture. Set the ***"A-B"*** switch to the ***"A"*** mode and set the ***"METER"*** switch to the ***"CAL"*** mode.

Notice the balance fixture has a round pin that is common to both faces of the fixture. See figure 1.

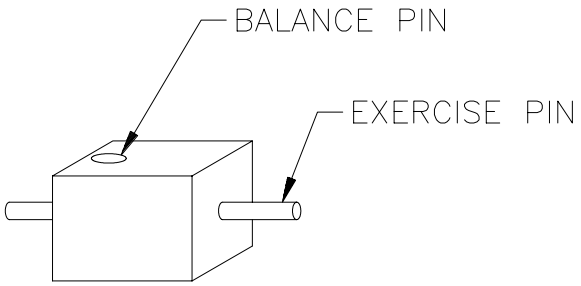

Figure 1 - Balance Fixture

This pin is restrained within the block, but can travel approximately 1 mill when the rod exiting from the block is pushed upon. The movement of the pin exercises both upper and lower transducers simultaneously. This is important to properly set balance.

Locate the balance fixture so the round pin is aligned with the upper and lower transducer contacts. Lower the upper transducer and clamp into position when the analog meter hand points to the green dot. Test the fixture by depressing the rod and observing the minor calibration analog scale. The movement of the pin should deflect the meter pointer between the end markers of the minor calibration scale. Switch the ***"A-B"*** switch to the ***"B"*** position and repeat the fixture test as above.

Reposition the upper transducer as necessary to remain within the scale limits.

To set the final balance, place the readout in either ***"Lo"***, ***"M"***, or ***"Hi"*** modes using the ***"METER"*** switch. Select the ***"A-B"*** mode using the ***"A-B"*** switch. Autozero the digital display by depressing the ***"ZERO"*** switch. Depress the fixture rod and observe the digital readout. If balance is properly set, the movement of the pin will not cause the digital display to vary by more than 2 microinches. If a larger movement is observed, rotate the balance control located on the rear panel of the readout by one turn. Again autozero the

digital display and observe the digital display while depressing the fixture rod. If the observed reading increases, rotate the balance control in the opposite direction and repeat the above procedure. When the displayed number approaches 2 microinches or less, the unit is in balance.

Final Magnification Setting:

Remove the balance fixture and replace it with 0.100" Grade 1 reference block. Repeat the ***"Primary Magnification Check"*** as detailed above. Do not make any further adjustments to the balance control. Set the final magnification as close as possible taking into account the gage block calibration deviation. When satisfied that magnification is properly set, test midpoint linearity with a Grade 1 0.1005" block. The display should indicate 0.0005000 (+/-) block calibration deviation, (+/-) 2 microinches.

MEASUREMENT MODE

The unit is ready for operation. Select the appropriate digital display sensitivity. Follow the measurement procedure outlined in the manual for the twin head gage block comparator the TOL 2200 is to be used with.

ELECTRICAL INTERFACE

The electrical interface consists of three wires and is RS-232C compatible. Baud rate is fixed at 9600 baud, 8 bits/character, one start bit, one stop bit, and no parity.

Table I

TOL 2020 Serial Connector	Printer
Pin 2 TXD	RXD
Pin 3 RXD	TXD
Pin 5 GND	GND

PRINTER OPERATION

The printer port supports popular printers such as the Epson FX86, FX850, etc. The selected printer must be installed with a serial option card for proper operation. The port also serves as the hardware interface to Edmunds Personal Computer Gage Block Software.

Pushing the front panel print switch or closing the contacts via the rear panel print connector will output the display contents via the printer port.

The port outputs standard ASCII characters that represent the digital display contents. The output consists of (8) numeric characters, followed by a line feed and a carriage return. See Table II below for the character sets.

Table II

(+) Reading ----------> 2BH

(-) Reading ----------> 2DH

Decimal Point ----------> 2EH

Characters 0-9 ----------> 30H - 39H

Line Feed ----------> 0AH

Carriage Return ---------> DEE

Printing Example:
Digital Display Value: -.0000020
Hex Output: 2DH 2EH 30H 30H 30H 30H 30H 32H 30H 0AH DEE

GAGE BLCOK SOFTWARE

The TOL can be solicited serially for the digital display contents. The Host computer caon request the data by transmitting an ASCII 'R' (52H) to the TOL.

The TOL will automatically switch to a PC communication mode on receipt of the ASCII 'R'. The PC communication mode was developed specifically for the interface between the TOL and the Edmunds "Gage Block Software". The functionality of the TOL will change while it is in this mode:

1) TOL numeric display will be blank
2) The "Zero" push button feature on the TOL will be disabled
3) The TOL response to the ASCII 'R' will be a numeric ASCII string with a status character appended at the end.

There are three possible values for the status character:

1) Current reading: 'R', (52H) - Indicates that the numeric reading is valid.

2) Saved Reading: 'S', (53H) - Indicates that the numeric reading is valid and that the print footswitch was activated since the last solicited read.

3) Invalid Reading: 'E', (45H) - Indicates one of the LVDTs is beyond its useable range and that the numeric reading should not be used.