ELECTRO-MOTIVE DIVISION • GENERAL MOTORS CORPORATION
SERVICE DEPARTMENT

MAINTENANCE INSTRUCTION

PRESSURE CONTROL SWITCH – TYPE 9012

INTRODUCTION

In locomotive applications pressure control switches, Fig. 1, are used to monitor main reservoir air pressure. When used this way the switch is designated the compressor control switch CCS. If main reservoir pressure falls below the lower level set on the switch then the switch picks up, causing the air compressor to load. The compressor pumps up reservoir air until the upper limit of the switch is reached. When the reservoir pressure reaches the upper limit, the switch drops out causing the compressor to unload. In this way the switch acts as a regulating device to maintain reservoir pressure at some established level.

These switches are also used in non-locomotive applications such as Power, Marine and Industrial products.

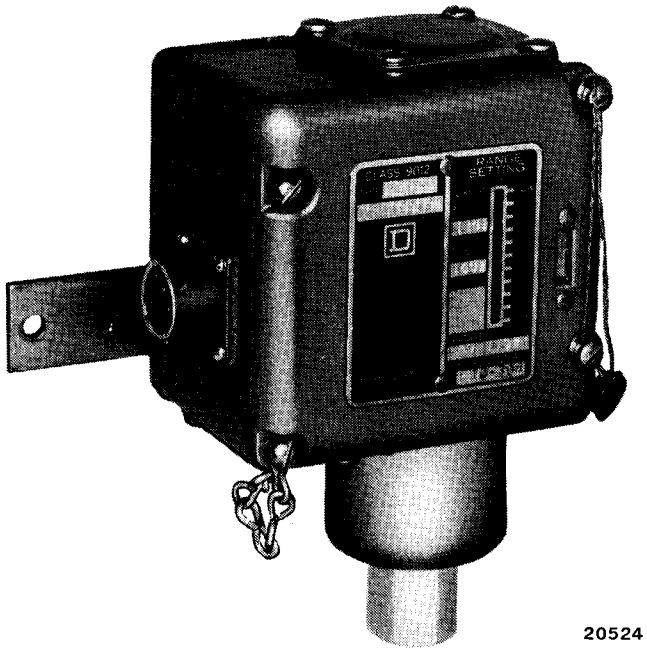
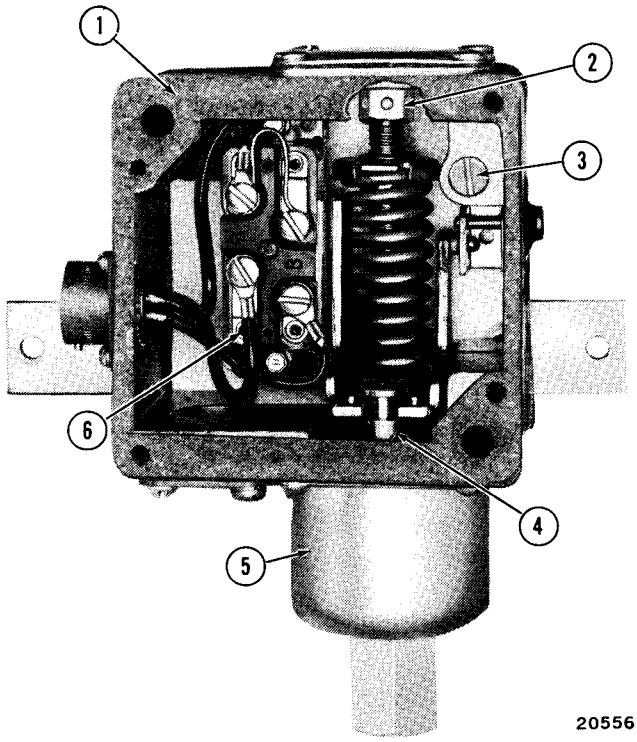


Fig. 1 – Pressure Control Switch

DESCRIPTION

Pressure control switches, Fig. 2, consist of an electrical switch actuated by a pressure sensitive bellows assembly through spring loaded levers. The electrical switch provides two sets of contacts (one normally open and one normally closed) rated at 15 amps, 115 volts DC. This switch and its actuating linkages are contained within a dustproof steel case.



1. Gasket
2. Internal Range Adjustment
3. Differential Adjusting Screw
4. Calibrating Nut
5. Bellows Assembly
6. Snap Switch

Fig. 2 – Pressure Control Switch With Cover Removed

*This bulletin is revised and supersedes previous issues of this number.

ADJUSTMENTS

Changes in the switch operating limits are made by varying the spring preload on the linkage arms. These adjustments are accessible when the front cover of the switch is removed. The two adjustments provided on this type of switch are:

RANGE

The range adjustment determines the dropout or low pressure point. This is the setting at which the switch goes back to its original (before being actuated) position. To raise the dropout (low pressure) point turn the range adjustment nut to the left. The increased preload on the range spring causes it to drop out the switch at a higher relative pressure. To lower the dropout point, turn the nut to the right. Because the range spring acts in conjunction with the bellows it exerts the greatest influence on the operating range.

DIFFERENTIAL

The differential adjustment sets the upper pressure point (pickup) for the switch. This is the setting where the switch initially responds to a specific rise in pressure. The adjustment establishes the amount of change, or differential, between the low setting (range adjustment) and the high setting. The differential is increased by increasing the preload on the differential spring which causes a greater force to be exerted in opposition to switch pickup. A greater opposition necessitates a higher pressure to overcome the spring force and pick up the switch. To raise the pickup pressure point, turn the differential adjusting screw clockwise. To lower the pickup pressure point, turn the screw counterclockwise.

NOTE: The range adjustment, because of its influence on the differential settings should be set first.

After adjusting the pressure control switch, check adjustment by simulating an operating cycle. If the switch does not perform satisfactorily, the range and the differential adjustment cycles should be repeated until the switch is correctly adjusted.

MAINTENANCE

INSPECTION

The pressure control switches are designed and manufactured to ensure long life and trouble free operation. Inspections should be limited to intervals prescribed in the Scheduled Maintenance Instruction. If air compressor difficulties arise, all other possible sources of trouble should be investigated before disturbing the settings of the compressor control switch.

If faulty operation of the switch is suspected, it should be removed from the locomotive for bench testing. A suitable test set-up is shown in Fig. 3.

REPLACEMENT OF SUB-ASSEMBLIES

ELECTRICAL SWITCH

The electrical snap switch is the basic contact mechanism and must be replaced as a complete unit. Tolerances in switch construction cause some variations in actuation points between individual switches. This variation must be considered whenever the electrical switch is replaced. To compensate for these differences it is necessary to

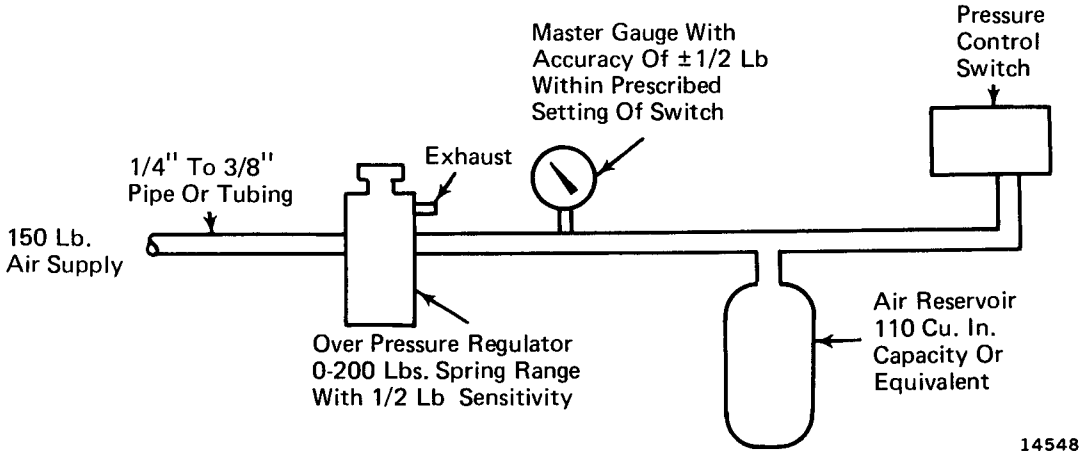


Fig. 3 – Bench Test Set-Up For Pressure Control Switches

establish the correspondence between switch actuation and movement of the bellows. To do this the backplate must be removed. When the backplate is removed the switch operating screw is adjusted with a .050" hexagon Allen wrench. The adjustment is made by turning the screw in a clockwise direction (viewed from the back) one turn beyond the point where the switch just trips.

NOTE: This adjustment must be made with the switch operating lever at its lowest position - no pressure on bellows.

BELLOWS

The bellows assembly can be replaced as a unit. If the bellows assembly is replaced, then the new assembly must be calibrated for the pressure range of the switch. The movement of the bellows must be synchronized with the actuation of the electrical switch.

NOTE: The pressure range of each switch is specified on the nameplate.

After a new bellows assembly has been installed, switch calibration is carried out with the calibration nut shown in Fig. 2. Before the calibration nut is adjusted, the range adjustment must be moved to its minimum preload position - the lowest switch dropout setting. This effectively removes the range adjustment from the system and allows the bellows alone to dictate the dropout point. With the range adjustment at this minimum position, turning the calibration nut down (left to right) will lower the range (dropout) setting and conversely, moving the nut up (right to left) will raise the range (dropout) setting. The calibration nut should be manipulated until the falling pressure point is in agreement with the minimum range as shown on the nameplate. Once this setting has been established no further calibration adjustment is necessary.

MODIFICATIONS

When the compressor synchronization modification is ordered, this same pressure control switch provides for compressor synchronization of units in multiple operation. The switches are connected so that all the air compressors in a locomotive consist are synchronized to discharge air into their respective main reservoirs when the main reservoir air pressure in any one unit drops to the low pressure setting of the switch.

A dual pressure control switch, Fig. 4, is also available. The second switch element is added to

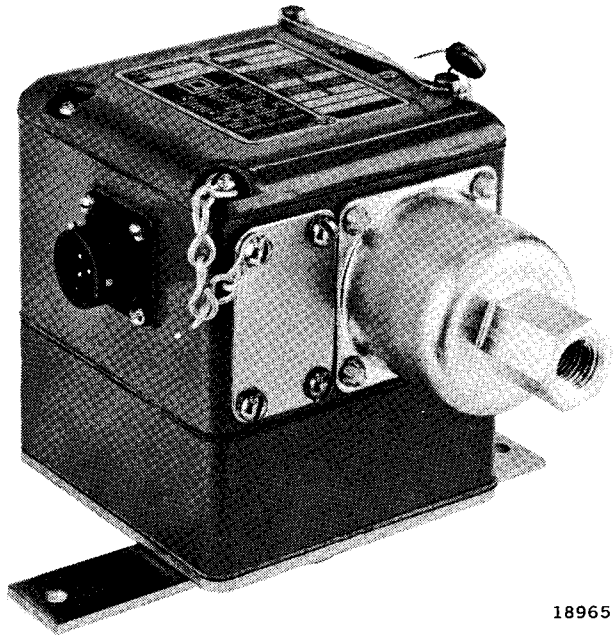


Fig. 4 -- Modified Pressure Control Switch

the back of the original switch. The purpose of the additional switch element is to provide another set of contacts to control equipment used in multiple operation - such as several air compressors operating synchronously in a locomotive consist. If one of the air compressors reaches the upper limit of the dual switch setting it will cease loading even though another compressor in the consist senses a low reservoir pressure condition. This dual feature prevents continued "popping" of the main reservoir safety valve.

NOTE: When the adjustments are made for the single switch, the settings are made automatically for the dual switch.

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