900-012
Receiver Controller and Transmitter

Calibration Kit
Instruction Booklet

This kit is designed for use in:

1. The setup and calibration of receiver controllers.
2. Checking transmitter operation and calibration.
3. Adjusting PE relays and switching relays that require a field adjusted setpoint.

GENERAL INFORMATION

The 900-012 is packaged in a molded case with a fitted foam insert designed to protect the manifold. Included are fittings and tubing to connect the manifold for use. Tubing connections are 1/4" so that available fittings andtubing may be utilized as necessary. The hook and chain are designed for easy attachment to any convenient point allowing the hands to be free for making adjustments. Multiscale gauges have the most common ranges shown. A 3 to 15 psig scale is shown to accommodate nonstandard ranges.

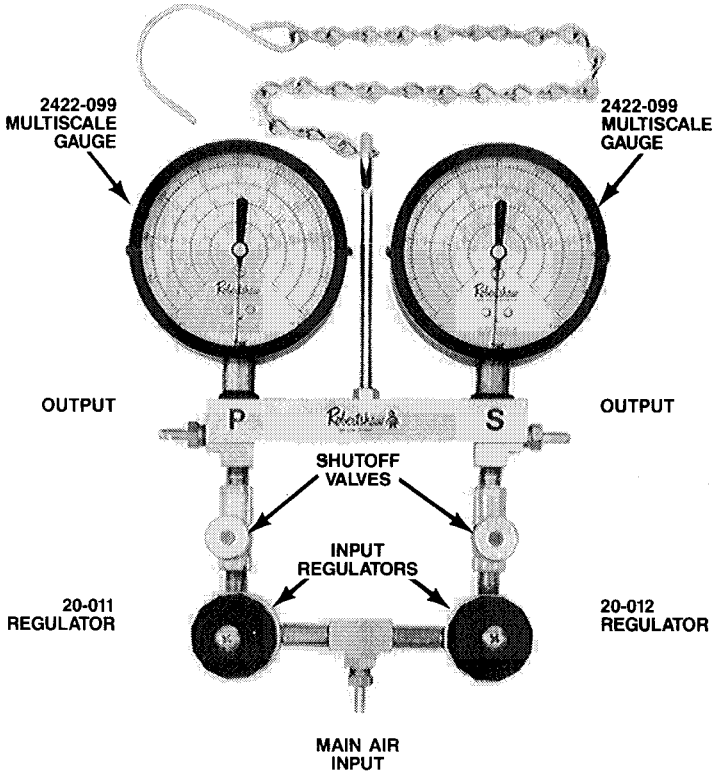

Figure-1

Receiver controllers from different manufacturers have different port designations. The following list covers most receiver controllers of recent manufacture. Applications should be checked or drawings reviewed for the special piping arrangements that may be used occasionally, such as inverse piping of transmitters.

Manufacturer	Port	Input/Output
Robertshaw	1	Primary Input
	2	Remote Setpoint
	3	Secondary Input
	M	Main Air
	B	Branch Line
Robertshaw	M	Main Air
	B	Branch Line
	S	Primary Input
	C	Remote Setpoint
	R	Secondary Input
Honeywell	1	Primary Input
	2	Secondary Input
	CPA	Remote Setpoint
	M	Main Air
	B	Branch Line
TAC	1	Primary Input
	2	Secondary Input
	M	Main Air
	B	Branch Line
	A	Remote Setpoint
Johnson	O	Branch Line
	I	Remote Setpoint
	II	Primary Input
	S	Main Air
	III	Secondary Input
Powers (Direct Acting & Reverse Acting)	S	Main Air
	C	Branch Line
	1	Primary Input DA
	2	Primary RA
	3 or 4	Secondary DA

DEFINITIONS AND CALCULATIONS

The following terms and calculations are used in the calibration of pneumatic receiver controllers. These definitions are included to familiarize the user with pneumatic terminology and to help in understanding the application of these controllers and the transmitter inputs to them.

1. **Transmitter**

   The transmitter is normally used as the sensor which provides an input signal to the receiver controller. The transmitter may sense or measure either temperature, pressure, or humidity and this sensed condition is converted to a pressure signal which is transmitted to the receiver controller. This sensed condition is directly translatable to a pressure signal that is constant for any given value of the sensed condition. Generally a transmitter is a fixed range device without a setpoint adjustment, though any pneumatic controller may be used as a transmitter if values for range, span, and sensitivity can be determined.

2. **Transmitter Range**

   This is the end values of the span of a selected transmitter. Examples would be 0° to 100°F, or 40° to 240°F, 0 to 150 psig, or 0 to 10" W.C. It is over this range that the output varies from 3 to 15 psig. A 0° to 100°F range transmitter has a span of 100°F..

3. **Transmitter Output**

   The number of units of the sensed variable required to produce a 12 psig (3 to 15 psig) output variation. It is also customary to state that a standard transmitter has an output span of 12 psig.

4. **Transmitter Sensitivity**

   The output variation in psig that is produced by a change of one unit of the sensed variable. The sensitivity of the transmitter is expressed as the pounds change per unit of sensed variable and is determined as follows:

   $$\text{Sensitivity} = \frac{\text{Transmitter output span}}{\text{Transmitter range span}}$$

   $$\text{Example:} \quad \frac{12 \text{ psig}}{100°} = .12 \text{ psig/°F change}$$

   The sensitivity equals transmitter output span divided by the transmitter range in units. This range may be expressed in degrees, inches of water column, psig, or relative humidity.

5. **Receiver Controller**

   The receiver controller is a device which converts a main air supply into a varying 3 to 15 psig output in response to a varying 3 to 15 psig signal input from one or more external devices. The receiver controller provides the means for amplifying and also provides setpoint, throttling, and authority adjustments to provide the necessary control signal to position final control devices.

6. **Single Input Receiver Controller**

   The single input receiver controller receives the input at its primary input port from a single transmitter. A single input receiver controller may be used with or without a remote setpoint capability. The 2341 Receiver Controller is a dual input device with remote setpoint capability. It may be used as a single input device and when applied in such a manner, the unused input ports are left open.

7. **Dual Input Receiver Controller**

   A dual input receiver controller receives the input from two transmitters furnishing 3 to 15 psig signals. The primary transmitter, or sensor, normally senses the variable condition that is being controlled by the receiver controller. The second input is a reset input, and provides the capability of resetting the control point or setpoint in response to an outside condition. An example of this would be outside air reset of a hot water supply temperature. Dual input receiver controllers may be equipped with a remote setpoint capability or they may not, depending on the manufacturer and/or application. TAC receiver controllers all have this capability.

8. **Setpoint**

   The setpoint is the selected value within the range of the primary transmitter at which the receiver controller is

attempting to maintain the value of the controlled variable. This is also referred to as control point. Usually the receiver controller is calibrated to provide a 9 psig branch pressure when the control point is at its desired value. It can be calibrated for any branch pressure from 3 to 15 psig when required by the application. The setpoint may be expressed in either units of the controlled variable (such as temperature) or by the equivalent primary transmitter output pressure.

9. Throttling Range

The throttling range (TR) is the number of units the controlled variable has to change for the receiver controller to produce a branch line pressure change of 3 to 15 psig. The TR is always referred to in relation to the primary transmitter signal and is normally stated in number of units of the controlled variable required. It is also expressed as a percentage of the span of the primary transmitter. As an example, a 20° throttling range would represent a 10% throttling range adjustment if the primary transmitter had a span of 200°, or if it had a span of 100° it would represent a 20% throttling range adjustment. **NOTE:** The TR adjustment should always be made prior to calibration. If further TR adjustments are necessary after initial calibration, the device should be recalibrated.

Table-1 Port Comparisons.

2341-001	2341-501
Port 1	Port S
Port 2	Port C
Port 3	Port R

10. Authority

Authority is the adjustment which determines the effect of a secondary transmitter input signal at port 3 on the branch pressure output as compared to the effect of the primary transmitter input signal at port 1. An increase in secondary or reset transmitter pressure at port 3 causes the setpoint to be lowered and a decrease in the reset pressure causes the setpoint to be raised.

The extent to which the setpoint is raised or lowered by a given change in the variable sensed by the secondary transmitter is determined by the authority setting. This setting is adjustable from 20% to 200% on the 2341-001 (2341-501 is 10% to 300%).

Because the two transmitters often do not have the same sensitivities, the reset ratio must be calculated for each given application to account for these differences. The authority calculation formula is also designed to account for the variation in throttling range effect along with the transmitter sensitivity effect. The formula is as follows:

$$\text{Authority percentage} = \frac{\left(\Delta T@_{\text{Primary}} \times \text{Primary Sensitivity}\right) + \left(TR \times \text{Primary Sensitivity}\right)}{\Delta T@_{\text{Secondary}} \times \text{Secondary Sensitivity}} \times 100$$

11. Control Point Adjustment (CPA)

The function of the control point adjustment (CPA) is to raise or lower the controller's setpoint in response to pressure changes from a remote device such as a manual gradual switch or motorized transducer which is positioned by commands from an automation system.

a. **2341-001** — An increase in pressure at port 2 will raise the controller setpoint, and a decrease will lower it. A 3 to 15 psig (12 psig change) in CPA pressure will shift the setpoint up to 30% of the primary transmitter span. Thirty percent represents a 30° setpoint adjustment if the primary transmitter has a 100° span. In most applications the controller is preloaded with a 9 psig signal at port 2 before setpoint calibration. This permits subsequent adjustments upward or downward from the calibrated setpoint of plus or minus 15% of the span of the primary transmitter. Alternately, a 3 psig preload allows upward adjustment only of 30% of the span of the primary transmitter, and a 15 psig preload allows downward adjustment only of 30% of the span of the primary transmitter.

b. **2341-501** — An increase in pressure at port C will raise the controller setpoint, and a decrease will lower it. A 3 to 15 psig (12 psig change) in CPA pressure will shift the setpoint up to 20% of the primary transmitter span. Twenty percent represents a 20° setpoint adjustment if the primary transmitter has a 100° span. In most applications the controller is preloaded with a 9 psig signal at port C before setpoint calibration. This permits subsequent adjustments upward or downward from the calibrated setpoint of plus or minus 10% of the span of the primary transmitter. Alternately, a 3 psig preload allows upward adjustment only of 20% of the span of the primary transmitter, and a 15 psig preload allows downward adjustment only of 20% of the span of the primary transmitter.

This device is to be used on clean, dry, oil free control air only and will operate properly when mounted in any position. The inherent reliability of the device is enhanced and prolonged through regular inspection and preventive maintenance by a qualified control expert. Should a device become inoperative, it should be replaced by a new unit.

Note: Device should be calibrated in the mounted position.

Table-2 Sensitivity Chart.

Transmitter	Range	Span	Sensitivity
2220	50° to 90°F	40°	. 3 psig/°F
2232	30% to 80% R.H.	50%	.24 psig/% R.H.
2252 Series	-40° to 160°F	200°	.06 psig/°F
	40° to 240°F		
	0° to 100°F	100°	.12 psig/°F
	40° to 140°F		
	-25° to 125°F	150°	.08 psig/°F
	30° to 80°F	50°	.24 psig/°F
2301 Series	-10 to +40 psig	50 psig	.24 psig/psig
	0 to 150 psig	150 psig	.08 psig/psig
	0 to 300 psig	300 psig	.04 psig/psig
2302 Series	0 to 50 psig	50 psig	.24 psig/psig
	0 to 100 psig	100 psig	.12 psig/psig
2323 Series	0" to 3" WC	3" WC	4 psig/1" WC
	-0.5" to +5.5" WC	1" WC	1.2 psig/0.1" WC
	0" to 10" WC	10" WC	1.2 psig/1" WC
	0.05" to +0.2" WC	.25" WC	2.4 psig/.05" WC
2327 Series	200 to 2000 FPM	1800 FPM	.007 psig/FPM
	300 to 3000 FPM	2700 FPM	.004 psig/FPM
	400 to 4000 FPM	3600 FPM	.003 psig/FPM
	550 to 5500 FPM	4950 FPM	.002 psig/FPM

INSTALLATION AND CALIBRATION

CALIBRATION: SINGLE INPUT

1. Set the desired throttling range (TR).
2. Set the authority to minimum.
3. Note the input pressure or reference point (temperature, etc.) at port 1.

Note: Always set TR and authority before calibration. If either setting is adjusted after calibration, it will affect the calibration of the device and it will be necessary to recalibrate.

4. Turn the control point adjustment until the branch pressure is 9 psig (or other desired pressure, such as mid-spring range pressure).
5. Lift the control point scale to disengage, and turn the scale to the pressure (or reference point) noted at port 1 in step 3. Release the control point scale so that it will reengage.
6. Turn the control point adjustment until the scale indicates the desired control point in psig (or desired reference point).

Example:

a. The throttling range desired is 10° or 10% for a 100° Span transmitter. (See Definitions.) This is set on the TR scale.
b. The input pressure at port 1 is read at 6 psig. (if a 0°-100°F transmitter is being used, a temperature of 25° is indicated).
c. The control point adjustment is turned until the branch pressure gauge reads 9 psig (or mid-spring range pressure).
d. The control point scale is turned to a value equal to the gauge reading at port 1 or 6 psig. (See item (b) above).
e. The Control Point Adjustment is then turned to the pressure that represents the desired control temperature. If scales calibrated in temperature are used instead of in psig, deal directly with temperature in steps (b), (d) and (e).

2341-001 CALIBRATION: SINGLE INPUT WITH CPA

Set input pressure at port 2. This pressure is normally set at 9 psig which allows a ± 15% effect on the setpoint. (See Definitions). This preload may be set at 3 psig to allow only upward adjustment (30% maximum), or at 15 psig allowing only a downward adjustment (30% maximum) of the control point.

2341-501 CALIBRATION: SINGLE INPUT WITH CPA

Set input pressure at port C. This pressure is normally set at 9 psig which allows a ± 10% effect on the setpoint. (See Definitions). This preload may be set at 3 psig to allow only upward adjustment (20% maximum), or at 15 psig allowing only a downward adjustment (20% maximum) of the control point.

Note: The effect of a varying pressure at port 2 has a direct effect on the setpoint of the controller.

Proceed with calibration procedure as described in Single Input Calibration, steps 1 through 6.

CALIBRATION: DUAL INPUT

Note: Always set TR and authority before calibration. If either setting is adjusted after calibration, it will effect the calibration of the device and it will be necessary to recalibrate.

To setup or calibrate the 2341 Receiver Controller on a dual input or reset application, it is necessary to determine the desired reset schedule. The reset schedule is determined by the design of the mechanical system. In the typical application shown, (see Figure 6), the hot water supply temperature leaving the converter is being controlled. This temperature is being raised or lowered in response to changes in outside air temperature. In this case, the geographic location determines the design temperatures of the building, and the mechanical equipment (converter size, etc.) determines the supply temperatures necessary to meet the needs of maintaining space temperature properly.

Other applications could involve the control of static pressure, humidity, water, steam or pressure to meet the needs of a particular HVAC system. The principles discussed here apply to most potential applications.

In this example a steam to hot water converter is used to generate the hot water for the system. It is desired to reset the hot water temperature from a low of 100°F at outside temperature of 60°F, to high of 180°F at 10°F outside air temperature. A throttling range of 30°F is considered necessary for stable control. Thus the desired reset schedule is:

Reset Schedule	
Hot Water Supply Temperature	**Outside Air Temperature**
180°	10°
140°	35°
100°	60°

Transmitter Selection

A transmitter must be selected to meet the needs of the system. Normal procedure is to pick a transmitter range that puts the desired control points toward the middle of the range. For the example:

Outside Air: -25°F to 125°F

Hot Water Supply: 40°F to 240°F

Throttling Range

A throttling range of 30°F has been chosen to provide stable control.

Authority Calculation

The following formula is used to determine the authority setting for a dual input receiver controller application. For clarification of the terminology used in the formula, refer to the Definitions section of this booklet.

$$\text{Authority percentage} = \frac{\left(\Delta T@\text{Primary} \times \text{Primary Sensitivity}\right) + \left(TR \times \text{Primary Sensitivity}\right)}{\Delta T@\text{Secondary} \times \text{Secondary Sensitivity}} \times 100$$

Using the information given in the reset schedule, the transmitter ranges chosen, and the desired throttling range, we can determine the values for our formula.

ΔT @ Primary:	80°
Primary sensitivity:	.06 psig/°F
Throttling range:	30°
ΔT @ Secondary:	50°
Secondary sensitivity:	.08 psig/°F

The formula now becomes:

$$\text{Authority percentage} = \frac{(80° \times .06) + (30° \times .06)}{50° \times .08} \times 100$$

$$\text{Authority percentage} = \frac{4.8 + 1.8}{4.0} \times 100$$

$$\text{Authority percentage} = \frac{6.6}{4.0} \times 100$$

Authority Percentage = 1.65 x 100
Authority = 165%

Calibration Steps

1. Set Throttling Range and authority.
2. Using the Receiver Calibration Kit 900-012 for simulated inputs, proceed as follows:
   a. Set inputs to match the midpoints of the reset schedule. This may be done in units of temperature (as read on the receiver gauge scale matching the transmitter range) or in pressure (taken from the output & pressure chart on page 11).

      In this example: 140°F or 9.0 psig at port 1, and 35° or 7.8 psig at port 3.
   b. Turn the control point adjustment until the branch pressure is 9 psig (or the midspring range pressure of the controlled device).
   c. Disengage the control point scale by lifting. Rotate the scale until it equals the midpoint of the reset schedule (at port 1 - the primary input). This may be read as a corresponding temperature (using optional control point scale) or in psig on the scale. In this example: 140°F or 9.0 psig. Reengage the setpoint scale.

      The 2341 Controller is now calibrated to the desired setpoint of a 140°F hot water supply at a 35°F outside air temperature.

      To verify the correct throttling range, the primary input only may be varied (port 1). Varying this input over the span of the desired throttling range should change the branch pressure from 3 to 15 psig.

      To verify the correct authority setting, the simulated inputs should be raised and lowered. Example: Port 1 to 180°F and port 3 to 10°F, or port 1 to 100°F and port 3 to 60°F. Both conditions should give a branch pressure equal to that obtained when both inputs are at the midpoints of the reset schedule. 140°F and 35°F.
   d. Connect transmitters to the proper ports.
3. If the 2341 Controller is being calibrated “live” or under actual operating conditions, proceed as follows:
   a. Set the Throttling Range and authority.
   b. Turn the control point adjustment until the branch pressure is 9 psig (or midspring range of the controlled device).
   c. Note the input temperature or corresponding pressure at port 1. Disengage the control point scale by lifting, and rotate the scale until it matches the input temperature (or corresponding temperature) at port 1 and reengage the scale.

Note: The supply Temperature must be within the range of the reset schedule. If it is not, the system should be brought into range before final calibration.

d. Rotate the setpoint scale until the scale corresponds to the required temperature indicated by the input temperature at port 3. (Temperature at port 3 must be within the desired reset schedule to allow for proper calibration). To determine the correct supply temperature, it is necessary to draw a graph of the reset schedule as shown in Figure 2.

Note: The setpoint scale only represents the hot water supply temperature (in this example) at the one point which corresponds to that given input at port 3. With any change in the sensed condition at port 3, the setpoint of the controller shifts to correspond to that value.

Examples: Use reset schedule shown in figure 2, which corresponds to our example schedule in figure 1 on page 6.

- Input at port 3 indicates 35°F. Corresponding HWS temperature should be 140°F.
- Input at port 3 indicates 20°F. Corresponding HWS temperature should be 164°F.
- Input at port 3 indicates 50°F. Corresponding HWS temperature should be 115°F.

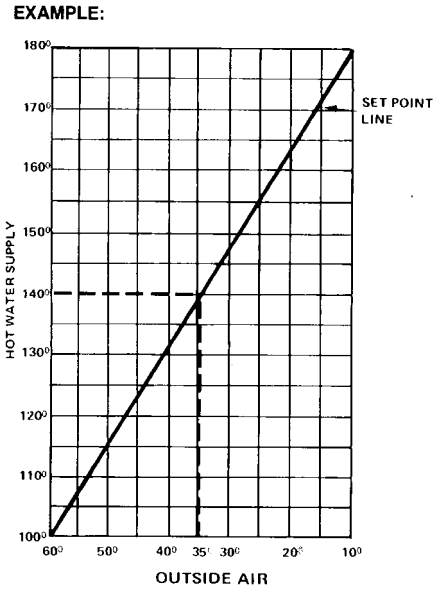

Figure-2 Reset Schedule.

MOUNTING DIMENSIONS

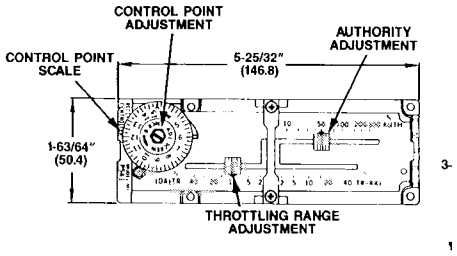

Figure-3

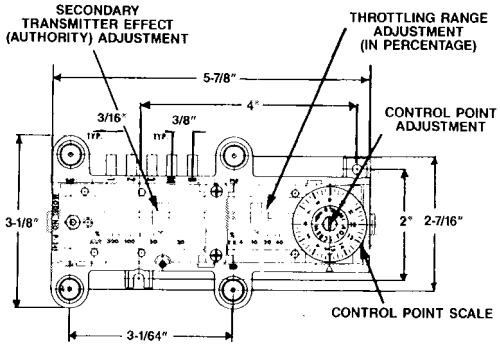

Figure-4

SINGLE INPUT CALIBRATION PROCEDURES (Input to Port 1 Only)

1. Note the input pressure to port 1. It must be between 6 and 12 psig.
2. Set the desired throttling range (in psig).
3. Turn the control point adjustment screw until the branch pressure gauge reads 9 psig.
4. Depress the control point scale to disengage the gear teeth and set the scale to the pressure noted at port 1 (between 6 and 12 psig). Release the control point scale so that it will reengage the gear teeth.
5. Turn the control point adjustment screw until the scale indicates the desired control point:

   Example:

   a. The input pressure at port 1 is read at 6 psig. If a 0°F to 100°F transmitter is being used, a temperature of 25°F is indicated.

   b. The throttling range necessary is 10°F or 1.2 psig for a 100°F span transmitter.

   c. The control point adjustment screw is turned until the branch pressure gauge reads 9 psig.

   d. The control point scale is turned to a value equal to the gauge reading at port 1 or 6 psig. (See item a. above).

   e. The control point adjustment screw is then turned to the pressure that represents the desired control temperature. If scales calibrated in temperature are used instead of in psig, you should deal direclty with temperature in steps 1, 4, and 5.

SINGLE INPUT WITH REMOTE MANUAL SETPOINT ADJUSTMENT

1. Set port 2 input pressure at 9 psig.

Note: The input pressure to port 2 has a 20% affect on the control point. Example, if the port 1 transmitter has a span of 100°F, the remote manual adjustment pressure on port 2 can change the control point ±10°F, or a total of 20°, or 20% of the span of the primary or port 1 transmitter.

2. Proceed in exactly the manner described above for a one input controller.

Note: The effect of varying the pressure on port 2 is direct. An increase in port 2 pressure raises the control point and a decrease in port 2 pressure decreases the control point.

DUAL INPUT TYPICAL APPLICATION

Hot Water Reset System. The schematic drawing below illustrates a typical piping arrangement.

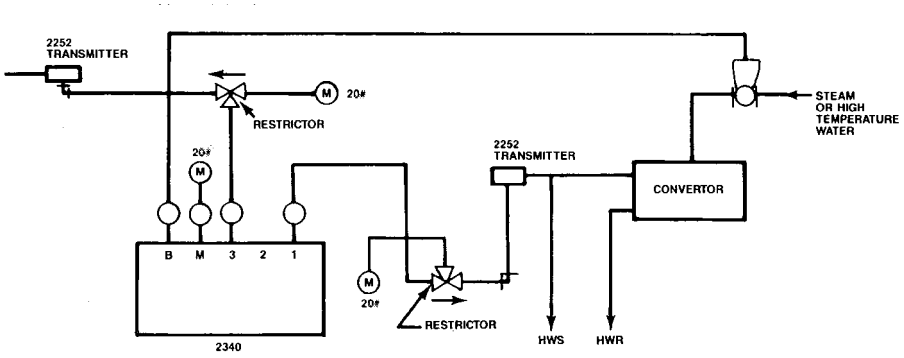

Figure-5

Discharge Water Temperature	Outside Air Temperature
200°F	0°F
100°F	70°F

In order to allow field personnel to set up this system to control according to the above reset schedule, transmitters must be selected and the TR (in psig) and the authority (in %) must be provided. In addition, show the sensor pressures that exist at several points along the reset schedule. For this purpose provide a reset schedule that shows the temperatures and corresponding pressures at each extreme end of the desired operating schedule, plus the midpoint readings.

1. The transmitters selected are as follows: Outside air sensor - 2252 (remote bulb) range - 25°F to +125°F, Hot water supply - 2252 (rigid + well) range 40°F to 240°F.
2. TR: Past experience plus knowledge of the amount of pressure drop taken when sizing the steam control valve permits the selection of a probable throttling range. For this application, select a throttle range of 20°F. Based on a 200°F span primary controller, each degree change in hot water temperature represents .06 psig change in transmitter pressure. Therefore, we would set 1.2 psig (20°F x .06 psig) as our throttling range setting.
3. Authority: Calculate the outside air sensor authority required to provide the above reset schedule.

$$\text{Authority percentage} = \frac{\Delta P \text{ (Discharge sensor)} + TR}{\Delta P \text{ (OA sensor)}} \times 100$$

From calculations determine the pressure range for each transmitter and substitute as follows:

$$\text{Authority percentage} = \frac{6.0 + 1.2}{5.6} \times 100 \quad \frac{7.2}{5.6} \times 100 = 129\%$$

Example:

	Reset Schedule			
	Port 3 Pressure	**OA Temp.**	**HW Temp.**	**Port 1 Pressure**
Set Point	5.0 psig	0°F	200°F	12.6 psig
	7.8 psig	35°F	150°F	9.6 psig
	10.6 psig	70°F	100°F	6.6 psig

SET: 9.6 psig (150°F)
TR: 1.2 psig
AUTH: 129%

Since all calculations and settings have been determined, proceed with the following steps:

1. If the input pressure to port 1 and 3 are to be simulated, refer to the reset schedule shown above and simulate the mid range operating pressures (7.8 psig port 3 and 9.6 psig port 1).
   a. Set the throttling range (1.2 psig) and authority (129%) settings.
   b. Turn the control point adjustment until the branch pressure is 9 psig (or mid range of the spring range of the control valve).
   c. Disengage the control point scale from the gear teeth by depressing. Rotate the scale until the pressure corresponds to the mid range temperature (9.6 psig) and reengage the gear teeth. The readout from this scale is not meaningful to the operating engineer, but only serves as a point of calibration. It should be explained to the operating engineer that the control point of the PP2340 will follow a reset schedule and the mid scale setting will occur at only one point in the schedule.
2. If the PP2340 is being calibrated live or in actual operating conditions:
   a. Proceed with the TR and authority settings as mentioned above and make the settings on the PP2340.
   b. Turn the control point adjustment until the branch pressure reads 9 psig or mid range of the control valve spring range.
   c. Disengage the control point scale from the gear teeth, by depressing. Rotate the scale until the scale pressure reading corresponds with the input pressure at port 1, which is the pressure reading from the primary sensor. Reengage the gear teeth and rotate scale until the setpoint corresponds with the required water temperature for outside air temperature requirements. This is determined by having projected a graph of hot water supply temperature versus outside air temperature.

TRANSMITTER OUTPUT PRESSURES

	Temperature Range (F)				Output Pressure
	-25 to +125F	0 to 100F	40 to 140F	40 to 240F	
Actual Sensed Value (Temp. or Pressure)	**-25**	0	40	40	3.0
	-22	2	42	44	3.24
	-19	4	44	48	3.48
	-16	6	46	52	3.72
	-13	8	48	56	3.96
	-10	10	50	60	4.2
	- 7	12	52	64	4.44
	- 4	14	54	68	4.68
	- 1	16	56	72	4.92
	2	18	58	76	5.16
	5	20	60	80	5.4
	8	22	62	84	5.64
	11	24	64	88	5.88
	14	26	66	92	6.12
	17	28	68	96	6.36
	20	30	70	100	6.6
	23	32	72	104	6.84
	26	34	74	108	7.08
	29	36	76	112	7.32
	32	38	78	116	7.56
	35	40	80	120	7.8
	38	42	82	124	8.04
	41	44	84	128	8.28
	44	46	86	132	8.52
	47	48	88	136	8.76
	50	50	90	140	9.0
	53	52	92	144	9.24
	56	54	94	148	9.48
	59	56	96	152	9.72
	62	58	98	156	9.96
	65	60	100	160	10.2
	68	62	102	164	10.44
	71	64	104	168	10.68
	74	66	106	172	10.92
	77	68	108	176	11.16
	80	70	110	180	11.4
	83	72	112	184	11.64
	86	74	114	188	11.88
	89	76	116	192	12.12
	92	78	118	196	12.36
	95	80	120	200	12.6
	98	82	122	204	12.84
	101	84	124	208	13.08
	104	86	126	212	13.32
	107	88	128	216	13.56
	110	90	130	220	13.8
	113	92	132	224	14.04
	116	94	134	228	14.28
	119	96	136	232	14.52
	122	98	138	236	14.76
	125	100	140	240	15.0

	Transmitter Range (F)			Output Pressure
	30 to 80% RH 30 to 80°	-10 to +40F	0 to 50 psi	
Actual Sensed Value (Temp., %RH, Pressure)	**30**	-10	0	3.0
	32	- 8	2	3.48
	34	- 6	4	3.96
	36	- 4	6	4.44
	38	- 2	8	4.92
	40	- 0	10	5.40
	42	2	12	5.88
	44	4	14	6.36
	46	6	16	6.84
	48	8	18	7.32
	50	10	20	7.80
	52	12	22	8.28
	54	14	24	8.76
	56	16	26	9.24
	58	18	28	9.72
	60	20	30	10.20
	62	22	32	10.68
	64	24	34	11.16
	66	26	36	11.64
	68	28	38	12.12
	70	30	40	12.60
	72	32	42	13.08
	74	34	44	13.56
	76	36	46	14.04
	78	38	48	14.52
	80	40	50	15.0

	Transmitter Range (F)				Output Pressure
	50 to 90F	0 to 10"	-0.5 to +0.5"	-0.05 to +0.2"	
Actual Sensed Value (Temp., Inches W.C.)	**50**	0	-.50	-0.05	3.0
	52	.5	-.45	-0.0375	3.6
	54	1	-.40	-0.025	4.2
	56	1.5	-.35	-0.0125	4.8
	58	2.0	-.30	0	5.4
	60	2.5	-.25	0.0125	6.0
	62	3.0	-.20	0.025	6.6
	64	3.5	-.15	0.0375	7.2
	66	4.0	-.10	0.05	7.8
	68	4.5	-.05	0.0625	8.4
	70	5.0	0	0.075	9.0
	72	5.5	.05	0.0875	9.6
	74	6.0	.10	0.10	10.2
	76	6.5	.15	0.1125	10.8
	78	7.0	.20	0.125	11.4
	80	7.5	.25	0.1375	12.0
	82	8.0	.30	0.15	12.6
	84	8.5	.35	0.1625	13.2
	86	9.0	.40	0.175	13.8
	88	9.5	.45	0.1875	14.4
	90	10.0	.50	0.20	15.0

	Transmitter Range (F)			Output Pressure
	0 to 150 psi	0 to 300 psi	0 to 3"	
Actual Sensed Value (Press., Inches W.C.)	**0**	0	0	3
	5	10	.1	3.4
	10	20	.2	3.8
	15	30	.3	4.2
	20	40	.4	4.6
	25	50	.5	5.0
	30	60	.6	5.4
	35	70	.7	5.8
	40	80	.8	6.2
	45	90	.9	6.6
	50	100	1.0	7.0
	55	110	1.1	7.4
	60	120	1.2	7.8
	65	130	1.3	8.2
	70	140	1.4	8.6
	75	150	1.5	9.0
	80	160	1.6	9.4
	85	170	1.7	9.8
	90	180	1.8	10.2
	95	190	1.9	00.6
	100	200	2.0	11.0
	105	210	2.1	11.4
	110	220	2.2	11.8
	115	230	2.3	12.2
	120	240	2.4	12.6
	125	250	2.5	13.0
	130	260	2.6	13.4
	135	270	2.7	13.8
	140	280	2.8	14.2
	145	290	2.9	14.6
	150	300	3.0	15.0

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