



# M AINTENANCE I NSTRUCTION

## AIR COMPRESSOR CONTROL SWITCH TYPES 223 AND 220-10

### DESCRIPTION

The air compressor control switch, illustrated in Fig. 1, is an air pressure operated, 15 ampere, 115 volt DC, single pole, double throw switch having two stationary and two movable contacts. All operating parts of this switch are enclosed in a dust-proof case of compact size.

The function of this switch is to control the air pressure in the main reservoir and to provide compressor synchronization for units in multiple unit operation.

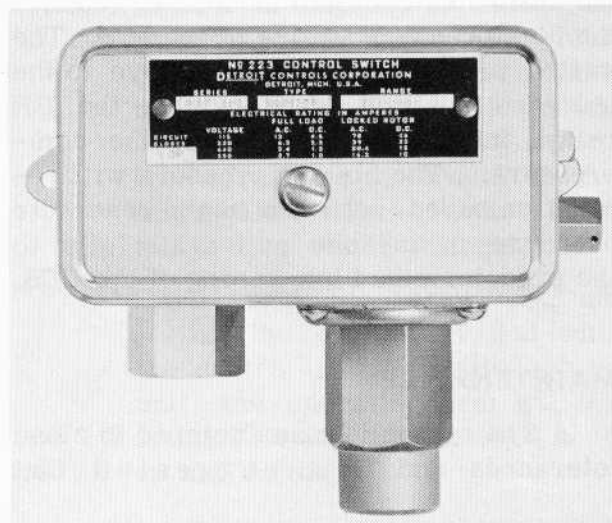
The electrical arrangement is such that all compressors in the locomotive consist are synchronized to discharge air into their respective main reservoirs when the main reservoir air pressure in any one unit drops to the low pressure setting of the compressor control switch.

### OPERATION

The operation of the compressor control switch (CCS) is such that when the pressure in the main reservoir of any one unit falls to a predetermined value the CB contact opens, Fig. 2, and the CA contact closes.

**NOTE:** The CCS switches in the units other than the one responsible for loading will remain in the unloaded position.

The opening of the CB contact de-energizes the compressor control (CC) magnet valve allowing air to exhaust from



Type #223



Type #220-10

Fig. 1 - Air Compressor Switch

the compressor unloader pipe causing the compressor of that unit to load.

The closing of the CA contact energizes the CC wire which establishes a

\* THIS BULLETIN SUPERSEDES ALL ISSUES OF M.I. 1532.

circuit to the compressor relays (CR) in all units of the locomotive consist. When the CR relays are energized, they open the circuit to their respective CC magnet valves causing all compressors to pump air.

The pumping of air will continue in all units until main reservoir pressure in the unit which initiated the loading reaches the high pressure setting of the CCS. The switch in this unit will then move to the unloaded position de-energizing the CR relays in all units, unloading the compressors. The air compressors will remain unloaded until the main reservoir pressure in any one unit again falls to the predetermined low setting of the CCS.

**MAINTENANCE**

The switch is manufactured to close tolerances and it is suggested that

inspections be limited to intervals as prescribed in Maintenance Instruction 1704 (Scheduled Maintenance Program).

If air compressor difficulties arise, all other sources of possible trouble should be investigated before any attempt is made to disturb the settings of the compressor control switch.

For information on the compressor magnet valve, see Maintenance Instruction 636.

**INSPECTION**

During periodic inspections of the compressor control switch or when faulty operation is suspected, the switch should be removed from the locomotive and a bench test made. Fig. 3 shows a schematic diagram of a recommended bench set-up for testing this switch.

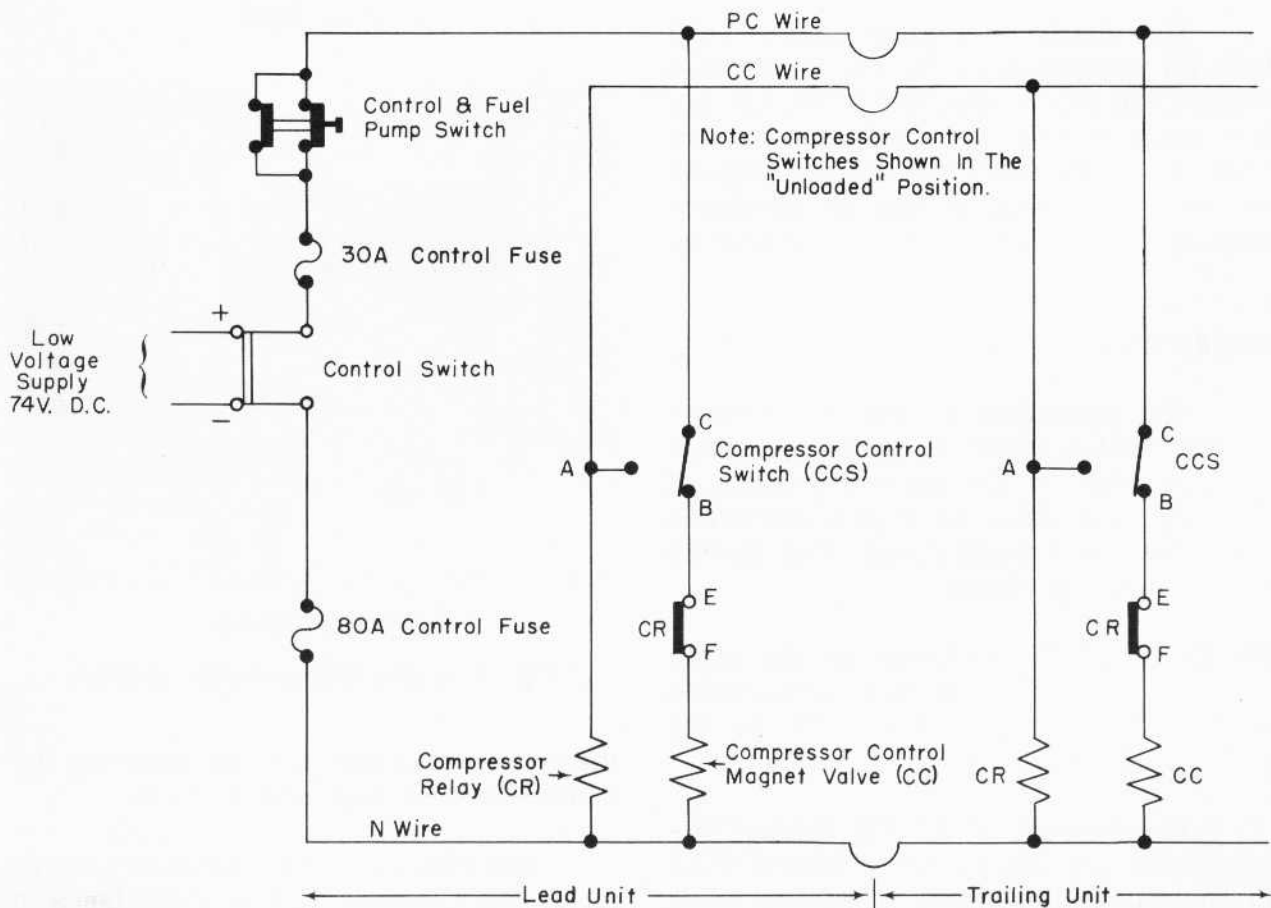


Fig. 2 - Schematic - Compressor Control Circuit

It is recommended that test lamps be used in conjunction with an air pressure gauge, to give positive indication of the opening and closing of the contacts. Refer to "Testing And Adjustment" section for proper installation of test lamps.

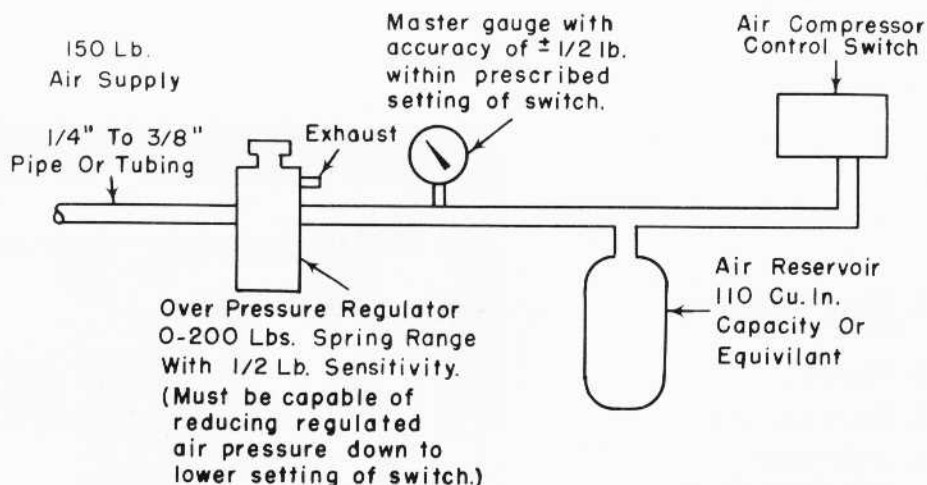


Fig. 3 - Schematic - Bench Test

## CLEARANCE

Before testing for proper settings of the switch, a clearance check should be made to determine that the switch is not binding and that the contacts are set for correct openings.

With the use of feeler gauges, check the following clearances:

1. Lower contact set for .025" opening with .020" over travel.
2. Upper contact set for .025" opening with .020" over travel.
3. Clearance between operating rod and nylon block in switch .010" minimum.
4. Clearance between operating rod and spring retaining cap 1/32" minimum.

Should any of the above clearances be off, it is recommended that the switch be replaced with a spare and sent to EMD for Repair and Return.

## TESTING AND ADJUSTMENTS

Referring to Figs. 4 and 5 for location of terminals A, B and C attach two test lamps to the switch on test as follows:

1. Using a battery as a current supply source, attach a lead from the positive side of the battery to terminal C of the switch.
2. Connect one lead from the first test lamp to terminal B and the other lead

of the test lamp to the negative side of the battery. This lamp will indicate the closing of the lower contacts.

3. Connect one lead from the second test lamp to terminal A and the other lead to the negative side of the battery. This will indicate the closing of the upper contacts.

The compressor control switch is set so that the upper contacts close at the low setting of the switch, and the lower contacts close at the high setting of the switch.

### Range Adjustment

Apply air to the switch at the pressure desired to have the upper contact close. If the upper contact is open at this pressure, turn the range screw clockwise until the contact just closes. If this contact is closed, open by turning the range screw counterclockwise and then adjust to the point where the contact just closes. This fixes the "closing" point of the upper contact.

### Differential Adjustment (Switch Type 223)

The opening of the upper contact and closing of the lower contact is adjusted by the differential screw. This adjustment is made by applying air to the switch at the pressure desired to have the lower contacts close. If the lower contacts close at this pressure, the differential screw need not be touched. If

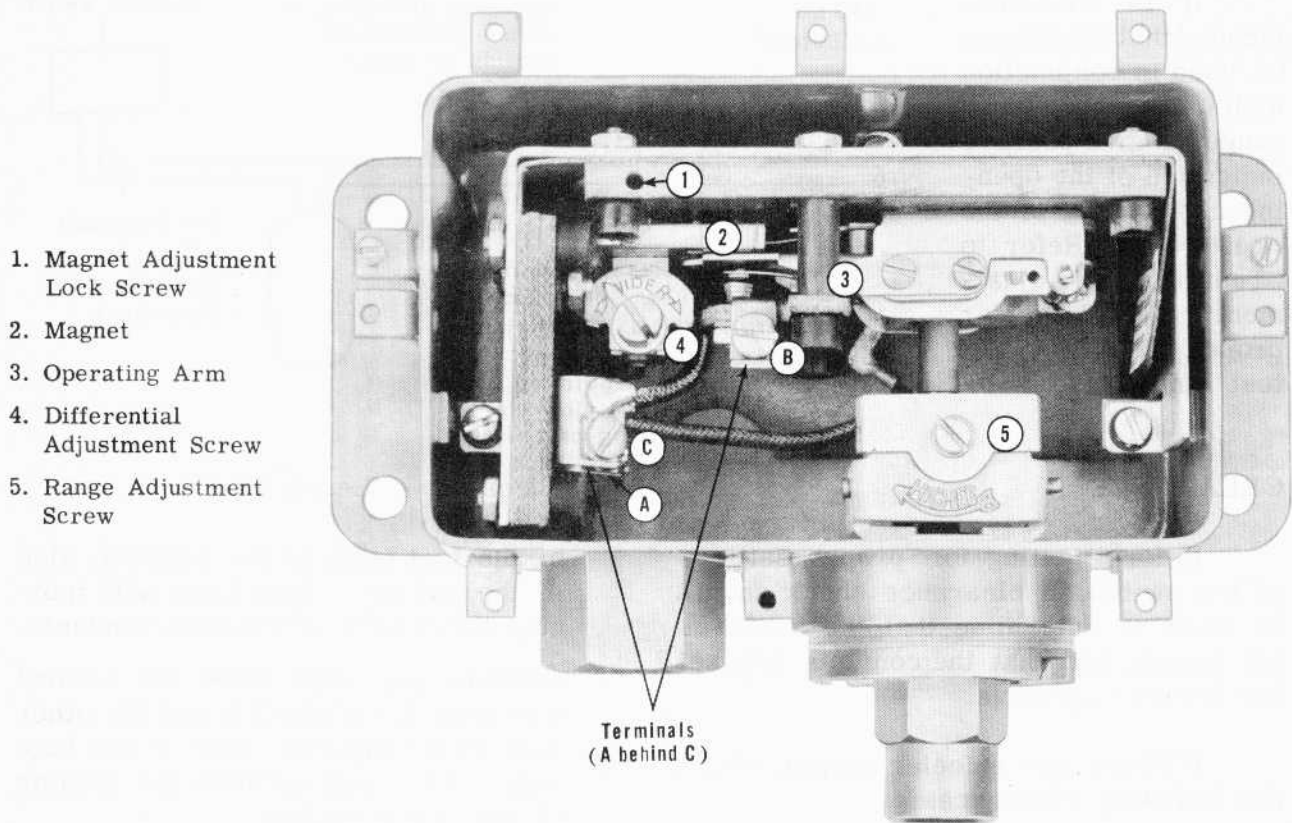


Fig. 4 - Type 220-10 Compressor Control Switch With Cover Removed

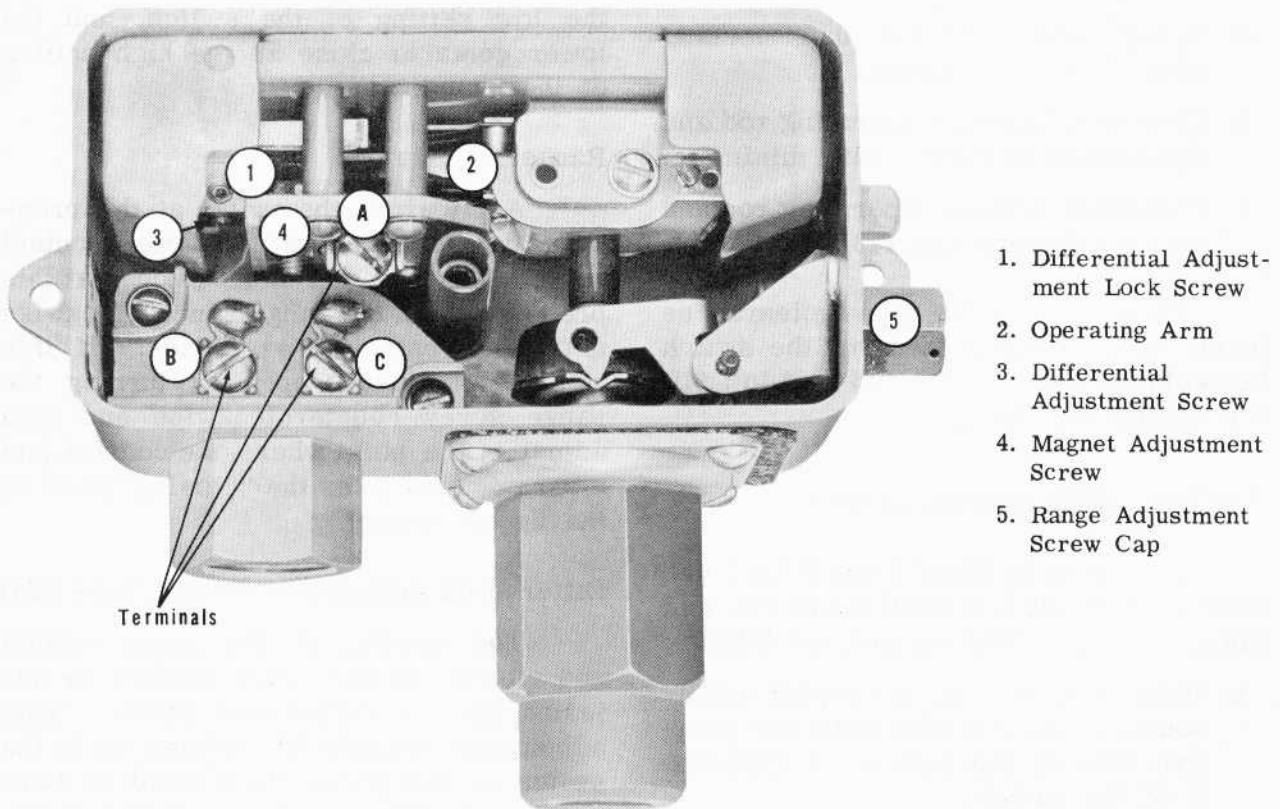


Fig. 5 - Type 223 Compressor Control Switch With Cover Removed

the contacts do not close, the differential screw can be turned slowly counterclockwise for less differential or clockwise for greater differential.

NOTE: Before attempting to adjust differential, loosen the differential adjustment lock screw, Fig. 4. After adjustment has been made, it is important that the differential adjustment lock screw be re-tightened, as failure to do this will allow vibration to change the setting of the differential.

If sufficient differential cannot be obtained with use of the differential screw, then use the magnet adjustment Allen screw located below the magnet.

NOTE: Care should be taken when adjusting the magnet so that when the switch is in operation on the unit, the operating arm will not contact the magnet, causing a short in the switch.

Differential Adjustment  
(Switch Type 220-10)

The opening point of the upper contact and the closing of the lower contact is adjusted by the differential screw. This adjustment is made by applying air to the switch at the pressure desired to have the lower contacts close. If the lower contacts close at this pressure, the differential screw need not be touched. If the contacts do not close, the differential

screw can be turned slowly counterclockwise for less differential or clockwise for greater differential.

If sufficient differential cannot be obtained with use of the differential screw, then use the magnet adjustment screw located above the magnet.

NOTE: Before attempting to adjust the magnet, loosen magnet adjustment lock screw, Fig. 4. After adjustment has been made, it is important to retighten the magnet adjustment lock screw, as failure to do this might allow vibration to change the setting of the differential.

Care should be taken when adjusting the magnet so that when the switch is in operation on the unit, the operating arm will not contact the magnet causing a short in the switch.

After adjusting the compressor control switch, check adjustments 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.

Any switch which cannot be adjusted as outlined above, or a switch which fails to function because of mechanical difficulty within the switch, should be replaced, and the faulty switch returned to EMD on a Repair and Return basis.

MAINTENANCE DATA

Contacts

Lower Contact Closes	- - - - -	At top setting of switch +0 -1 psi
Upper Contact Closes	- - - - -	At low setting of switch +0 -4 psi
Differential	- - - - -	10 psi minimum to 14 psi maximum

Clearances

Lower Contact	- - - - -	.025" opening with .020" over travel
Upper Contact	- - - - -	.025" opening with .020" over travel
Operating Rod and Nylon Block	- - - - -	.010" minimum
Operating Rod and Spring Retainer Cup	- - - - -	1/32" minimum