INSTRUCTIONS FOR FIELD SERVICING

TELEDYNE PRESSURE TRANSDUCER

Taber®

Model 206

TABER INSTRUMENT CORPORATION

107 Goundry Street, North Tonawanda, New York, U.S.A.

Telephone LUdlow 8900, TWX Ton 277

GENERAL INFORMATION

INSPECTION OF DIAPHRAGMS AND CLEANING OF PRESSURE CAVITY

Fig. 1 The cap containing the pressure cavity should be removed according to disassembly steps 1 and 2. With minimum lapse of time, the diaphragms and pressure cavity should be cleaned, using a soft lintless cloth and Methylene Chloride, and the instrument recapped following steps 7 through 14.

PRELIMINARY INSPECTION OF A TELEDYNE TRANSDUCER THAT MALFUNCTIONS

First the transducer should be checked out electrically referring to the instrument's Calibration Record Card for the following information: input voltage or current, gage resistance, pressure check points, linearity, hysteresis and wiring diagram. If the transducer's failure is due to reasons within the electrical circuit, the instrument should be returned, postage prepaid, to the factory for servicing and recalibration.

If diaphragm damage is evident such as signs of dents or corrosion, a new Diaphragm Replacement Set should be installed. The proper replacement set for the particular pressure range of the instrument should be ordered from the factory using the following information. When ordering specify: Model, Serial Number, and pressure range of instrument.

Fig. 2

Cat. No.	DESCRIPTION	QUANTITY
206	**Diaphragm Replacement Set—**	
	For Pressure Ranges up to 2000 PSI Set consists of: Matched set of 2 diaphragms, 1 seal and 12 screws and lockwashers.....	one set
	For pressure ranges 3000 and 4000 PSI Set consists of: Matched set of 2 diaphragms, 1 "O" ring and 12 screws and lockwashers.....	one set
	For Pressure Range 5000 PSI Set consists of: Matched set of 3 diaphragms, 1 "O" ring and 12 screws and lockwashers.....	one set

The following steps Fig. 1 through Fig. 15 describe and detail the procedure to be followed whenever it becomes necessary to open a Teledyne Pressure Transducer for the purpose of installing a Diaphragm Replacement Set.

DISASSEMBLY

Fig. 3 **FIGURE 1.** Place the instrument in an upright position on the bench top. A cloth wrapped around the instrument body will insure hand protection while the screws are being loosened. The instrument should be grasped with the edge of the hand resting against the electrical connector. This will provide sufficient leverage to permit loosening the cap screws. IMPORTANT: The instrument should not be clamped in a vise unless it is supported between wood blocks shaped to fit the instrument contour.

FIGURE 2. Remove the cap as follows: First, the 12 cap screws should be broken free by a partial turn with an Allen wrench on the first pass around the circumference. Remove the screws completely on the second pass.

FIGURE 3. Lift the cap and carefully remove the diaphragms, seal, screws and lockwashers. Remove the piston by inverting the instrument with one hand and slightly tapping it on the palm of the other hand until it falls. NOTE: Care should be exercised to keep dust or dirt from entering into the measuring chamber while the instrument is temporarily opened.

Fig. 4 **FIGURE 4.** Clean all replacement and exposed parts including the piston bore and piston centering pin. Methylene Chloride is recommended. (This chemical should be used with due safety precautions regarding inhalation of fumes or body contact.) A soft lintless cloth, similar to that used for wiping spectacles, should be moistened with the chemical and used for cleaning the parts. IMPORTANT: Do not use Carbon Tetrachloride as it leaves a white residue.

FIGURES 5 and 6. If the instrument has been opened for more than one half hour, or if the cleaning fluid has penetrated the body of the instrument, the following drying procedure is necessary. The instrument, with piston removed, should be placed in an oven and maintained at a temperature of 220°F, for three days. If a vacuum oven is available, the drying time at 220°F may be shortened to eight hours. Too much stress cannot be placed on a thorough drying procedure, because any skimping here will show up as a gradual zero shift after the instrument has been resealed and returned to service.

CAUTION—After the Teledyne has been removed from the drying oven do not allow the cap to remain unsealed from the Teledyne body overnight or for prolonged periods of time (not over one half hour).

RANGES 1000 AND 1500 (PSI) ONLY. After steps 7 through 15 have been completed, the Teledyne Instrument is left to cool completely. The six instrument base screws are loosened and the base lifted slightly or "cracked" enough to release the partial vacuum which is contained inside the instrument. The screws are then immediately retightened, sealing the internal cavity of the Teledyne from the outside atmosphere. The Teledyne Instrument is then ready for calibration.

NOTE: A diaphragm replacement kit is available from the factory which consists of: diaphragms, one seal, twelve screws and lockwashers. (See replacement parts.) The metal diaphragms are of extremely light gauge metal, manufactured to precise tolerances, and should be handled with special care. If the diaphragms in the instrument should show any damage however slight, such as being dented or crimped, it is imperative that they be replaced.

Fig. 5 *Vacuum Oven—Drying Time 8 Hours*

Fig. 6 *Standard Oven—Drying Time 3 Days*

REASSEMBLY

FIGURE 7. Place the cap on the bench with the pressure cavity facing up, then lay the seal in the cap cavity and place the metal plain diaphragm on top of it (convex side up).

Fig. 7

FIGURE 8. Place the flanged diaphragm over the first one (convex side up) and gently press it with the fingers until both become flush.

Fig. 8

Fig. 9

FIGURE 9. Gently place piston on flanged diaphragm, inside the convex ring. Hole in piston should be up.

Fig. 10

FIGURE 10. The body of the instrument is grasped in one hand, with the electrical connection up, and tilted slightly towards the cap until the upper edge of the instrument is lightly contacting the flanged diaphragm. The instrument is then slowly moved to the vertical position, engaging the piston and piston centering pin.

Fig. 11

FIGURE 11. Invert the instrument using both hands so the cap is up. A light spin of the cap will make sure that the diaphragms and seal are in proper position for clamping.

NOTE: The diaphragm must be handled with extreme care. Any attempt to place the diaphragm on top of the instrument and then lower the cap over it is almost certain to result in catching the edge of the diaphragm between the cap and the body of the instrument with resultant damage to the diaphragm and subsequent leakage.

Fig. 12

FIGURE 12. Line up the cap screw holes with the mating holes in the body of the instrument and insert three equally spaced screws without lockwashers. Screws should spin easily into holes without binding. Run the screws down until each lightly makes contact with the cap. Torque each screw in turn, proceeding in small increments, going from one screw to the next, until all three screws are firmly seated.

FIGURE 13. Place lockwashers in the remaining nine holes and insert the rest of the screws. Repeat the above tightening procedure on the added screws. Then remove the initial three screws, insert lockwashers and re-tighten.

Fig. 13

FIGURE 14. As a final step, go over all the screws and torque them as tightly as a hand-held Allen wrench will permit.

Fig. 14

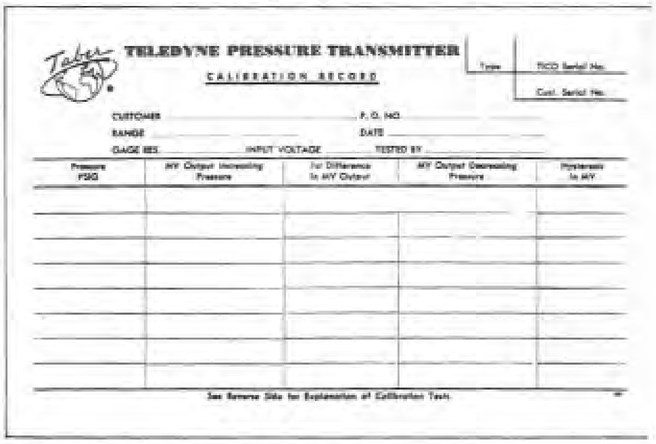
PRESSURIZING NEW DIAPHRAGMS PRIOR TO CALIBRATION

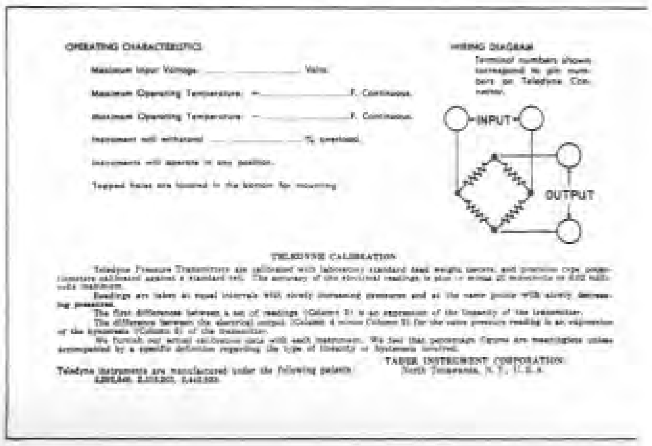
Before the instrument can be calibrated, the new diaphragms must be properly seated by pressurizing them. The initial cycling pressure is usually applied only once to the instrument. The required initial cycling pressure for each Teledyne range is given in the following chart. Care and caution must be exercised during the cycling operation so as not to overpressure the diaphragms beyond the limits as this will cause subsequent low output readings during recalibration.

MODEL 206 TELEDYNE INITIAL CYCLING PRESSURE CHART

Range (PSI)	*Initial Cycling Pressure (PSI)*
300	910
500	3100
750	2260
1000	3100
1500	6100
2000	7100
3000	7000
4000	9500
5000	10000

The Calibration Record Card shown at right which initially accompanies each Teledyne instrument is referred to for the following information: input voltage or current, gage resistance, pressure check points, linearity, hysteresis and bridge schematic.





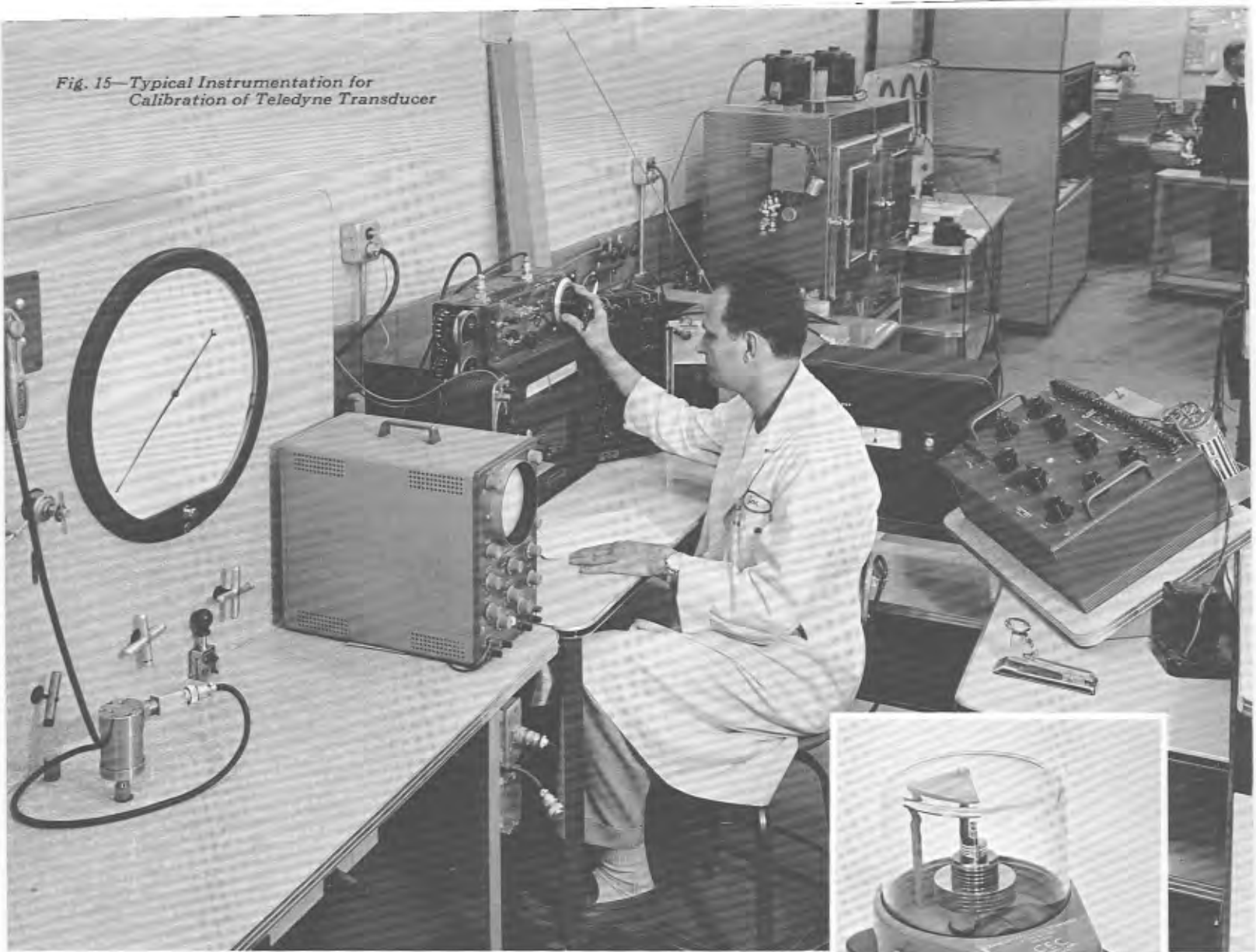


Fig. 15—Typical Instrumentation for Calibration of Teledyne Transducer

Fig. 15-A—CEC Primary Pressure Standard 0.3 to 150 PSI

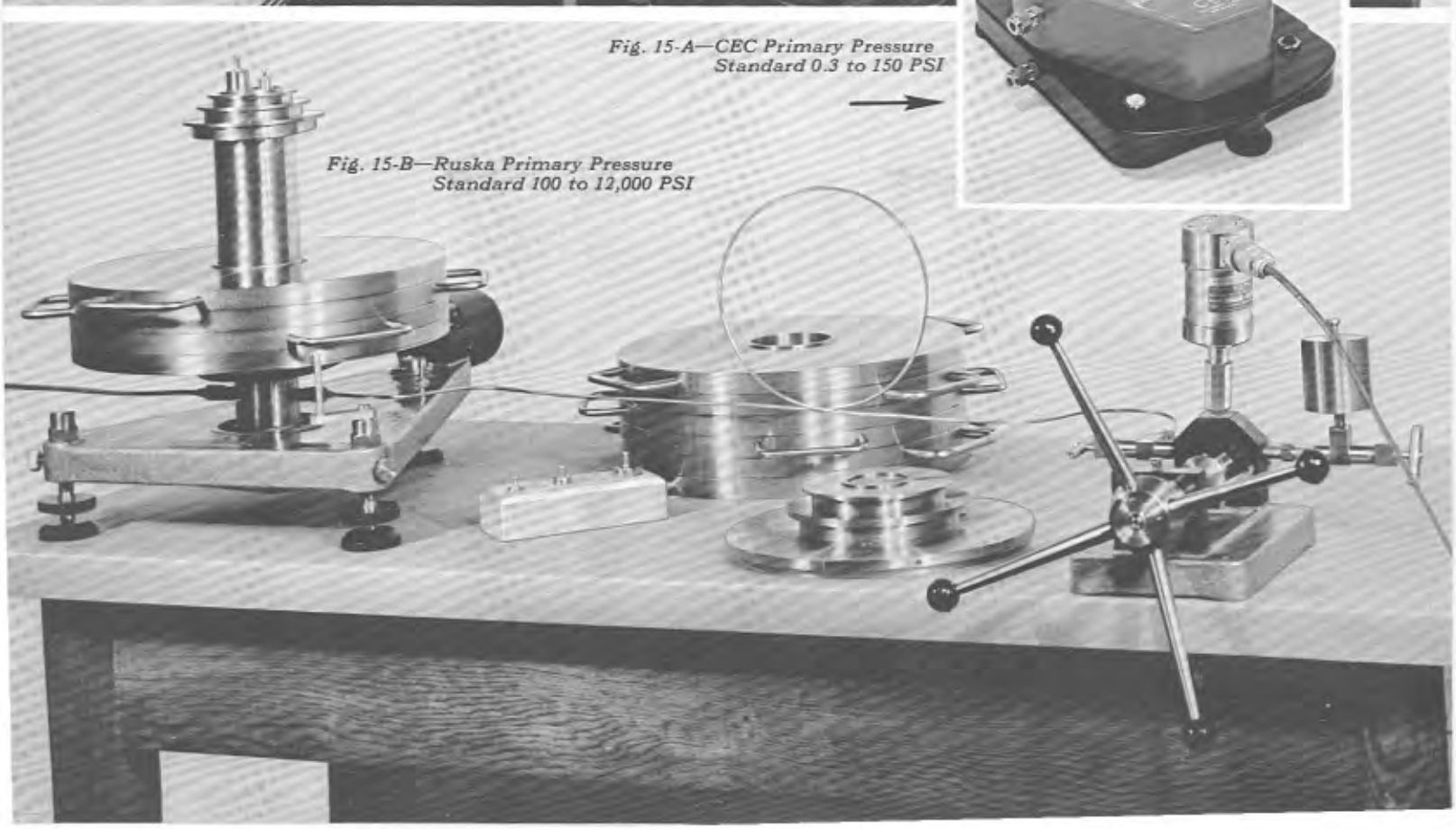


Fig. 15-B—Ruska Primary Pressure Standard 100 to 12,000 PSI

FIGURE 15. A slight difference between the new calibration points and those listed on the original calibration sheet furnished with the instrument may be noticed. This should be very small and can be attributed to several factors. The prime ones are the slight differences between the new and old diaphragms and the discrepancies between the calibration equipment.

SETTING UP A TYPICAL DEAD WEIGHT STANDARD TESTER

GENERAL

The dead weight gage should be erected on a heavy table or pier. The two leveling screws and the base support in the rear of the base casting should be supported on the foot plates furnished with the instrument. The hand pump should be securely fastened to a separate support to prevent jarring the tester when applying the transducer or may, if necessary, be mounted to the same table. The hand pump and gage should be filled with a turbine oil, such as Teresso No. 43 or No. 52 (Esso), or an equivalent. No. 43 oil (light) gives faster response, but slightly increases piston leakage. While automotive motor oil is not recommended, SAE No. 10 or No. 20 may be used, should the aforementioned not be available. Some time may be required for trapped air to bleed out of the system.

EFFECTIVE AREA

The effective diameter of a piston gage is the mean diameter of the piston and cylinder, provided the piston is concentric with the cylinder and falling at a rate at which the volume displaced by the piston is equal to the leakage between it and the cylinder. If, because of other volume changes in the system, the piston is falling at any other rate, the effective area will be changed.

PISTON AND CYLINDER

The diameter of the piston is measured with an optical comparator, using precision gage blocks as standards. The cylinder bore is measured with plug gages. The diameters of the plug gages are determined in the same manner as that of the piston. These measured dimensions are correct at 20°C.

WEIGHTS

The mass of the "weights" for the Dead Weight Gage is determined by comparison with Class S standards. These scientific standards are designed for comparison, calibration and precise analytical work. To allow greater convenience in computing the pressure exerted by the "weights," their mass is adjusted at the time of calibration to give the proper weight at standard gravity in air of density 1.2 mg/cm^3. It is this weight, rather than the mass, that is listed on the calibration data sheet. The "weights" are calibrated for the effective diameter of the piston-cylinder combination at zero pressure at 20°C.

FRICTION

To reduce inaccuracies caused by friction, the axis of the piston and cylinder assembly of a dead weight gage must be vertical at all times. The base of the Dead Weight Gage is equipped with leveling screws and has a circular level vial as reference. Weights must be stacked uniformly with care to maintain symmetry and prevent side loading. A film of oil between the piston and cylinder is maintained by rotating the piston assembly. For this purpose, a small motor is mounted on the base of the gage.

EQUILIBRIUM

Time to establish equilibrium must be allowed. This time depends upon the viscosity of the fluid and the conditions of observation.

CORRECTIONS

Dead weight gages are subject to a number of corrections. The more important ones are briefly discussed below.

Gravity: The pressure exerted by the piston is proportional to the value of gravity acting upon it. The local value of gravity in each vicinity is affected by latitude and the elevation of the gage above sea level. If the gravity cannot be measured accurately for the locality, it should be obtained from some nearby gravity station and the value corrected to the locality of the gage.

Barometric Pressure: The mass of the "weights," being converted to weight in normal air at the time of calibration, will require no buoyancy correction by the operator.

Changes in barometric pressure have little effect on the buoyancy of the weights; a drop of 6 cm (2.35") of Hg. from standard results in an increase in weight (therefore, pressure) of 0.001%.

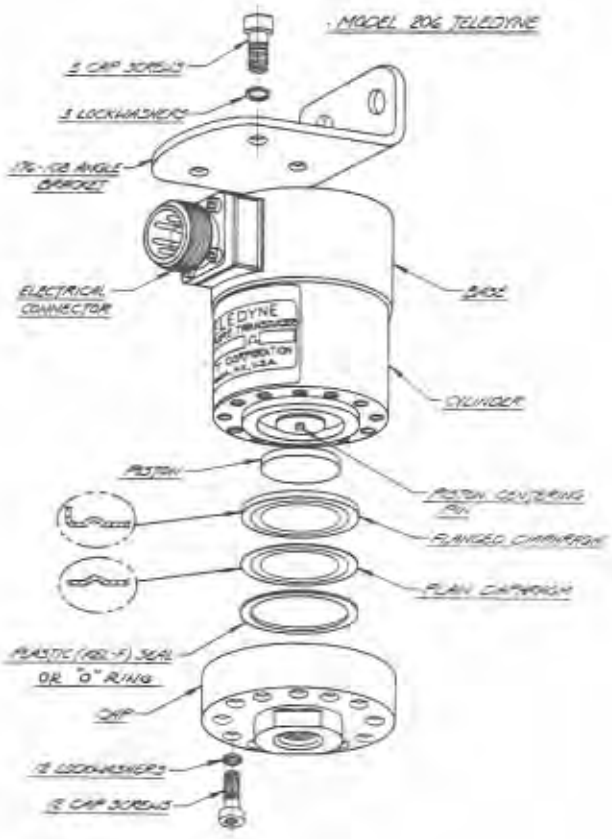
For measurements in which the absolute pressure must be known, the barometric pressure must be added to the gage pressure.

Temperature: An effort should be made to determine the temperature of the piston gage. A rise in temperature of 10°C. will result in a decrease of approximately 0.024% of the pressure exerted by the weights.

If the gage is used in applications where absolute pressure ratios are of greater importance than actual pressures, the temperature has no effect as long as it is constant.

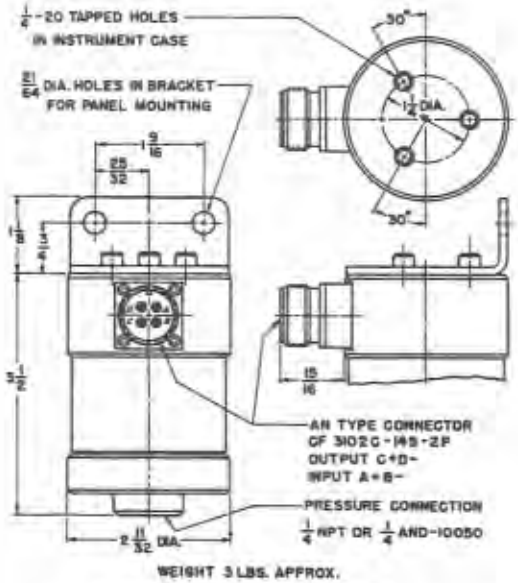
Caution: Care must be exercised in loading and unloading the gage in order to prevent damaging the piston and cylinder by slamming the piston stop against the body of the cylinder.

EXPLODED VIEW
MODEL 206 TELEDYNE



REPLACEMENT PARTS FOR
MODEL 206
TELEDYNE PRESSURE TRANSDUCERS

Cat. No.	DESCRIPTION	QUANTITY
176-108	**BRACKET FOR PANEL MOUNTING**—Complete with screws	1
206	**DIAPHRAGM REPLACEMENT SET—Specify Type, Serial Number and Pressure Range of Instrument.**	
	For Pressure Ranges up to 2000 PSI. Set consists of: Matched set of 2 diaphragms, 1 seal and 12 screws and lockwashers	one set
	For Pressure Ranges 3000 and 4000 PSI. Set consists of: Matched set of 2 diaphragms, 1 "O" ring and 12 screws and lockwashers	one set
	For Pressure Range 5000 PSI. Set consists of: Matched set of 3 diaphragms, 1 "O" ring and 12 screws and lockwashers	one set
	CONNECTOR PLUGS—(Female) To mate with Connector on Teledyne	1
	Plug WK-4-21C-5/16" (Cannon) to mate with WKP-4-32S (Cannon) Connector.	
	Plug 10-72614-2S (AN Type) to mate with ANCF-3102C-14S-2P Connector.	
	Special connectors available on special order.	



MOUNTING DIMENSIONS

TELEDYNE SERVICE DIVISION—A complete department is maintained for recalibrating, repairing or rebuilding Teledyne pressure transducers. Instruments should be carefully packed and forwarded with letter describing malfunction.

WARRANTY: Taber Instrument warrants all equipment or service supplied by it to be free from defects in workmanship or material under normal use and service. All such equipment and service is supplied subject to this warranty, and the Company's obligation thereunder is limited to repairing or replacing at its factory any part thereof which shall be returned, transportation charges prepaid, within 90 days from date of shipment, and which our examination shall disclose to our satisfaction to have been thus defective, this warranty is expressly in lieu of all other warranties expressed or implied, and of all obligations or liabilities on its part for damages following the use or misuse of the article or service supplied. No agent is authorized to assume for it any liability except as set forth above.

TABER INSTRUMENT CORPORATION

107 Goundry Street, North Tonawanda, New York, U. S. A.

Telephone LUdlow 8900, TWX Ton 277