READ AND SAVE THESE INSTRUCTIONS

CARNES®

INSTALLATION, OPERATION & MAINTENANCE MANUAL FOR

PRESSURE DEPENDENT CONTROLS

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CALIBRATION

A signal is sent directly from the thermostat to the unit damper actuator without any provisions made for duct pressure changes within the operating range of the terminal unit.

GENERAL

1. Refer to the calibration chart on the unit. Read the pressure differential required for that unit to deliver the desired CFM. (The unit can be found on the Carnes identification label).

2. Remove the caps from the high and low sensor signal tubes located at the inlet.

3. Connect a differential pressure gauge or incline manometer to the sensor tubes. The high pressure side of the gauge to the sensor tube having the sensing holes facing upstream (total pressure signal) and the low pressure side of the gauge to the sensor tube having the sensing holes facing downstream (static pressure signal).

PNEUMATIC CONTROLS

As a standard, the terminal unit is supplied with a Carnes 8-13 psi pneumatic damper actuator. Optional adjustment stops may be supplied for airflow balancing.

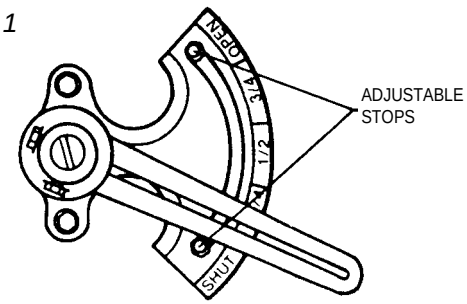
TOOLS NEEDED: 0.0" - 2.0" Pressure gauge or incline manometer, 5/16" open end wrench, 7/16" open end wrench, and a slotted screwdriver.

UNITS WITH OPTIONAL BALANCING QUADRANT *(Figure 1):*

1. Calibrate the maximum and minimum airflows by monitoring the pressure gauge and adjusting the damper stops so that the damper travel is limited to the desired maximum and minimum airflows.

2. Disconnect pressure gauge and replace sensor tube caps.

Figure 1



UNITS WITHOUT OPTIONAL BALANCING QUADRANT:

CAUTION: *Do not attempt to limit the maximum CFM on units without the balancing quadrant. Severe damage could occur at excessive control air pressures. Only a minimum CFM limit can be set. The minimum airflow limit should be chosen so that the damper is no more than 50% open.*

1. Adjust thermostat for full heat (minimum airflow).

2. Loosen the 5/16" damper setscrew and calibrate the minimum airflow by monitoring the pressure gauge and adjusting the damper so that the damper travel is limited to the desired minimum airflow.

3. Tighten the damper setscrew, disconnect the pressure gauge and replace sensor tube caps.

REVERSING RELAY ADJUSTMENT

For those applications that require a reversing relay:

- Direct acting thermostat and normally open damper.
- Reverse acting thermostat and normally closed damper.
- Dual duct units with adjustable mixing sequences.

Reversing relays are factory set for nominal “sum” of 16 psi. A thermostat pressure of 8 psi applied to port “3” (or “S”) yields 8 psi output of port “1” (or “B”). The output pressure decreases as the input thermostat pressure is increased and the output pressure increases as the input thermostat pressure is decreased. The “sum” of the input and output pressures always totals 16 psi.

To check or re-set the reversing relay, the following procedure is recommended.

TOOLS NEEDED: (2) 0 psi - 30 psi air gauges and a slotted screwdriver.

1. Connect a 20 psi main control air supply to port “M” of the reversing relay. *(Figure 2)*

2. Monitor the input pressure at port “3” (or “S”) and the output pressure at port “1” (or “B”) with 0 - 30 psi gauges.

3. Adjust the black adjustment screw, located on the end opposite of the port connections, to increase or decrease the “sum” value of the reversing relay.

4. Increasing the input-output “sum” moves the curve to the right on the airflow chart and decreasing the input-output “sum” moves the curve to the left on the airflow chart. *(Figure 3)*

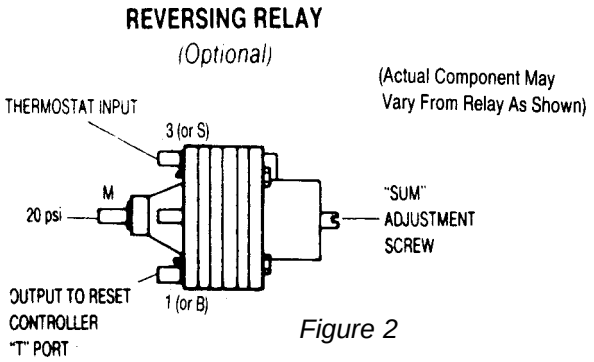


Figure 2

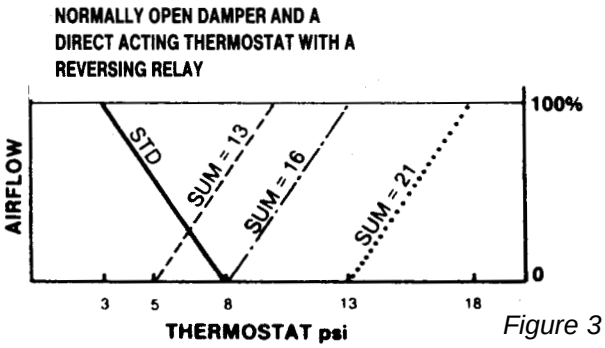


Figure 3

TROUBLESHOOTING PNEUMATIC CONTROLS:

SYMPTOM	PROBABLE CAUSE	CORRECTION
Damper actuator will not stroke	*1. Leak in the control line.*	1. Replace tubing.
	2. Leak in the actuator.	2. Apply 13-20 psi air to the actuator with a squeeze bulb. 2A. If actuator does not stroke, manually move linkage. If it is jammed, see 4 or 5 below. If the actuator still does not stroke, replace actuator. 2B. If actuator strokes but does not remain fully stoked or bleeds faster than pressure can build, replace actuator.
	3. Incorrect calibration.	3. Refer to calibration procedure.
	4. Damper linkage jammed or binding.	4. Adjust linkage for free operation.
	5. Debris inside terminal unit.	5. Disconnect duct and remove debris from inside.
Damper actuator remains full stroked at all times	*1. Incorrect calibration.*	1. Refer to calibration procedure.
	2. Debris inside terminal unit.	2. Disconnect duct and remove debris from inside.
Low airflow through box on call for max. CFM	*1. Thermostat not set for maximum CFM.*	1. Adjust thermostat to call for full cooling.
	2. Low inlet static pressure.	2. Measure the CFM delivered by the unit with the damper in the full open position. If the CFM is low, increase the system static.
	3. Incorrect calibration.	3. Refer to calibration procedure.
	4. Debris inside terminal unit.	4. Disconnect duct and remove debris from inside.
Low airflow through box	*1. Low inlet static pressure.*	1. Measure the CFM delivered by the unit with the damper in the full open position. If the CFM is low, increase the system static.
	2. Incorrect calibration.	2. Refer to calibration procedure.
	3. Debris inside terminal unit	3. Disconnect duct and remove debris from inside.

ELECTRIC CONTROLS

As a standard, the terminal unit is supplied with a 5 watt, 24 volt AC, 1 rpm (15°/minute), reversible drive damper motor. It is equipped with fully adjustable stops to restrict damper travel from 0° 90° and can be indefinitely stalled without damage. The motors may be provided with as many as two (2) optional microswitches (for reheat options) rated 1/2 amp at 125 VAC each.

TOOLS NEEDED: 0.0" - 2.0" Pressure gauge or incline manometer, a 1/4" nut driver, 1/8" Allen wrench, 9/64" Allen wrench, and a slotted screwdriver.

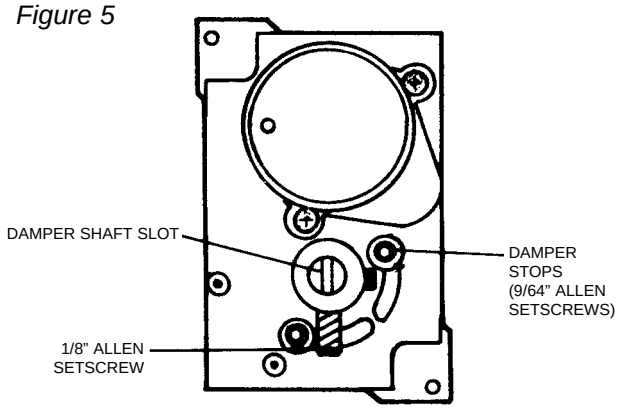
Remove the 1/4" sheet metal screws on the control enclosure cover to access the control components. Replace the cover and sheet metal screws upon completion of calibration.

ELECTRIC ACTUATOR (EA, EB) *(Figure 5)*

1. Calibrate the maximum and minimum airflows by monitoring the pressure gauge and adjusting the damper stops so that the damper travel is limited to the desired maximum airflows.

2. Disconnect pressure gauge and replace sensor tube caps.

Figure 5



ELECTRIC ACTUATOR WITH MICROSWITCH OPTIONS (ER, EK) *(Figure 6)*

Adjust microswitch settings after airflow balancing has been completed *(see above)*.

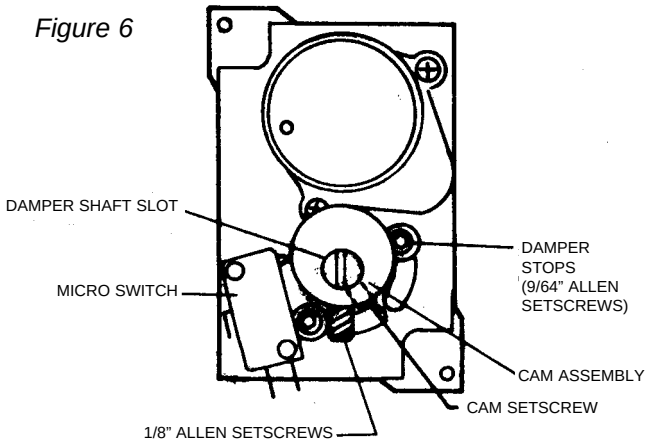
1. Set thermostat to call for desired airflow.

2. Loosen Allen head set screw securing the cam(s) on the actuator.

3. Rotate the cam(s) so that the cam energizes the switch(es) at the desired airflow.

4. Re-tighten the Allen head set screw to secure the cam(s).

Figure 6



ELECTRIC CHANGE-OVER THERMOSTAT OPTION (EB)

The change-over thermostat option is used in conjunction with the zone thermostat. The change-over thermostat reverses the action of the zone thermostat when warm air is supplied to the unit. This option is used for morning warm-up and is field adjustable from 60°F to 80°F switching temperature.