IB-1A202
Issue 2

INSTRUCTIONS for

FULSCOPE CONTROLLER

WITH

ADJUSTABLE SENSITIVITY AND RESET

CONTROL RESPONSES

ABB Kent-Taylor

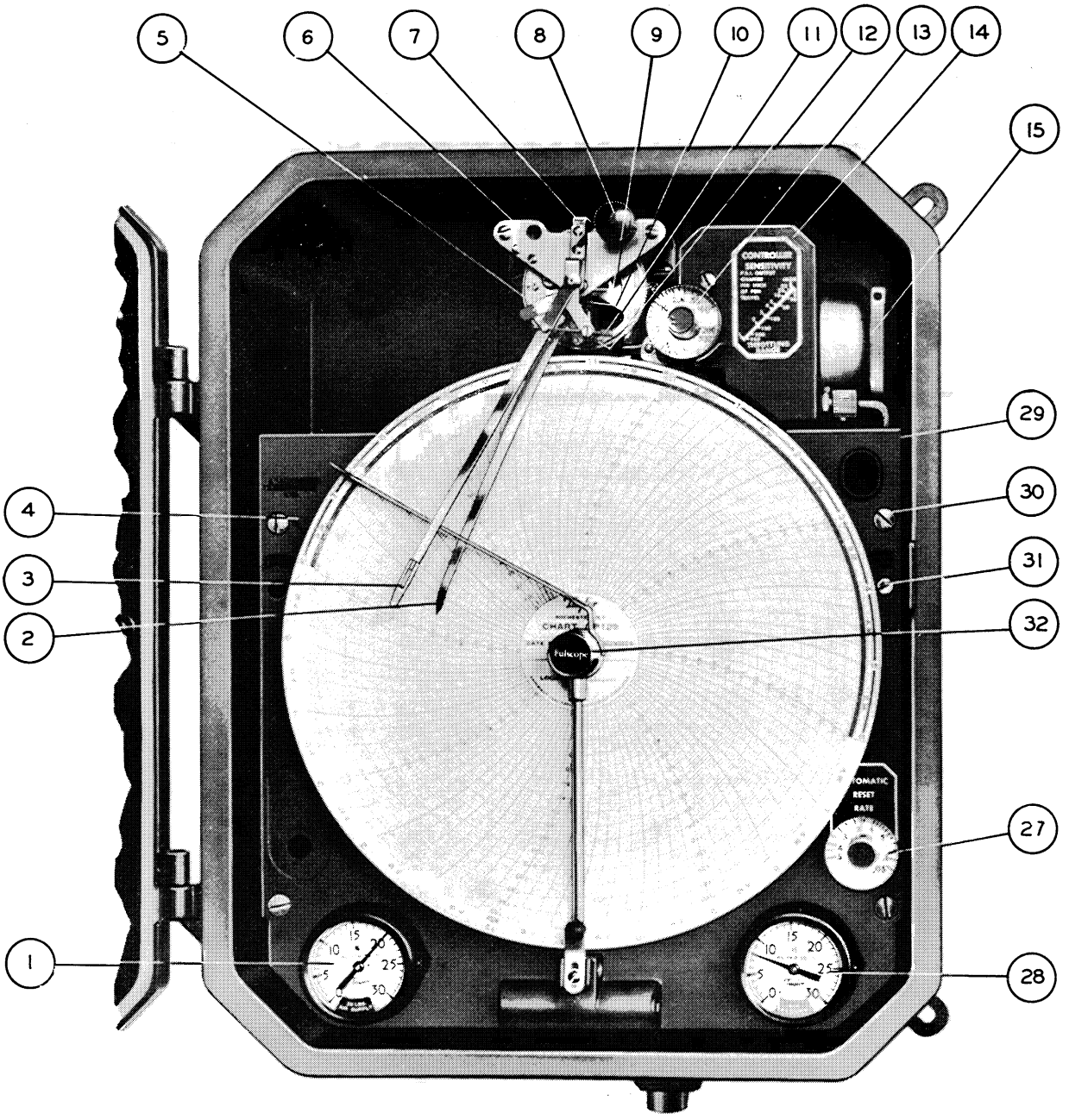


Fig. 1

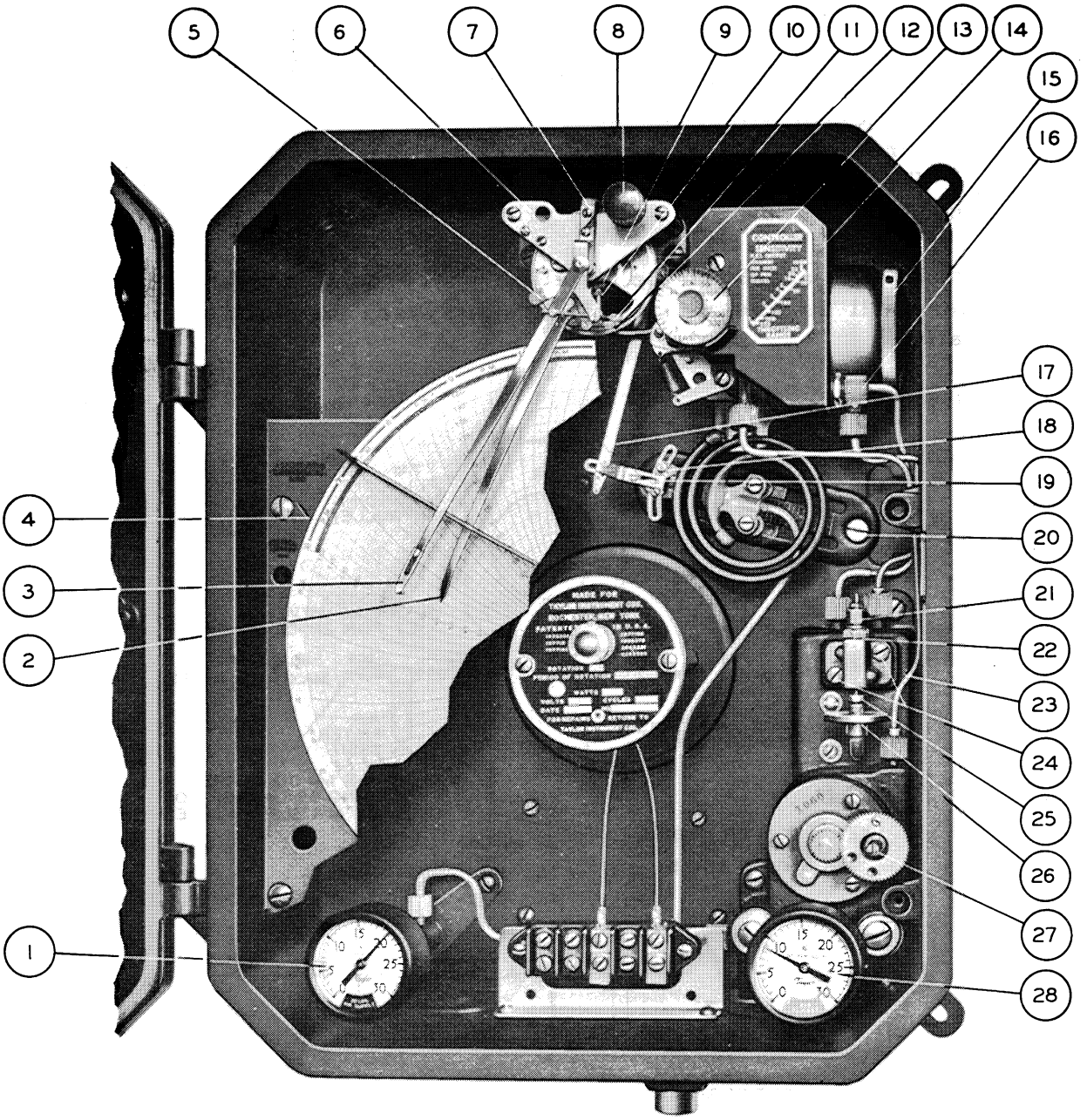


Fig. 2

INSTALLATION

A. General

Mount the Taylor Fulscope Controller on a wall or panel where it will be free from vibration. The mounting dimensions given on the back of this instruction form show how the mounting brackets are placed for either wall or panel mounting, and give other information necessary for installing the instrument. The controller should be installed where the temperature surrounding the case will not be lower than 32°F.; otherwise, there is the danger of moisture in the air lines freezing and impairing the operation of the instrument. If the air supply is absolutely "dry" temperatures lower than 32°F. will not be injurious.

The controller should not be installed where the temperature surrounding the case will be higher than 155°F.; otherwise, the clock may become inoperative.

B. Air Supply

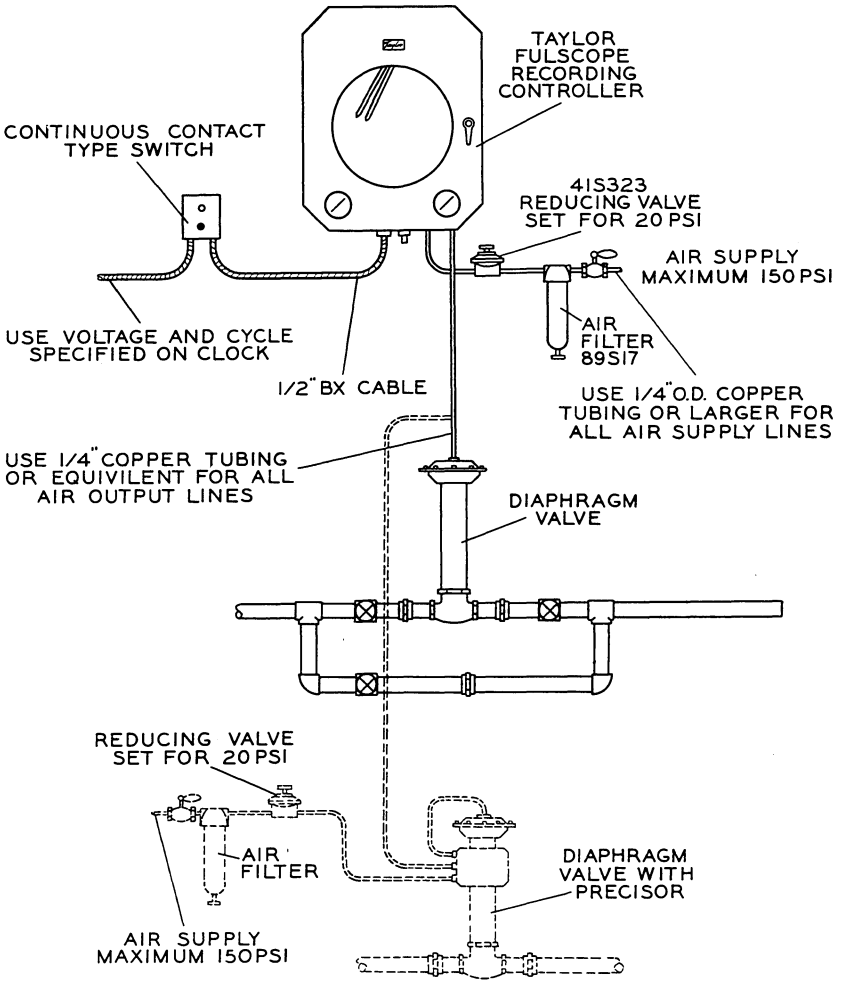


Fig. 3

Connect a clean dry air supply to the controller and the Precisor as shown in Fig. 3. The Taylor Fulscope Controller consumes approximately 0.4 cubic feet of free air per minute. The Taylor Precisor consumes approximately .15 cubic feet of free air per minute. The air supply must be sufficient to supply all units.

A shut-off valve in the air supply line is desirable. The size of supply piping is not critical. 1/4" o.d. copper tubing is large enough to supply one controller but larger tubing or pipe may be used. Use only corrosion-resistant material such as copper or brass. Do not use black iron pipe.

The air supply line should be sloped so that moisture drains away from the instrument. The Taylor air filter serves to remove dirt, rust and liquid globules of water and oil which may be carried in the air stream. If, during operation, it is found necessary to drain water from the filter oftener than once a day, this indicates that additional moisture traps are needed. Avoid getting dirt, pipe scale, burrs, chips, oil, pipe dope and all foreign matter in the air lines when connecting them. Before making the final connection to the filter, instrument, valve or other appliance, blow out the lines thoroughly. 80% of all instrument troubles are caused by dirty air.

Ream the burrs from the ends of each length of tubing, and blow it out thoroughly before making connections. Make sure that all connections are tight.

Fig. 3 shows the connections to be made from the controller to the Precisor or control valve.

C. Temperature Controller

A temperature controller may be installed as shown in Fig. 4.

After mounting the instrument case, carefully uncoil the tubing which connects the case and bulb. This tubing must not be kinked, cut or broken. Bends should not be less than 3" radius. Run the tubing in approximately its permanent location and install the bulb in the apparatus which is to be controlled. Then finally locate and properly support the connecting tubing.

Place the separable hub, well or steam circulating fitting in the apparatus first. Then insert the bulb and tighten the coupling nut. If the instrument has a plain bulb, install it in the apparatus where it will be subject to good circulation, but not too close to a radiating coil or open steam inlet. If a separable well is used, make certain the THERMOSPEED sleeve is inserted between it and the bulb, also that the bulb is pushed completely to the bottom of the well to insure maximum heat transfer.

If the tube system is of the vapor pressure type, make certain the elevation of the bulb with respect to the instrument case is the same as that for which the controller is designed. The bulb elevation is given on the data plate on

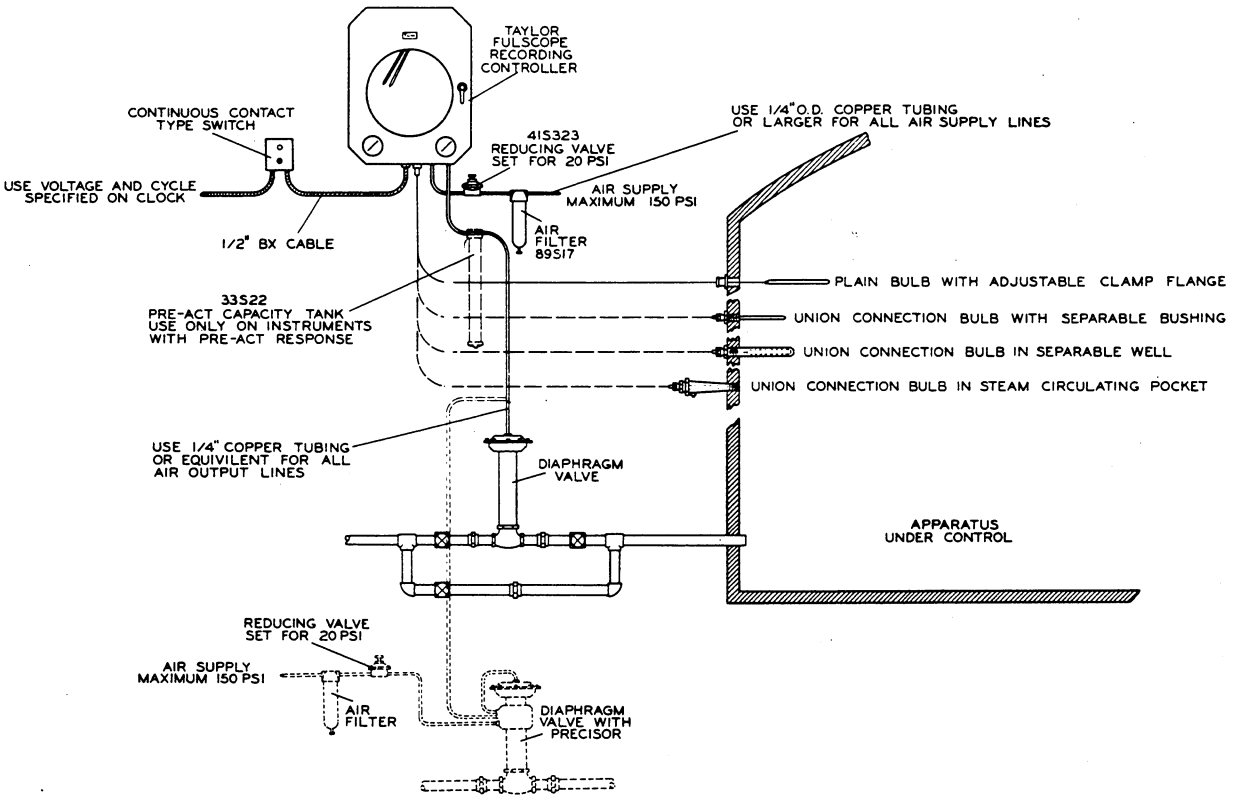


Fig. 4

the inside of the instrument door. Should the elevation be slightly different, it will be necessary to reset the pen to agree with the reading of an accurate test thermometer. (Page 15, paragraph E.)

The elevation on mercury tube systems is immaterial unless the bulb is to be more than 30 feet above the case. It is immaterial on gas systems regardless of elevation.

D. Pressure Controller

If the instrument is a pressure controller, install it as shown in Fig. 5.

On some fluid lines excessive pulsations may make it difficult to obtain good control. In such an event, include a Taylor Pulsation Damping Unit 58S104 as shown.

If the medium is corrosive, an oil seal is essential as a protection to the pressure element of the controller. Install these as illustrated. (These may be simply fabricated from a short section of capped pipe.)

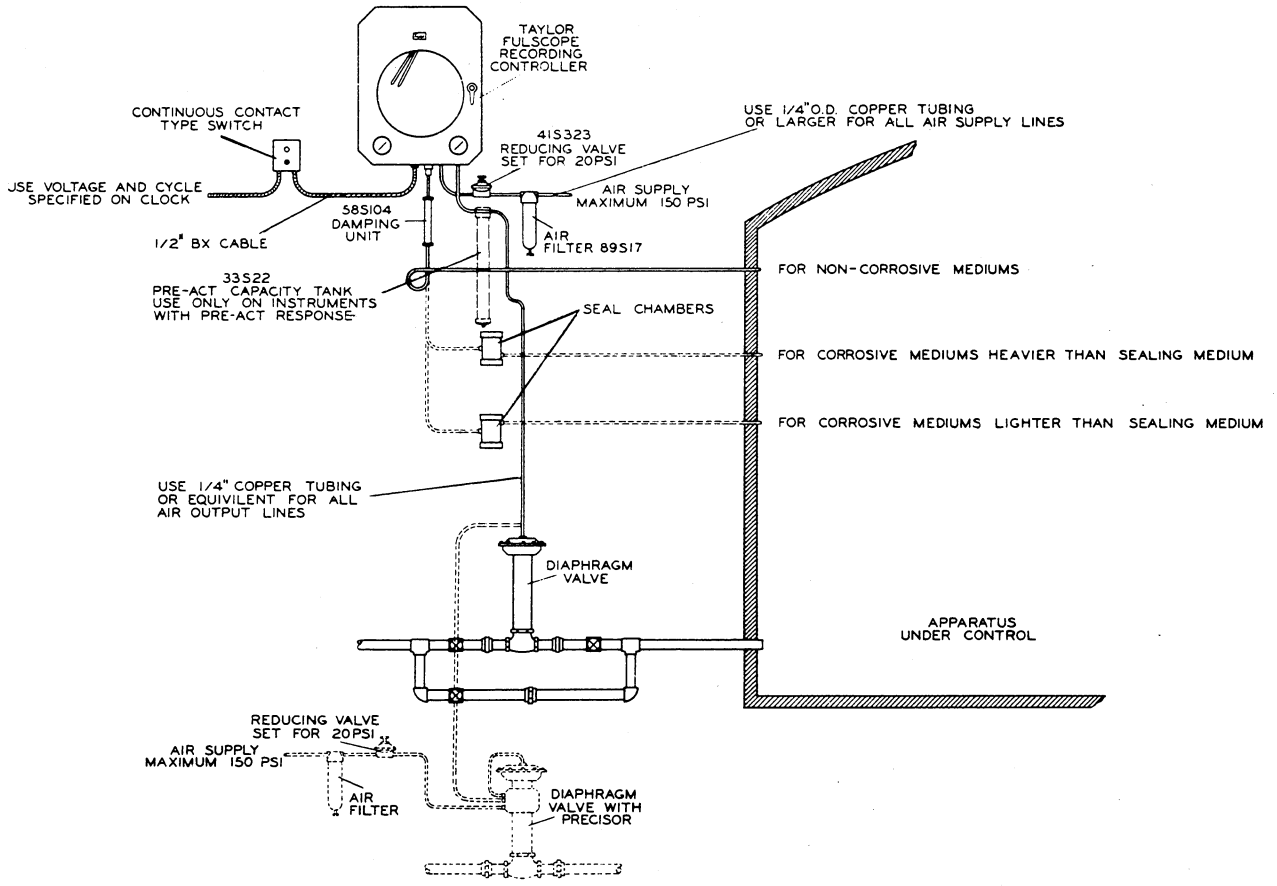


Fig. 5

E. Specialized Controllers

For specialized forms of controllers and controller accessories, refer to the appropriate instruction form which accompanies each of these instruments.

PROCESS START UP (See Fig. 1 and 2)

1. Assume that the process is operating under manual control, and the recording pen is at the desired value.

2. Set Sensitivity Knob (13) to 300 (or HIGH if 1-1000 Sensitivity Unit is used).

3. Turn Reset Rate Knob (27) clockwise to stop.

PROCESS START UP Cont'd.

4. Turn on the air supply.

5. Place set pointer (2) behind pen (3) by turning knob (8).

6. Determine whether or not the instrument action is correct.
   a. Adjust set pointer 1/8" below pen and note the output pressure.
   b. Note whether or not this gives the desired valve action.

   Ex: A temperature controller for maintaining a constant temperature in a water bath, with an air to close valve on the steam line, should increase the output air pressure to its maximum value when the pen moves above the set point.

7. If instrument action is incorrect, reverse it as outlined under CHANGE OF INSTRUMENT ACTION. (Page 17)

8. Set Sensitivity at 5 (or 3 if range is 1 - 1000).

9. Set Reset Rate Knob (27) to 5.

10. Manipulate the set pointer to obtain a 10 psi output pressure with the pen and the Set Pointer together.

    Ex: If the output pressure is low, move the Set Pointer away from the Pen in the direction which increases the output pressure. After a few seconds return the Set Pointer to its position behind the Pen. Repeat this procedure if the output pressure is still low. If it is high, move the pointer in the opposite direction for a few seconds.

11. Turn the Reset Rate Knob clockwise to its stop.

12. Open the air supply valves Fig. 3; close the manual control valve.

13. If the Pen deviates, move the Set Pointer in the opposite direction until the Pen settles out at the desired point.

14. If the Pen and the Set Pointer are not together, note the output pressure.

15. Turn the Reset Rate Knob counter-clockwise to its stop.

16. Move the set pointer back to the pen at such a rate that the output pressure remains at the value noted in step 14.
    a. Tap the output pressure gauge during this operation to sense the slightest pressure change.

17. When the set pointer is under the pen, turn the Reset Rate Knob clockwise to its stop.

18. Move the set pointer about 1/8", either up or down.

19. If the pen moves toward the set pointer and settles out without oscillating, increase the Sensitivity and move the set pointer back to the original point (1/8").

20. Continue to increase the Sensitivity, each time making a small Set Pointer change, until the Sensitivity is found at which the Pen oscillates continuously. The oscillations neither increasing nor decreasing in magnitude.

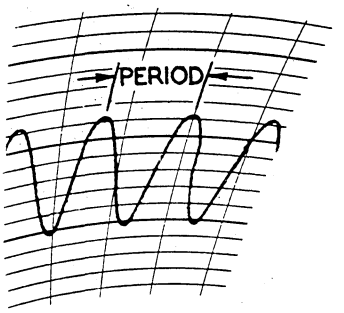


Fig. 6

21. Estimate the period of oscillation in minutes.
    a. The period is the time required for the pen to describe one complete wave; the time from peak to peak. Fig. 6.

22. Set the Sensitivity at .4 the value found in step 20.

23. Set the Reset Rate at the value equal to 1 divided by the period.
    a. A period of 2 minutes would call for a Reset Rate of 1/2 or 0.5/min.

24. Make a small Set Pointer change and check stability.
    a. The oscillations should die out with each wave approximately 1/4 as high as the one preceding it.
    b. This is normally good stability.

25. If the wave damps out more slowly or more stability is desired, reduce the Sensitivity and Reset Rate somewhat.

Sometimes the process experiences a new load condition that causes the process to oscillate. Should this occur, re-determine the settings of Sensitivity and reset rate. Keep a record of these values. The best Sensitivity will be 40% of the lowest Sensitivity thus found.

INSTRUMENT MAINTENANCE

To obtain good everyday operation of the Taylor Fulscope Controller, the following suggestions will prove very helpful.

A. Chart

To replace the chart, pull knob (32) forward, the pen and pointer are thus lifted from the chart facilitating chart removal. See Fig. 1. Place a fresh chart on the clock hub and rotate it until the correct time line is opposite the reference arc (4). Push Knob back into position.

The clock hub has small pins inserted in it. As the knob is pushed back into position the pins are forced through the paper and serve as a means of driving the chart.

USE ONLY TAYLOR CHARTS.

B. 1. To fill V-Type Pen

Fill the pen with Taylor Recorder Ink, using the filler supplied. If at first the pen does not write, touch the point with the wet filler.

2. To fill Reservoir Type Pen

Follow instructions 92058 supplied with Taylor ink.

3. Failure of Pen to Touch Chart

If the pen fails to touch the chart paper due to insufficient tension of pen arm (3), bend the pen arm slightly toward the chart, giving it just enough tension so that pen bears lightly against the chart.

4. Failure of Pen to Follow Time Line Fig. 7

If the pen fails to follow the time line on the chart, adjust the chart so that a time line corresponds to the reference arc. Bend the pen so it rests on the time line matching the reference arc.

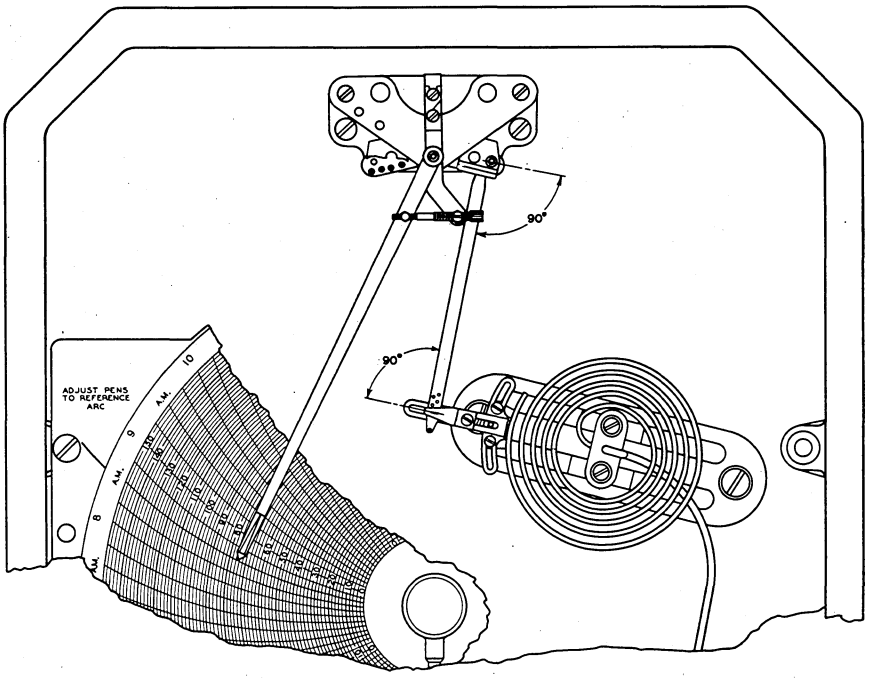


Fig. 7

NOTE: Occasionally wash out pens with clean hot water or alcohol. DO NOT use other than Taylor Recorder Ink as it is manufactured especially for Taylor pens and charts.

C. Common Instrument Troubles

Methods for diagnosing and correcting common instrument troubles are described below:

Set the controller sensitivity at 300 (HIGH if range is 1 - 1000). Separate the pen and set pointer at least 1", and note the output pressure. Move the set pointer 1" beyond the pen on the opposite side, and note the output pressure. The output pressure in one position should be 0 psi. In the other position the output pressure should be within at least 2 psi. of the supply pressure. If one or both of these conditions are not met, perform repair operations in the order indicated, until the trouble is corrected.

1. Failure of output air pressure to go to zero with pen and pointer separated.
   a. Plugged orifice in relay valve (25).
      (1) To clean, turn screw (31) counter-clockwise and release it.
   b. Dirt in relay valve.
      (1) Remove chart plate (29) by unscrewing four screws (30).
      (2) Loosen nuts (21) and (22), but don't remove them.
      (3) Back off screws (24).
      (4) Remove nut (22) and clean it, as well as the ball, the stem and the inside of valve with a cloth.
      (5) Also clean the orifice by removing nut (21).
   c. Dirt on baffle.
      (1) Clean the circular baffle - just above the nozzle - with a cloth.
   d. Leak in tubing connections.
      (1) Tighten tube connections to nozzle (16), manifold (23), and nozzle tip (10).
   e. Leak in capsular chamber (26).
      (1) Test with water around the chamber perimeter for bubbles.
      (2) Should bubbles appear, replace with new relay valve, Part 88S35.

2. Failure of output air pressure to go to within 2 psi of the supply pressure, with pen and pointer separated.
   a. Dirt in relay valve.
      (1) Remove chart plate (29) by unscrewing four screws (30).
      (2) Loosen nut (22), but don't remove.
      (3) Back off screws (24).
      (4) Remove nut (22) and clean it, as well as ball, stem and inside of valve - with a cloth.
   b. Dirt in nozzle.
      (1) Remove the nozzle and clean it in some grease removing solvent. Blow out the nozzle line by removing orifice nut (21) and placing a finger over the opening.
   c. Leak in air line from instrument to diaphragm valve. Repair leaks.
   d. Leak in back sealing bellows. (This may be indicated by a wandering control record.)
      (1) With output air pressure at its highest value, place a narrow

slip of paper between synchronizing wheel (15) and side of case. Note if paper flutters. Fluttering indicates conclusively that a leak is present.

(a) Remove the sensitivity adjusting unit assembly (14) from instrument case by loosening the mounting screws. Also disconnect the air lines to the unit.

(b) Refer to Fig. 8.

(c) Attached to the base, which holds the mounting screws, is an assembly including the adjusting dial, guard plate, parallelogram, nozzle tube and levers. This is carefully removed in one unit by means of two nuts attached to the base. At the same time this assembly is being lifted vertically from the base, slide the hook on end of plunger housing spring off the inner parallelogram lever.

(d) Remove plunger housing nut and spring in center of bellows with special wrench. See Fig. 9. Care must be taken at this time not to twist or permanently distort the bellows.

(e) Turn the hand wheel out until it is free from the inside of the bellows. At the same time push the front end of the main spring in through the center of the bellows. Remove spring and hand wheel assembly from the back.

(f) Remove the four screws holding main bellows to housing. Loosen bellows and gasket from housing with a thin blade.

(g) Remove the housing nut from back sealing bellows to back of housing. Hold 61S91 at C to prevent turning the bellows while loosening the nut.

(h) If the main and back sealing bellows are stuck together, take them out of the housing as a unit before separating. It may be necessary to apply pressure on the end of the back sealing bellows to loosen the gasket from inside of housing. The back and main bellows can be separated by the use of a small screw driver inserted from the front of the main bellows.

(i) Assemble the new back sealing bellows into the housing making sure gasket 43P214 is in place. Tighten nut 32P321 before attaching any other parts. This is to prevent possible twisting of the back bellows which may occur if the nut is tightened after the front end is fastened.

(j) Insert main spring inside of back sealing bellows making sure washer 22P322 is in place.

(k) Attach hand wheel and turn in as far as possible.

(l) Hold hand wheel and bellows housing stationery. Grasp front end of main spring and turn it into the hand wheel two complete turns. (Counter-clockwise.)

(m) Put sealing gasket 43P213 and collar 18P89 in place and assemble the main bellows including gasket 43P208 to the housing. Be sure the flat side on the front end of the main spring lines up with the hole in the center of the main bellows. Insert the front sealing bellows and tighten four screws, fastening these bellows to the housing.

(n) Assemble washer and plunger housing nut 32P327 to front end of main spring. Be sure spring 11P454 is in place on the

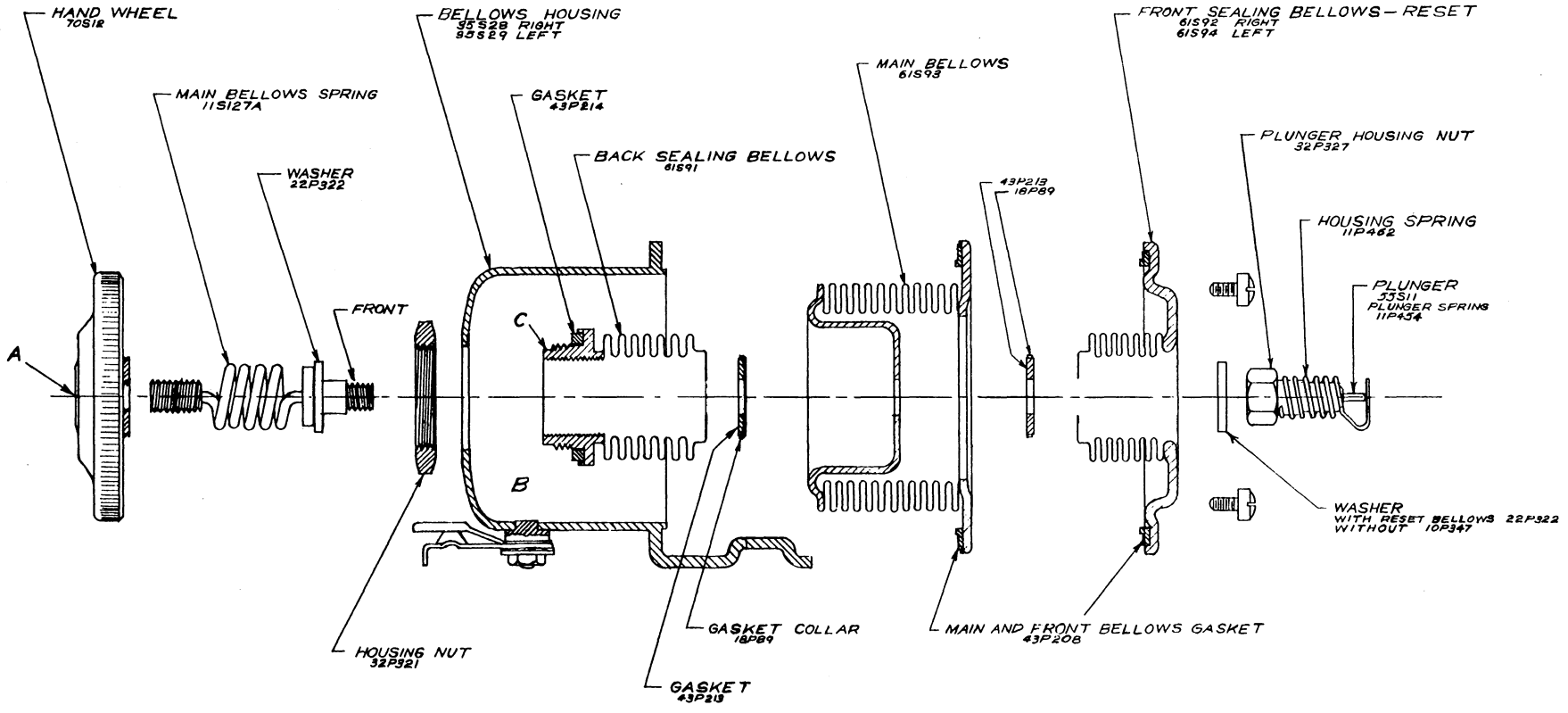

HAND WHEEL
70S12
MAIN BELLOWS SPRING
11S127A
WASHER
22P322
FRONT
A
BELLOWS HOUSING
95S28 RIGHT
95S29 LEFT
GASKET
43P214
BACK SEALING BELLOWS
61S91
C
B
MAIN BELLOWS
61S93
43P213
18P89
FRONT SEALING BELLOWS - RESET
61S92 RIGHT
61S94 LEFT
PLUNGER HOUSING NUT
32P327
HOUSING SPRING
11P462
PLUNGER
33S11
PLUNGER SPRING
11P434
WASHER
WITH RESET BELLOWS 22P322
WITHOUT 10P347
HOUSING NUT
32P321
GASKET COLLAR
18P89
GASKET
43P219
MAIN AND FRONT BELLOWS GASKET
43P208

Fig. 8

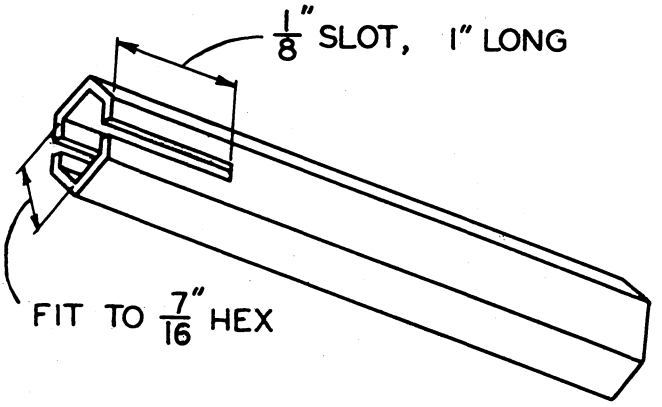


Fig. 9

inside end of the plunger. This is not shown in Fig. 6. Now back off the hand wheel, 3-1/2 turns.

(o) Before assembling any more parts, it is necessary to test the gasketed joints for leaks. This is done by attaching an air supply no greater than 10 psi to the bellows chamber and submerging in water. Dry bellows thoroughly with compressed air when finished.

(p) Turn housing spring 11P462 on the plunger housing nut so the hook is perpendicular to the mounting base. Replace adjusting dial, guard plate, and parallelogram assembly. See that housing spring 11P462 mentioned above is properly attached to outer parallelogram lever. The unit is now ready for use in the controller.

It is also advisable to check and see if there is a leak downstream of the Reset Rate needle valve. To do this proceed as follows:

a. Remove chart plate (29).
b. Slip the lower end of connecting link (17) off the actuating element pivot.
   (1) Be careful to note the hole in the link which was on the pivot. The correct hole is indicated by a scribed circle.
c. Wedge a small piece of loosely folded paper between the Pen Arm (7) and the movement plate (6).
d. Place the pen (3) in the center of the Chart.
e. Set the Sensitivity Knob (13) at 10.
f. Turn the Reset Rate Knob (27) counter-clockwise as far as it will go.
g. Adjust Set Pointer Knob (8) until the output pressure gauge (28) reads 10 psi.
h. Turn the Reset Rate Knob (27) clockwise as far as it will go.
i. Wait for approximately one minute. Tap the gauge.
j. If the output pressure doesn't creep downward, there is no leak in the connecting tubing or outside bellows. Proceed to step m.

k. If the output pressure has changed, tighten the air tube connections and inspect the front bellows for leaks.
l. Repeat step f through h until no creep is detected.
m. Adjust Set Pointer Knob until output pressure is zero.
n. Hold here for approximately one minute.
o. Adjust Set Pointer Knob until the output pressure is again 10 psi.
p. Turn Reset Rate Knob counter-clockwise to stop.
q. If the output pressure creeps upward, there is a leak between the front and back bellows, and the leak should be repaired.
(1) See procedure for leak in back sealing bellows.

D. Clock

1. Spring-Wound

Clocks should be wound every time charts are changed. If the clock is the 7-day revolution type, it has two winding arbors. Be sure to wind both arbors. Do not wind too tightly. If the clock stops, push the starter button. The clock may be adjusted by moving the speed regulator. Do not move the regulator too far at one time, a small movement is usually sufficient.

2. Electric

If the clock stops, test the supply current. If current is present a replacement clock is necessary.) Be sure to give revolution, voltage and number of cycles when ordering.)

E. To Set Pen

Controllers are calibrated and adjusted at the factory. After installing a new instrument, the controller temperature may not exactly agree with that of a test thermometer. Do not make any adjustments unless it is certain that the bulbs of the test thermometer and the controller are subject to the same conditions, and that sufficient time is allowed for both instruments to reach equilibrium. THIS IS VERY IMPORTANT.

If certain that the controller is in error, turn the pen arm micrometer screw (10) backward or forward, depending on the adjustment required, until the pen (3) records the correct temperature as shown on the test thermometer.

F. To Calibrate

If it is found that after setting the pen at one temperature as described above, it reads inaccurately at other points on the charts, the tube system must be recalibrated. Make no adjustments unless the bulb can be subjected to temperatures approximately twenty per cent from each end of the chart range.

All remarks will refer to temperature calibration, but are applicable to pressure. For Level-Buoy calibration see Instruction Form 92044. Follow the steps listed below for general calibrating procedure.

1. Be sure to use a test thermometer of known accuracy.

2. The bulb of test thermometer should be applied closely to the bulb of the controller.

3. The liquid in which the bulbs are immersed should be thoroughly agitated.

4. Remove Chart Plate (29), by loosening four screws (30).

5. Subject the bulb to the mid-chart temperatures.

6. Adjust the length of connecting link (17) and the position of the take off arm (18), so that the take off arm and the pen arm lever (lever arm in cage assembly to which the upper end of connecting link attaches) are parallel. Also that a right angle is formed between the link and the take off arm with the pen at mid-chart temperature. See Fig. 7.
   a. The holes in the end of the link are spaced to give increments of length change equal to 1/16".

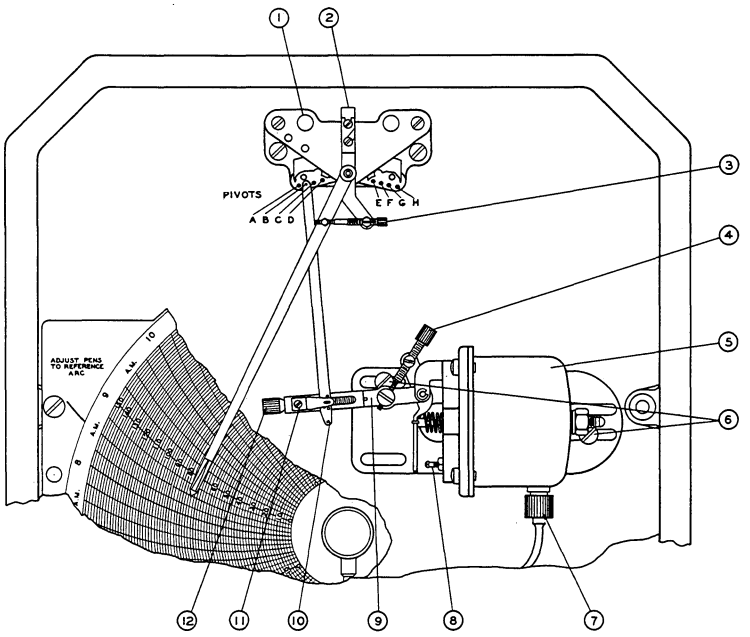


Fig. 10

   b. Be sure end hole only of the link is over the correct pivot pin on the pen arm lever. Pivot pins A and H are for 10" charts, and pins B and G are for 12" charts. See Fig. 10.

7. Subject the bulb to approximately 80% of the full chart temperature.

8. Set the pen to read correctly at this temperature.
   a. Loosen screws (18).
   b. Shift take off arm until the pen reads correctly.
   c. Minor adjustments less than 1/16" may be performed with the micrometer screw on the pen arm.

9. Subject the bulb to approximately 20% of the full chart temperature.

10. Note the reading.
    a. If pen moves too far clip (19) should be moved towards the spring. If pen hasn't moved far enough the clip should be moved away from the spring.
    c. This is accomplished by loosening the screw which clamps the clip to the take off arm.

11. Subject the bulb to 80% of chart temperature again.

12. Set the pen at the 80% temperature as outlined in step 8.

13. Repeat steps 9, 10, 11 and 12 until there is no error at the 20 and 80% readings.

14. If clip is practically at the end of take off arm realignment is necessary. This is done by shifting the spring on its sub-base.

15. Subject the bulb to mid-chart temperature.

16. Note whether the instrument reading is high or low. If the pen reads low at mid-chart, use the rotary adjustment of the take-off to give the take-off an initial rotation towards the upper part of the range or if the pen reads high at mid-chart give the take-off an initial rotation towards the lower part of the range. The amount of adjustment is to be found by trial and error. If necessary, after making this adjustment, adjust the length of the links to obtain correct scale readings.

G. General Precautions

DO NOT allow a stream of water or jet of steam to come in contact with the instrument.

DO NOT wash or flush out pipes, tanks or apparatus with steam or hot water so as to subject bulb to a higher temperature than maximum chart range unless the instrument is designed to take care of this. If necessary, first remove the bulb.

DO NOT subject the pressure element of the controller to a higher pressure than the maximum range of the chart unless the instrument is designed to take care of this.

DO NOT allow the controller door to remain open any longer than is necessary. Keep the glass clean. If the glass steams up, apply a small quantity of glycerine.

BLOW OUT the air-compressor receivers periodically, to drain the moisture, oil, dirt, etc. from the system.

The supply of controlling medium should always be more than is required to maintain the desired control point of the apparatus.

REMEMBER that your instrument is a valuable piece of mechanism, and with a reasonable amount of care will give many years of satisfactory service.

CHANGE OF INSTRUMENT ACTION

To change the action of the instrument proceed as follows:

1. Set the Sensitvity at its lowest value.
2. Turn Set Pointer Knob (8), so that the indicator tab passes under the cage assembly until the set pointer strikes its stop.
3. Lift the small spring locking tab (5).
4. Continue to turn knob (8) for 1/4 turn in same direction.
5. Release tab (5).
6. Pull down nozzle (10) to allow baffle pivot clearance.
7. Continue to turn the knob in the same direction until the locking tab re-latches.
8. Return the Sensitivity to its original value.

CONTROLLER MECHANISM ALIGNMENT

Centering the baffle.

1. Remove chart plate (29).
2. Slip the lower end of connecting link (17) off the actuating element pivot.
   a. Be careful to note hole in link which was on pivot, for correct re-placement. The correct hole is indicated by a scribed circle.
3. Wedge a small piece of loosely folded paper between the pen movement arm (7) and the movement plate (6).
4. Place the pen in the center of the chart.
5. Set the Sensitivity at 10.
6. Turn the Reset Rate Knob (27) counter-clockwise to its stop.
7. Adjust the Set Pointer Knob until the output pressure is 10 psi.

8. Turn the Reset Rate Knob clockwise to its stop.

9. If Set Pointer is not behind pen, place it there.

10. Set the Sensitivity at 300. (Just before HIGH if range is 1 - 1000).

11. If the output pressure is 10 psi, proceed to paragraph 20.

12. Position cam (19), Fig. 11, with a screw driver until the output pressure is 10 psi.

13. Reverse the instrument action. See CHANGE OF INSTRUMENT ACTION.

14. Position the set pointer so that the output pressure is 10 psi with the Sensitivity set at 300 or just before HIGH.

15. If the set pointer is behind the pen, the baffle is correctly centered and the instrument may be returned to the desired action.

16. If the pen and the set pointer are separated, move the set pointer 1/2 the distance toward the pen with knob (8) and the remaining distance with micrometer screw (12).

17. Obtain 10 psi output pressure by adjusting cam.

18. Return the instrument to its original action.

19. Adjust Set Pointer Knob until the output pressure is 10 psi with the Sensitivity set at 300 or just before HIGH.

20. If the pen and pointer are less than 1/8" apart, use micrometer screw to position set pointer behind pen.

21. If the pen and pointer are more than 1/8" apart, repeat steps 16, 17, 18, 19 and 20 until the requirements of step 20 are met.
    a. Be sure that the instrument is set in the action desired.

Squaring the Parallelogram

This consists of adjusting the Sensitivity parallelogram so that the Sensitivity may be varied over a wide range when the pen and pointer are together without varying the output pressure.

1. Set the Sensitivity knob (13) at 300 (just before HIGH if range is 1 - 1000).
   a. Be sure steps 6, 7, 8 and 9 above have been performed.

2. Adjust cam (19), Fig. 11 with a screw driver to obtain an output pressure of 10 psi.

3. Reduce the Sensitivity to 3. (2 if range is 1 - 1000).

4. If the output pressure does not change the parallelogram is square and you may proceed to step 7.

5. Unlock the synchronizing wheel (15).
   a. Push the locking lever toward the center of the case. This lever is behind the bellows unit.

6. Adjust the synchronizing wheel to obtain an output pressure of 10 psi.

7. Return the Sensitivity to 300 (just before HIGH if range is 1 - 1000).

8. If the output pressure doesn't change, the parallelogram is square.

9. If the output pressure shifts more than one pound from the value of 10 psi repeat steps 2, 3, 5, 6 and 7 until the output pressure does not change.

DESCRIPTION OF OPERATION

Fig. 11 is a schematic diagram of a Taylor Fulscope Controller with Adjustable Sensitivity and Automatic Reset on a heating application. The control valve is of the "Air to Close" type, and the controller is direct acting.

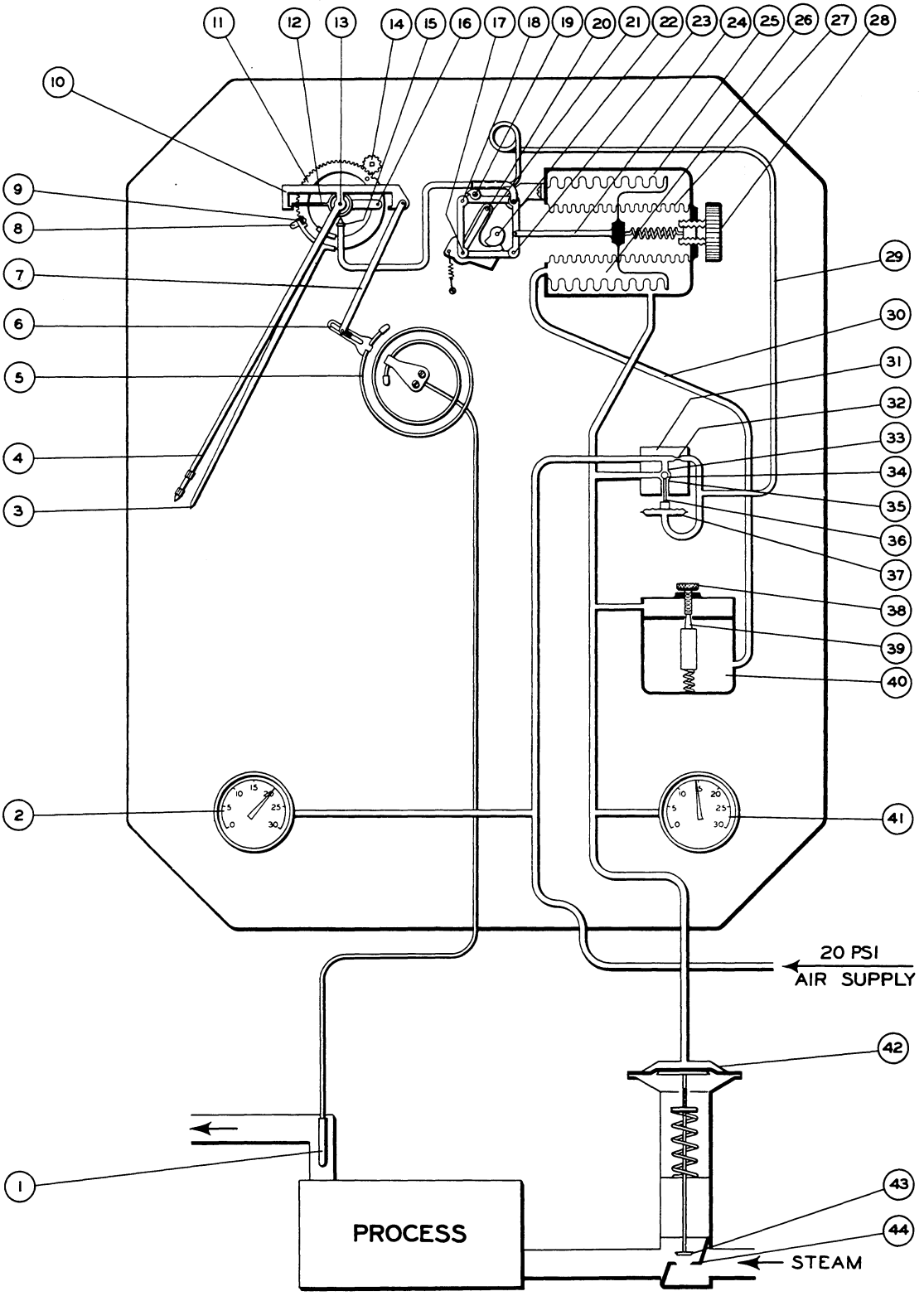
The 20 psi air supply enters the controller and goes to the air relay valve (31). In the relay valve the air supply divides. A small part passes through orifice (32) and feeds nozzle (15) through nozzle air line (29), and to capsular chamber (37). The main flow of air is to the control valve (42) and the bellows (25) of the adjustable sensitivity unit. The air flow to the back bellows is unrestricted, while the air to the front bellows (26) passes through needle valve (39).

Let us assume the pen (4) and pointer (3) are together at the control point, and the output pressure to maintain this equilibrium is 10 psi.

This means that baffle (12) and nozzle (15) are so positioned that the back pressure in capsular chamber (37) of relay valve (31) throttles the air supply, to diaphragm motor (42) and both bellows (25 & 26) of the adjustable sensitivity unit, at just 10 psi.

If the process temperature increases due to a load change, the pen (4) would move upward and away from the set pointer (3). This pen movement raises baffle (12) off nozzle (15). The increased clearance between the nozzle and the baffle reduces the back pressure in the capsular chamber (37).

A decrease in this back pressure lowers ball (34) in relay valve (31). This increases the output pressure to control valve (42), as well as increasing the pressure in bellows (25) of the sensitivity unit. The increased pressure on diaphragm valve (42) tends to close it, reducing the amount of heating medium to the process.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20 PSI
AIR SUPPLY
PROCESS
STEAM

Fig. 11

The flow of air to bellows (25) is unrestricted. The increase in pressure in this bellows forces rod (24) to the left. This movement makes the nozzle (15) follow the baffle (12), limiting the initial clearance between the nozzle (15) and baffle (12).

The change in nozzle (15) baffle (12) clearance has increased the output pressure to some new value. The pressure in the front bellows (26) begins to increase, because of the differential pressure existing across needle valve (39). As the pressure in the front bellows (26) increases, the nozzle (15) is pulled away from baffle (12), increasing the output pressure. The output pressure continues to increase, and the differential across the needle valve (39), is maintained until the process cools down sufficiently to bring the pen back to the control point. At this point equilibrium is again established, because the baffle (12) has returned to its original position above the nozzle (15). There is no longer a pressure differential across the needle valve (39) - both bellows are at the same new output pressure.

With pivot point (20) of arm (21) directly under pivot point (18) there is no nozzle follow up. The sensitivity is at its highest value. The farther pivot point (20) is moved clockwise by turning the knob (22) counter-clockwise, the more the nozzle (15) follows the baffle (12) - lowering the Sensitivity.

Turning the Reset Rate Knob (38) counter-clockwise forces needle (39) downward, increasing the annular opening. This increases the Reset Rate and allows a faster pressure change in bellows (26).

SELECTION OF CONTROLLER

This particular Taylor Fulscope Controller is designed for control of systems with periods of oscillation less than 1.6 minutes, (step 21 of PROCESS START UP page 4), and having frequent load changes. If the period is longer than 1.6 minutes and frequent load changes do not occur, a Taylor Fulscope Controller with Pre-Act should be supplied. If the period should be longer than 1.6 minutes and frequent load changes are experienced, a Taylor Fulscope Controller with Pre-Act and Reset should be supplied.

SUMMARY OF ILLUSTRATIONS

Fig. 3	Dwg. 6912	Fig. 8	S. E. D. 9673
Fig. 4	Dwg. 6897-1	Fig. 9	Dwg. 6911
Fig. 5	Dwg. 6897-2	Fig. 10	Dwg. 6856-8
Fig. 6	(Chart Record)	Fig. 11	Dwg. 6913
Fig. 7	Dwg. 6865		

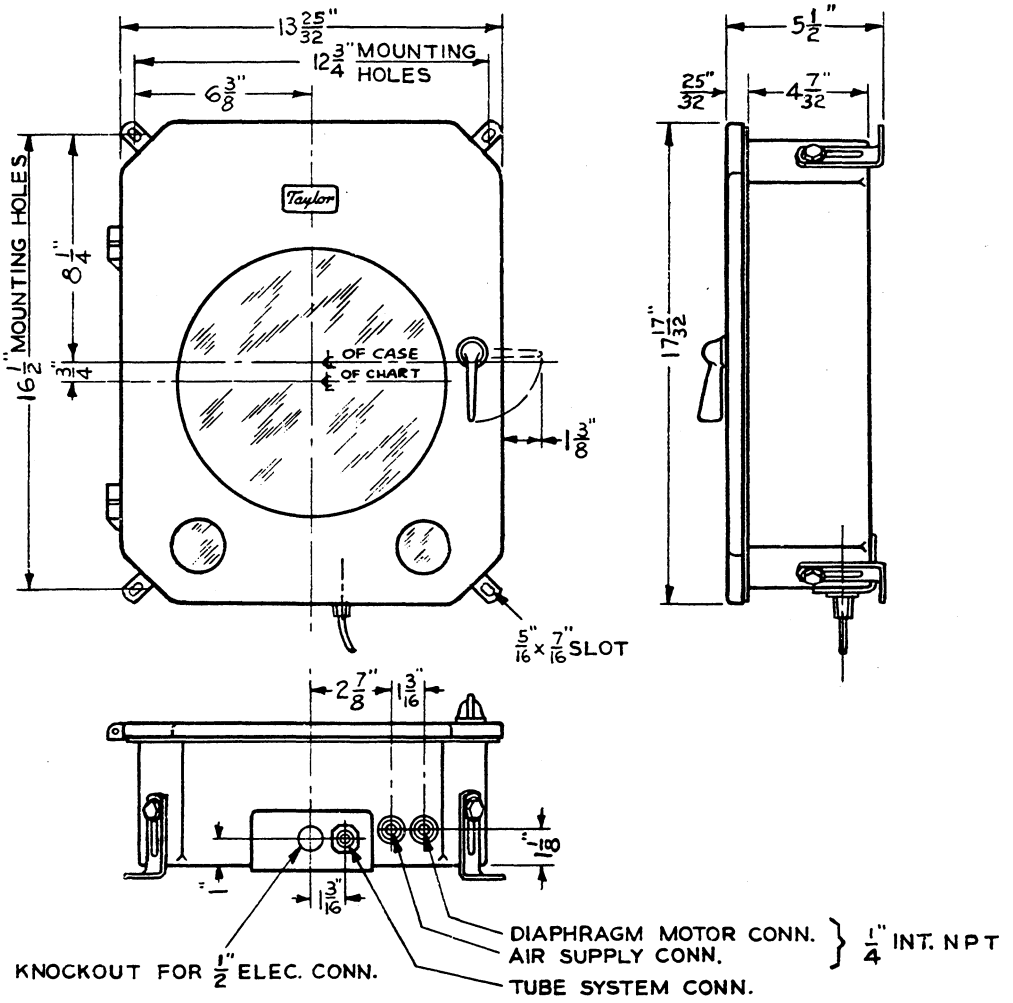
TAYLOR FULSCOPE

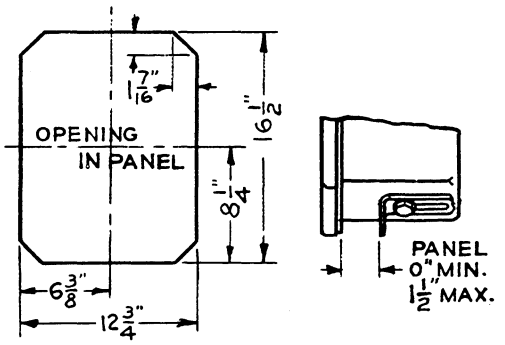
RECORDING TEMPERATURE CONTROLLER

115R TO 124R SERIES

SINGL-DUTY SINGLE RECORD

BOTTOM CONNECTED





NOTE-REVERSE MOUNTING LUGS TO FLUSH MOUNT INSTRUMENT

SEE REVERSE SIDE IF CERTIFICATION IS REQUIRED.

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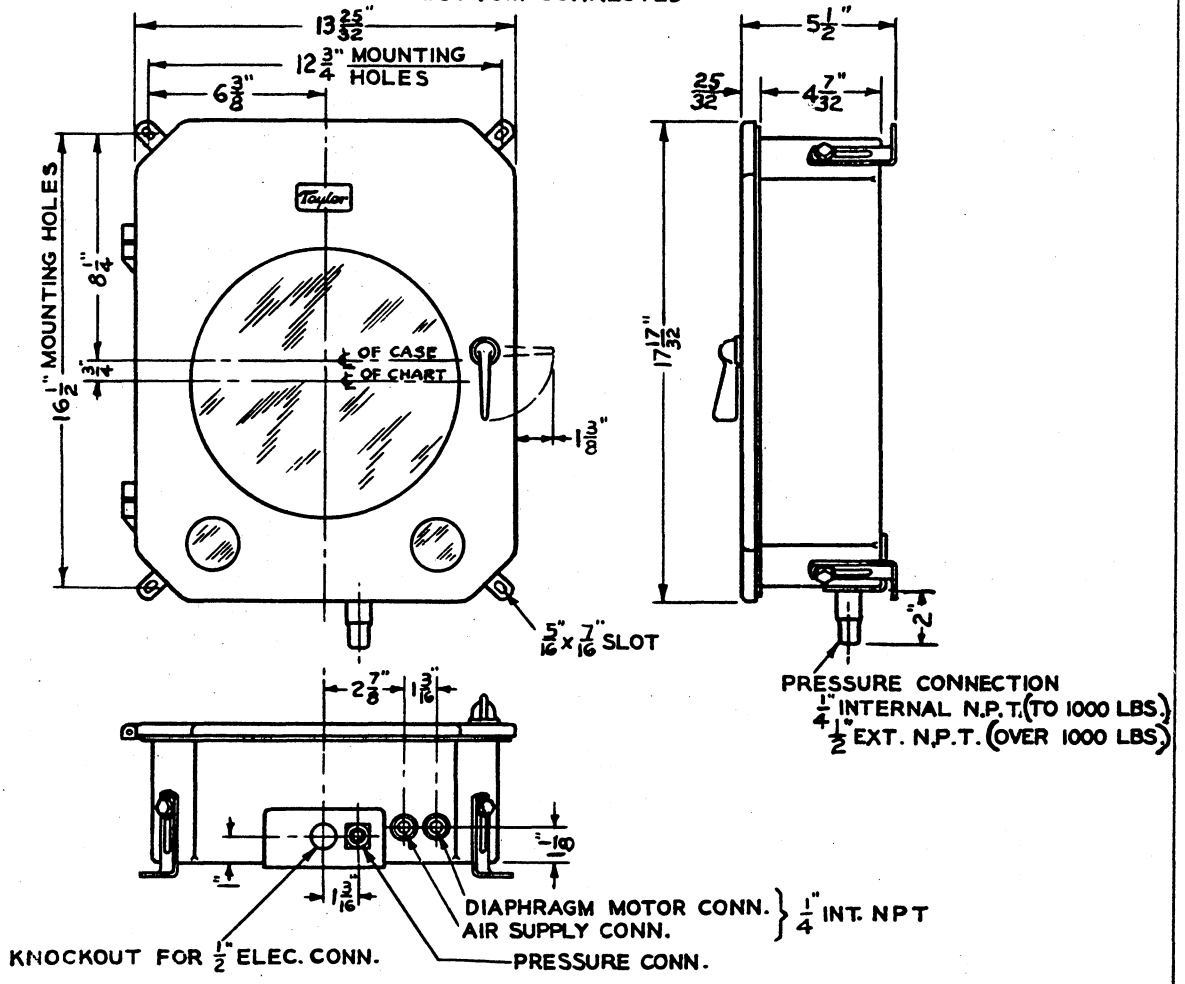
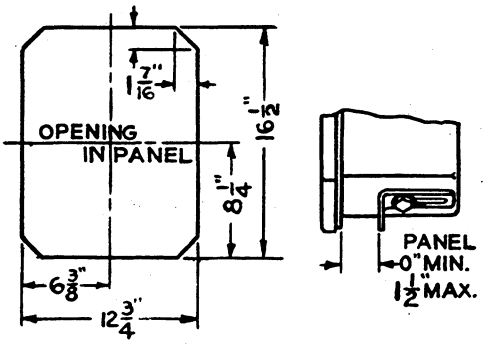
RECORDING PRESSURE CONTROLLER

115R TO 124R SERIES

SINGL-DUTY SINGLE RECORD

BOTTOM CONNECTED





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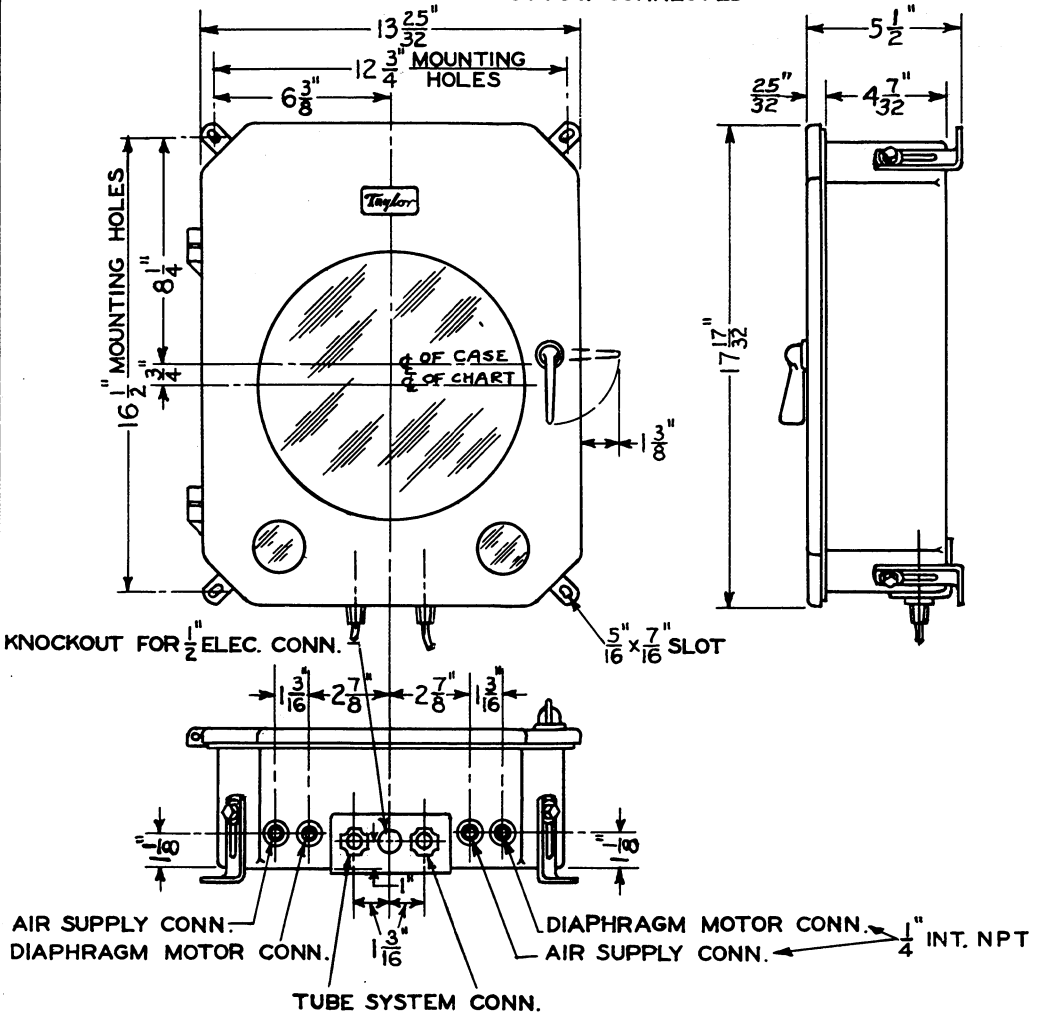

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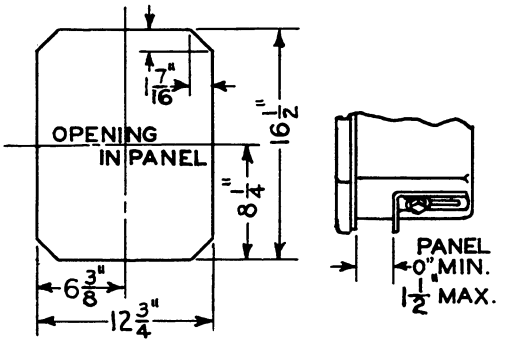

NOTE-REVERSE MOUNTING LUGS TO FLUSH MOUNT INSTRUMENT

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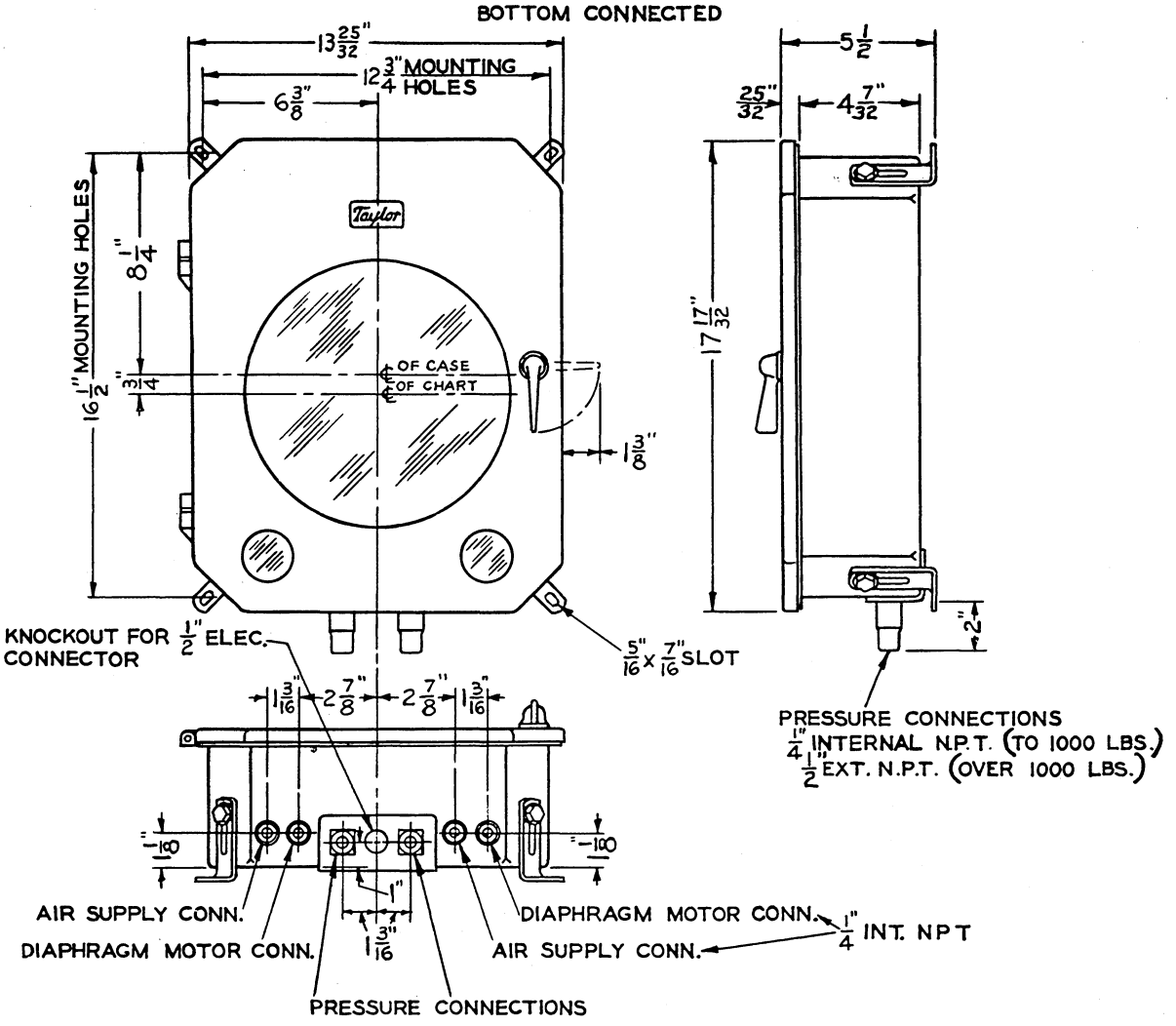

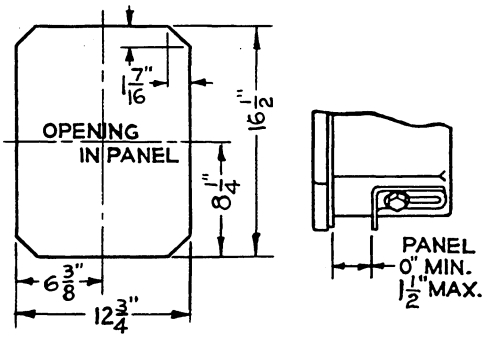

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NOTE: REVERSE MOUNTING LUGS TO FLUSH MOUNT INSTRUMENT

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