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Transmation

Pneumatic Calibrator

PneuCal IV-B

- **Tough enough for your truck**
  Mounted in a weatherproof case
- **Calibrate pneumatic instruments**
  Pneumatic controllers, pressure gauges and pneumatic recorders
- **Check P/P instruments**
  Accurately control two pressures
- **Test pressure switches**
  Indicates open and closed
- **Test P/I transducers**
  Read mA or Volts
  Built-in 24V loop supply
- **Pressure engineering units**
  PSI, Bar, mbar, kg/cm^2, mm Hg, in Hg, kPa, in H_2O @4°C, in H_2O @20°C, in H_2O @60°F, cm H_2O @4°C, cm H_2O @20°C, mm H_2O @4°C & mm H_2O @20°C
- **Electrical engineering units**
  mA, % 4 to 20 mA, % 10 to 50 mA and Volts DC

The Transmation PneuCal IV-B Digital Pneumatic Calibrator improves upon traditional dial gauge pneumatic calibrators. The Transmation PneuCal IV-B provides digital accuracy of ±0.035% and also incorporates mA and V inputs, and a built-in 24 volt loop power supply to simultaneously power a device while reading the resultant current.

This equipment is designed primarily for field checking and calibration of pneumatic controls, switches and instrumentation. In most cases, the device being checked need not be removed from its mounting or operating location.

The Transmation PneuCal IV-B consists of a carrying case containing an aluminum panel with the mounted digital pressure indicator, a selector valve, two precision pressure regulators, an air filter and a connection block. A graphic flow diagram on the panel shows clearly all connections between the various units.

Do not discard these instructions.The information provided in this document is essential to safe, proper equipment operation and maintenance.

1. General Information

1.1 Description

The Transmation PneuCal IV-B Digital Pneumatic Calibrator improves upon traditional Pneumatic Calibrators. The Transmation PneuCal IV-B improves accuracy, provides digital accuracy of ±0.035% and also incorporates mA and V inputs, and a built-in 24 volt loop power supply to simultaneously power a device while reading the resultant current. This equipment is designed primarily for field checking and calibration of pneumatic controls and instrumentation. In most cases, the device being checked need not be removed from its mounting or operating location. The Transmation PneuCal IV-B consists of a carrying case containing an aluminum panel with the mounted digital pressure indicator, a selector valve, two precision pressure regulators, an air filter and a connection block. A graphic flow diagram on the panel shows clearly all connections between the various units.

1.1.1 Selector Valve

The Transmation PneuCal IV-B employs a differential pressure sensor. The low side of the sensor is connected directly to port “S” on the calibrator. The high side of the sensor can be pressurized directly via port P3, or through the two regulators via ports Pl and P2. The selector valve permits only one of the three pressure ports to be applied to the pressure connection in the gauge. A fourth position permits venting pressure from the gauge to atmosphere.

1.1.2 Air Filter

The air filter mounted under the panel is easily replaceable and protects the various components if the air supply is of less than instrument air quality. WARNING: TO AVOID POSSIBLE SEVERE PERSONAL INJURY, DO NOT APPLY PRESSURE IN EXCESS OF 90 PSI TO THE FILTER.

1.1.3 Precision Pressure Regulators

The two precision pressure regulators accept supply air pressure up to 90 PSIG through the filter and regulate the output. These are used in applying known pressures to pneumatic control devices.

1.2 Unpacking

Remove the packing list and verify that all equipment has been received.

Upon receipt of shipment, inspect the container and equipment for any signs of damage. Take particular note of any evidence of rough handling in transit. Immediately report any damage to the shipping agent.

NOTE: THE CARRIER WILL NOT HONOR ANY CLAIMS UNLESS ALL SHIPPING MATERIAL IS SAVED FOR THEIR EXAMINATION.

After examining and removing the contents, save packing material and carton in the event reshipment is necessary. Check to see that the unit is complete. Included with the calibrator should be a set of test leads and an AC adapter/charger.

Become familiar with the designation and polarities of the five jacks located below the keypad of the calibrator.

2. Operation

2.1 Operating Safety Considerations

- All electrical connections are fused with a 1/8 Amp 2AG size fuse located on the printed circuit board near the input jacks. These fuses can be replaced in the field by removing the six(6) faceplate screws and removing the faceplate to change the fuse in question.
- When using the internal 24 volt power supply to power a device under test, be aware that the internal power supply is current limited to approximately 25 mA.
- Do not subject the instrument to pressure beyond its range. This can easily be controlled by properly setting the air regulator.
- Unless wide temperature changes are experienced, the effect of temperature may be neglected. Do not use the instrument near a source of heat or cold. Temperature allowance equals 0.01 percent of full scale per 1° C change from calibration temperature of 23°C. Temperature allowance represents the maximum possible error due to temperature.
- Compatible media is clean, dry air. Strong corrosive gases should be avoided. DO NOT use for liquid service.

2.2 Operating Instructions

NOTE: BEFORE ANY PRESSURE MEASUREMENT CAN BE MADE, THE CALIBRATOR MUST BE ZEROED OUT. THIS CAN BE DONE BY SETTING THE SELECTOR VALVE TO THE “VENT” POSITION AND BY PRESSING THE ZERO KEY. IT IS ADVISABLE TO DO THIS OFTEN TO ENSURE ACCURATE CALIBRATIONS ARE BEING MADE.

2.2.1 Selecting engineering units

1) Turn on the calibrator and select desired pressure range by pressing the “Range Select” key.
2) For voltage measurements press the the “Volts” key.
3) For milliamp measurements or for switch testing press the “mA” key. Select from mA, %4-20, %10-50 or Switch (for testing pressure switches).
4) Electrical connections for milliamps are shown in Figures 1 and 2.

2.2.2 Measurement of Pressure from External Sources

IMPORTANT: ALWAYS BE SURE TO USE TEFLON TAPE ON ALL FITTINGS BEING CONNECTED TO THE MANIFOLD. EVEN AT LOW PRESSURES LEAKS WILL OCCUR IF TEFLON TAPE IS NOT USED. IT IS RECOMMENDED THAT THREADS ARE WRAPPED 3 TO 4 TIMES WITH TAPE TO ENSURE AN AIRTIGHT FIT.

1) Connect the unknown pressure to connection marked P3. Leave “S” open to atmosphere.

NOTE: MAXIMUM INPUT PRESSURE IS 100 PSI.

2) Turn selector valve to position P3 and read the pressure on calibrator.

NOTE: FOR VACUUM GREATER THAN 100 INCHES OF WATER, CONNECT TO “S” AND LEAVE P3 OPEN TO ATMOSPHERE.

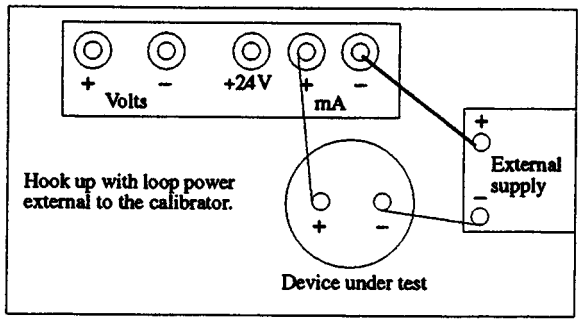

Figure 1. Loop power is supplied by an power supply in the loop. The calibrator is hooked in series with the remainder of the loop where applicable.

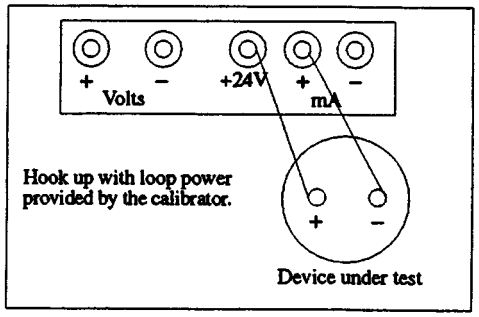

Figure 2. The PneuCal IV-B supplies power to the loop. The calibrator is hooked in series with the remainder of the loop where applicable. Use this hookup to test pressure switches.

2.2.3 Calibration of Pressure Gauges with Regulated Air from the PneuCal

1) Connect AIR SUPPLY to a source of air pressure from 0 to 90 psig.
2) Connect gauge to PI or P2 with flexible tubing or, if gauge is small enough and has 1/8-inch NPT male thread, screw gauge directly into connection block at PI or P2.
3) Turn handle of appropriate regulator counter-clockwise until spring in regulator is completely relaxed.
4) Turn handle of selector valve to appropriate position.
5) Turn on air supply, adjust pressure to desired value with regulator and compare gauge reading with the calibrator reading.

2.2.4 Calibration of Pneumatic Recorders or Indicators

1) Connect air supply and recorder or indicator as in 2.2.3, sentence 2 or 3 above.
2) Proceed as in 2.2.3, sentence 4 and 5, comparing recorder pen reading or indicator pointer reading with calibrator reading.

2.2.5 Measurement of Pressure Differentials from External Sources

1) Connect higher of two pressures to P3.
2) Turn selector valve handle to position P3.
3) Apply lower of two pressures to “S” and read difference in pressure on calibrator.

CAUTION: DECREASE REFERENCE PRESSURE TO ZERO OR SHUT IT OFF BEFORE SHUTTING OFF OR DISCONNECTING PRESSURE CONNECTION ON P3.

2.2.6 Calibration of Pneumatic Controller in Which Applied Set and Variable Pressures Result in an Output Pressure Which is a Function of the Other Two Pressures

1) Connect AIR SUPPLY to a source of air pressure not exceeding 90 psig.
2) Connect PI to SET pressure connection on control device.
3) Connect P2 to PROCESS VARIABLE pressure connection on control device.
4) Connect OUTPUT connection on control device to P3.
5) Turn regulator handles counter-clockwise until spring in regulator is completely relaxed.
6) Turn on air supply.
7) Turn selector valve to position PI and adjust Regulator 1 until SET pressure displayed on calibrator is the value required by the particular device.
8) Turn selector valve to position P2 and using Regulator 2 set the PROCESS VARIABLE to the desired value.
9) Turn selector valve to P3 and read the OUTPUT pressure resulting from action of P1 and P2 on controller.
10) Repeat steps 8 and 9, at various points, as many times as desired to cover the range of PROCESS VARIABLE pressure.

2.2.7 Adjustment of Any Pneumatic Device in Which the Difference Between Two Signals Should Be Zero or Some Value Not Exceeding the Range of the Calibrator

1) Connect the two signals to P3 and “S” respectively with the higher pressure on P3.
2) Turn selector valve to P3.
3) Turn on the two signals simultaneously if possible. Otherwise turn on P3 first. WARNING: TO AVOID POSSIBLE SEVERE PERSONAL INJURY OR EQUIPMENT DAMAGE, THE PRESSURE APPLIED TO “S” MUST NOT EXCEED 105 PSI.

2.2.8 Measurement of Absolute Pressure

1) Connect vacuum pump to “S” and evacuate the low side of the differential sensor (as close as possible to a full vacuum). The reading will indicate pressure below atmosphere (vacuum).
2) Connect pressure to be measured to P3.
3) Turn selector valve to P3 and read absolute pressure.

2.2.9 Calibrating Pressure Transmitters (P/I Devices)

1) Connect AIR SUPPLY to a source of air pressure not exceeding 90 psig.
2) Connect PI or P2 to the pressure input on the device under test.
3) Turn regulator RI handle counter-clockwise until completely relaxed.
4) Make electrical connections in series with the current loop per diagram in Figure I.
5) Turn on air supply.
6) Adjust air pressure to desired setting using regulator RI.
7) Read pressure and current on display.
8) To check zero and span or mid-range values, repeat steps 7 & 8 at desired test points.

2.2.10 Verifying Pressure Switches

1) Disconnect any electrical connections to the switch being tested.
2) Connect the pneumatic (pressure) input of the switch to one of the PneuCal IV-B’s outputs.
3) Press the “ma” key until the word “SWITCH” appears on the display.
4) Connect the pressure switch output to the +24 and + mA jacks on the PneuCal IV-B as shown in figure 2.
5) The display will indicate “OPEN” or “CLOSED” depending on continuity.
6) Adjust the pressure output and note the pressure readings when the switch display changes between “OPEN” and “CLOSED”.
7) Repeat this test with both rising and falling pressures to determine

3. Maintenance

3.1 General Care of Instrument

This calibrator is a precision instrument. It has been constructed as ruggedly as the service for which it is intended will permit. Every precaution has been taken to prevent it from going out of adjustment when subjected to vibration and shock. In view of this, the instrument should be handled with care and protected against violent and sudden jolts.

This instrument is intended for use with clean, dry, non-corrosive gas only.

3.2 Air Filter

Replace air filter U28021 or U13422 at regular intervals depending on the quality of the air supply and the frequency with which the calibrator is used. To protect your precision instrument, routine filter change is necessary. With daily use of the calibrator, change filter every month, with frequent use, change every three months, and with occasional use, change filter every year. Replacement filters are available from Transmation.

3.3 Regulator

The regulator can be replaced, if needed. Please consult Transmation for the correct replacement of this part. Be sure to specify the range as stamped on the bottom of the regulator.

3.4 Batteries

The PneuCal IV-B is powered by 5 rechargeable AA batteries. A charging unit is supplied with the instrument, the charger connection is located on the Pneu-Cal face plate. The unit can be operated with the charger plugged in, the batteries will charge while the unit is in use. In the event that the batteries need to be replaced, standard NiCd AA batteries can be used. Non-rechargeable batteries can also be used if desired. Contact the factory for alkaline battery conversion instructions.

Product Specifications

Accuracy	Pressure: ±0.035% of full scale mA, %4-20 mA, %10-50 mA: ±0.025% of full scale V: ±0.025% of full scale
Temperature coeffieient	0.01% full scale/°C from 0 to 18°C and 28 to 50°C
Loop power	24V DC, current limited to a nominal 24 mA
Switch test	Dry (unpowered) contacts only, nominal 24 mA @ 24 VDC excitation current supplied to contact
Modes of operation	Gauge, differential, vacuum (vacuum to -5 PSI)
Media compatibility	Clean, non-corrosive gasses
Operating temperature	0°C to 50°C (32°F to 122°F)
Storage temperature	-20°C to 60°C (-18°F to 154°F)
Electrical protection	Fuse, 1/8 Amp
Display	2-line, 16 character dot matrix
Power	Internal Ni-Cd batteries or AC adapter that simultaneous charges batteries and powers the calibrator
Size (HWD)	343mm x 292mm x 140mm (13.5" x 11.5" x 5.5")
Weight	7.25 kg (16 lbs.)

Ranges:

PSI	-5.00 to 100.00	BAR	-0.345 to 6.895
mbar	-345 to 6,895	kg/cm^2	-352 to 7.031
mm Hg	-259 to 5172	in Hg	-10.18 to 203.60
kPa	-34.5 to 689.5	in H_2O@4°C	-138.4 to 2768.1
inH_2O@20°C	-138.5 to 2,770.7	inH_2O@60°F	-138.5 to 2,770.7
cmH_2O@4°C	-352 to 7,031	cmH_2O@20°C	-352 to 7,031
mmH_2O@4°C	-3515 to 70,308	mmH_2O@20°C	-3515 to 70,308
mA	0.00 to 52.00	Volts	0.000 to 20.000
% 4-20 mA	-25.00 to 300.00	%10 to 50 mA	-25.00 to 105.00
Switch	OPEN or CLOSED		

Warranty

Transmation products are warranted to be free from defects in material and workmanship (excluding fuses, batteries and leads) for a period of one year from the date of shipment. Warranty repairs can be obtained by returning the equipment prepaid to our factory. Products will be replaced, repaired, or adjusted at our option. *Transmation gives no other warranties, including any implied warranty of fitness for a particular purpose.* Also, Transmation shall not be liable for any special, indirect, incidental or consequential damages or losses arising from the sale or use of its products.

Ordering information	**Part No.**
PneuCal IV-B Pneumatic Calibrator for 110 VAC	24454P
PneuCal IV-B Pneumatic Calibrator for 220 VAC	24454P-220

Included with each PneuCal are:
Test leads, AC Adapter/Charger

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