

EAT•N Lebow Products Product Information

Eaton Corporation
1728 Maplelawn Road
P.O. Box 1089

Troy, Michigan 48099
Telephone (313) 643-0220
TWX (810) 232-4818

STRAIN GAGE REACTION TORQUE SENSOR

MODEL 2110 - 5K S/N 705 CALIBRATION DATE: 2/29/88

SPECIFICATIONS:

RATED CAPACITY..... 5,000 In. Lbs.
MAX. LOAD (without zero shift)..... 50% overload (150% of rated capacity)
SIGNAL SENSOR..... 4 arm bonded strain gage bridge
BRIDGE RESISTANCE..... 350 ohms nominal
MAX. BRIDGE EXCITATION..... 20 volts DC or AC RMS
COMPENSATED TEMP. RANGE..... +70 deg. F to +170 deg. F
USEABLE TEMP. RANGE..... -65 deg. F to +200 deg. F
*EFFECT OF TEMP. ON ZERO..... +0.002% of rated capacity/deg. F
*EFFECT OF TEMP. ON OUTPUT..... +0.002% of reading/deg. F
NONLINEARITY..... +0.02 % of rated capacity
OUTPUT..... CW+ 2.104 mV/Volt at rated capacity
CCW- 2.104 mV/Volt at rated capacity

*Within compensated temperature range

ELECTRICAL CONNECTIONS: Western Regional Wiring Code

RECEPTACLE: Pig Tails MS-3102A-14S-5P OR PTO2E-10-6P
MATING CONNECTOR: MS-3106A-14S-5S OR PTO6W-10-6S

| <u>PINS</u> | <u>FUNCTION</u> | <u>RESISTANCE</u> |
|--------------------------------|-----------------|-------------------|
| <u>RED A (+) and D (-) BLK</u> | Excitation | <u>372.4 ohms</u> |
| <u>GRN B (+) and C (-) WHT</u> | Signal | <u>350.7 ohms</u> |

CALIBRATION:

A precision wire wound resistor, when shunted across one leg of the strain gage bridge, produces an electrical signal equivalent to an applied torque. This shunt calibration is valid only when used with high input impedance indicators. The equivalent values below were determined by factory calibration.

| <u>LOAD VALUE</u> | <u>ACROSS PINS</u> | <u>RESISTOR VALUE</u> |
|-------------------------------|------------------------|-----------------------|
| <u>3,470 In. Lbs. CW (+)</u> | <u>GRN B and A RED</u> | <u>60 K ohms</u> |
| <u>3,473 In. Lbs. CCW (-)</u> | <u>GRN B and D BLK</u> | <u>60 K ohms</u> |

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SHUNT CALIBRATION TRANSFER

The purpose of this technique is to provide the transducer user with a means of easily performing an accurate system calibration using an Eaton-Lebow supplied shunt resistor and its electrical signal equivalent value.

Possibility One → The instrument and interconnecting cable were provided to Eaton-Lebow for the actual calibration: Use the electrical signal equivalent value supplied by Eaton-Lebow and adjust the instrument display or output to the equivalent load value with the shunt resistor connected on the instrument and activated.

Possibility Two → The instrument and interconnecting cable were not provided to Eaton-Lebow for the actual calibration: The actual calibration was performed using Eaton-Lebow's instrument and a short interconnecting cable to determine electrical equivalent value with a shunt resistor. Since a different cable and instrument will be used in your application, the following method should be used to calibrate the system:

1. Connect the instrument to the transducer using the actual interconnecting cable.
2. Shunt the appropriate pins at the transducer receptacle with the shunt resistor provided by Eaton-Lebow, using short pigtail leads.
3. Adjust the instrument readout or output for the electrical equivalent value supplied by Eaton-Lebow.
4. Disconnect the pigtails and shunt resistor from the transducer receptacle.
5. Install the shunt resistor on the instrument.
6. Press the cal buttons one at a time. Read and record the display or output on the instrument. This is the new electrical equivalent value to be used when the shunt resistor is installed and activated on the instrument and using actual cable.
7. Steps 1 through 6 should be repeated whenever the cable and/or instrument is changed.

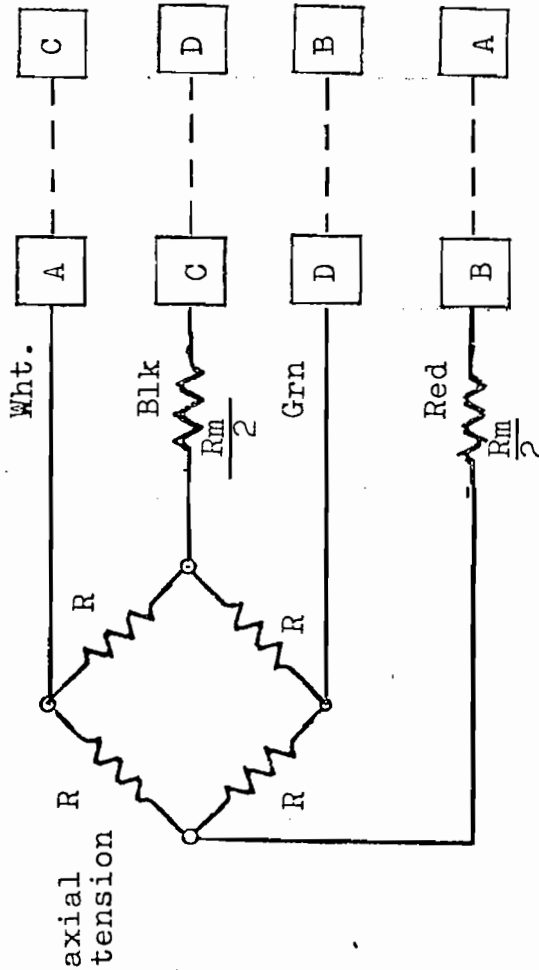
NOTE: WHILE THIS METHOD OF SYSTEM CALIBRATION IS USUALLY VERY RELIABLE AND ACCURATE, IT IS RECOMMENDED THAT THE EQUIVALENT LOAD VALUES BE PERIODICALLY VERIFIED BY CALIBRATING THE SYSTEM WITH KNOWN, ACCURATE MECHANICAL MEANS. EATON-LEBOW RECOMMENDS A MAXIMUM OF ONE YEAR BETWEEN RECERTIFICATION.

Pin Terminals
 Lebow Code W.R.C.

FUNCTIONS

Pig Tails Color Code

| | |
|--------------|-----|
| - SIGNAL | WHT |
| - EXCITATION | BLK |
| + SIGNAL | GRN |
| + EXCITATION | RED |



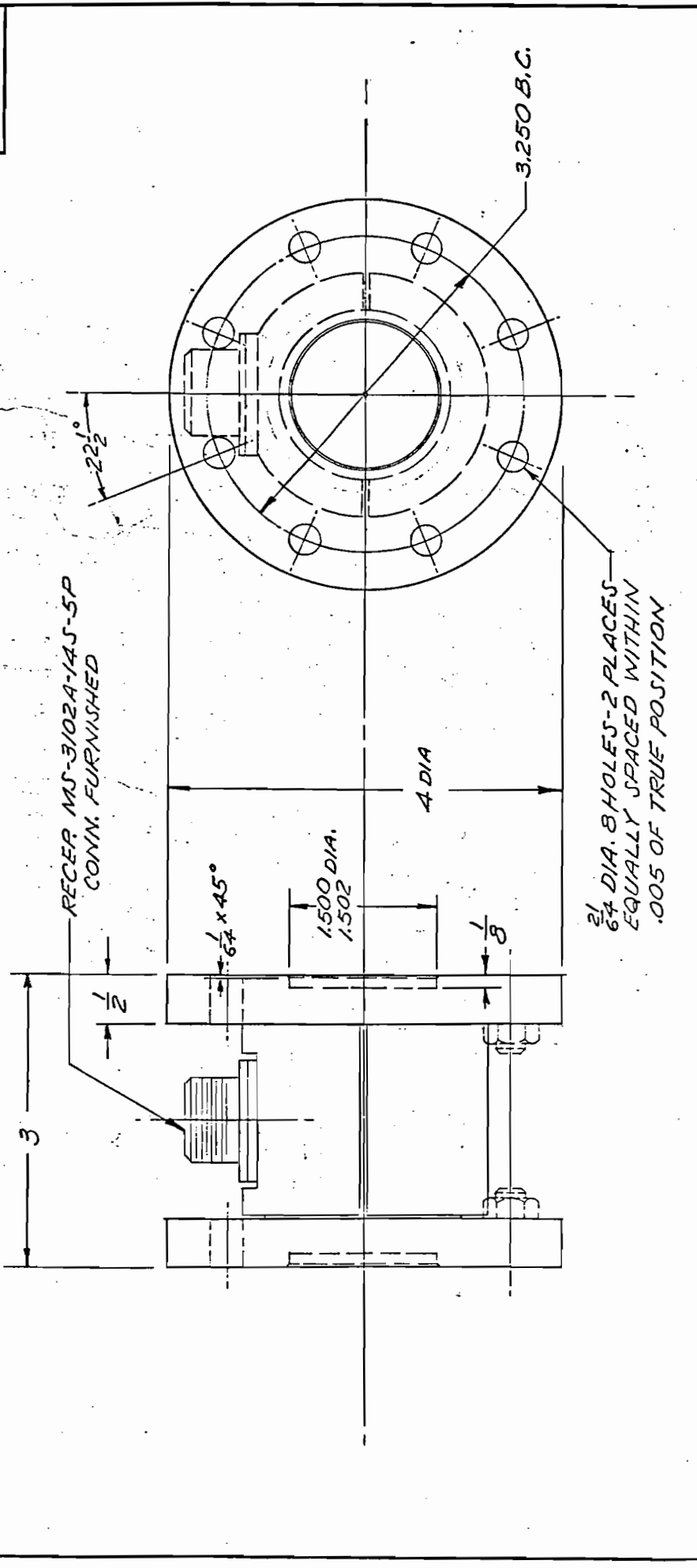
NOTES:

1. R=STRAIN GAGE RESISTANCE
2. Rm=MODULUS & OUTPUT MATCHING RESISTANCE
3. THE WIRING CODE FOR THIS TRANSDUCER IS CIRCLED
4. TENSION LOADING OR CLOCKWISE TORQUE WILL PRODUCE A POSITIVE OR UPSCALE READING.

| DET. No | PART No | DESCRIPTION | REQ'D |
|---|-------------------------|-------------|-----------------------------|
| WIRING CODES FOR LEBOW TRANSDUCERS | | | |
| SCALE: | DRAWN BY: <i>W.R.C.</i> | REF. DWG: | MAT'L: |
| DATE: 1-15-76 | CHK'D BY: | MODEL: | JOB NO. |
| UNLESS OTHERWISE SPECIFIED: TOLERANCE ON FRACTIONS ± 1/64 TOLERANCE ON DRILLED HOLES + .007 TWO PLACE DECIMALS ± .010 REMOVE ALL BURRS & SHARP EDGES THREE PLACE DECIMALS ± .005 DIMENSION LIMITS HELD AFTER PLATING ANGLES ± 0°30' SURFACE FINISH 125μ | | | |
| LEBOW ASSOCIATES, INC. TROY, MICHIGAN | | | DRAWING NO. <i>W-220</i> |

| | | |
|------|----------|------|
| SYM. | REVISION | DATE |
|------|----------|------|

B-2110-D



| | |
|----------|------------|
| 2110-5K | 5000 IN·LB |
| 2110-500 | 500 IN·LB |
| 2110-1K | 1000 IN·LB |
| 2110-6K | 6000 IN·LB |
| 2110-4K | 4000 IN·LB |
| 2110-2K | 2000 IN·LB |
| MODEL | CAPACITY |

OUTPUT 20MV/VOLT NOMINAL

| DET. NO | PART NO | DESCRIPTION | REQ'D |
|-------------------------------|---------------------------------------|---|----------------------|
| | | INSTALLATION DIMENSIONS ~ FLANGED REACTION TORQUE SENSOR | |
| SCALE: FULL | DRAWN BY: CLOUTER | MAT'L: | |
| DATE: 5-24-65 | CHK'D BY: | MODEL: 2110 | JOB NO. |
| UNLESS OTHERWISE SPECIFIED: | | | |
| TOLERANCE ON FRACTIONS ± 1/48 | TOLERANCE ON DRILLED HOLES ± .007 | | |
| TWO PLACE DECIMALS ± .010 | REMOVE ALL BURRS & SHARP EDGES ± .008 | | |
| THREE PLACE DECIMALS ± .005 | DIMENSION LIMITS HELD AFTER PLATING | | |
| ANGLES ± 0'30" | SURFACE FINISH 125A | | |
| LEBOW ASSOCIATES, INC. | | | DRAWING NO. B-2110-D |
| OAK PARK, MICHIGAN | | | |

| BYN. | REVISION | DATE |
|------|-----------------|-------|
| B | ECN 2337 | 12-71 |
| A | ADDED 500 IN·LB | 7-74 |
| | | 8-82 |

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LIMITED WARRANTY (Liability for Repair and Replacement Only)

The Company's products are warranted to be free from defects in material and workmanship for one year from date of shipment from the factory. The Company's obligation is limited to repairing, or at their option, replacing products and components which, on verification, prove to be defective, at the factory in Troy, Michigan. The Company shall not be liable for installation charges, for expenses of Buyer for repairs or replacements, for damages from delay or loss of use, or other indirect or consequential damages of any kind. The Company extends this warranty only upon proper use of the product in the application for which intended and does not cover products which have been modified without the Company's approval or which have been subjected to unusual physical or electrical stress, or upon which the original identification marks have been removed or altered. Transportation charges for material shipped to the factory for warranty repair are to be paid by the shipper. The Company will return items repaired or replaced under warranty prepaid. No item shall be returned for repair without prior authorization from the Company.

Whenever the design of the equipment to be furnished or the system in which it is to be incorporated originate with the buyer, manufacturer's warranty is limited specifically to matters relating to furnishing of equipment free of defects in material and workmanship and assumes no responsibility for implied warranties of fitness for purpose or use.

CERTIFICATE OF CONFORMANCE AND TRACEABILITY

This is to certify that the products described herein meet the specifications and performance requirements described in this manual. Test reports and other pertinent information are on file and available for inspection by your representative and/or U.S. Government representative upon request.

Calibration was performed with a test system in compliance with MIL-STD-45662 utilizing a reference load cell and or deadweights and an electronic indicator. The test system was within current calibration requirements at the time of the test and is traceable to the U.S. National Bureau of Standards.

REV: July 1986