

**CLEANING EQUIPMENT FRAMES  
BY MEANS OF COMPRESSED AIR  
NO. 1 CROSSBAR AND CROSSBAR TANDEM OFFICES**

**1. GENERAL**

**1.01** This section covers the method of pressure cleaning equipment frames in No. 1 crossbar and crossbar tandem offices. It is intended for use with Section 069-703-801 which covers general information applicable to all crossbar offices.

**1.02** This section is reissued to add a caution and reference concerning relays and crossbar switches and to make other changes as required. This reissue does not affect the Equipment Test List.

**1.03** In compliance with specifications, as outlined by the Occupational Safety and Health Act (OSHA), compressed air for cleaning shall be reduced to less than 30 PSI and then shall be used only with chip guarding and personal protective equipment. ♦To meet this objective when using the KS-14758 or De Vilbiss DG-514-2 duster gun, it should be equipped with a KS-14758 L10 booster nozzle.♦

**1.04** All cleaning by means of compressed air shall be done at no more than 30 PSI pressure and using a 3/32-inch nozzle.

**2. METHOD**

**2.01** The need for making circuits busy to avoid service reaction depends on the type of circuits on the frame to be cleaned and on traffic conditions. During extremely light traffic, frames may be cleaned without making the circuits busy. At any other time it is recommended that common equipment, such as markers, connectors, and senders, be removed from service. Careful consideration should be given to the amount of

this equipment made busy so as not to adversely affect service.

**2.02** Relay covers shall be removed, except as indicated below, in accordance with the following.

(a) **Relays Under Common Strip Covers:**  
Remove the common strip covers for the complete frame, and store in a convenient location.

(b) **Polarized Relays, B- and G-Type Relays, and Wire-Spring Type Relays:**  
These relays shall be pressure cleaned with the cover caps in place.

(c) **Multicontact Relays (Other Than Wire-Spring Type):** The cover shall be removed from one relay at a time and replaced before proceeding to the next relay.

(d) **Relays Under Individual Covers:**  
Remove the individual covers for the complete frame [except as in (b) and (c)].

(e) **Selecting Off-Normal Spring Covers:**  
The selecting off-normal spring covers, if provided, of crossbar switches within the curtain enclosure shall be removed and treated as a relay cover.

**Note:** Exercise care in removing and remounting the selecting off-normal spring covers so that the cover spring is not flexed enough to reduce its tension.

**2.03** To clean the covers which have been removed, blow out the inside of the covers with the nozzle held approximately 6 inches away from the cover. This operation shall be done at the exhaustor end of the curtain enclosure before the pressure cleaning on the frame is started and while the

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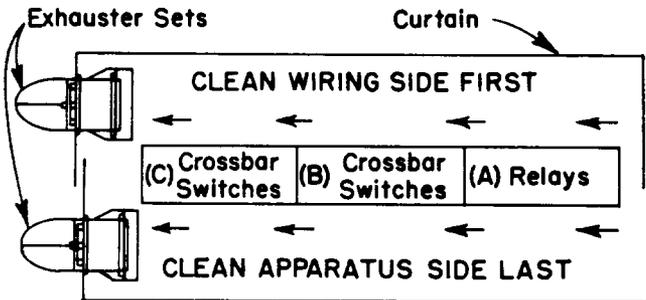
**SECTION 069-703-802**

exhauster sets are operating. Do not direct the air stream toward the frame. Wipe the outside surfaces of the covers using a KS-14668 polishing cloth, and store outside of the curtain enclosure in a clean location. Store in an orderly manner so no difficulty will be experienced in replacing each cover to its original location.

**2.04** Where deposits have formed on magnetic shields or surfaces similar to those located under the hinge point of U-type relays or other equipment, dispersion of this deposit in pressure cleaning is considered undesirable. Remove such deposits by using a KS-14668 polishing cloth or vacuum cleaner before air from the air nozzle is applied to either the wiring or apparatus side of the equipment.

**2.05** Start the cleaning of a frame at the point farthest removed from the exhauster sets, continuing in an orderly manner toward the sets. (See Fig. 1.)

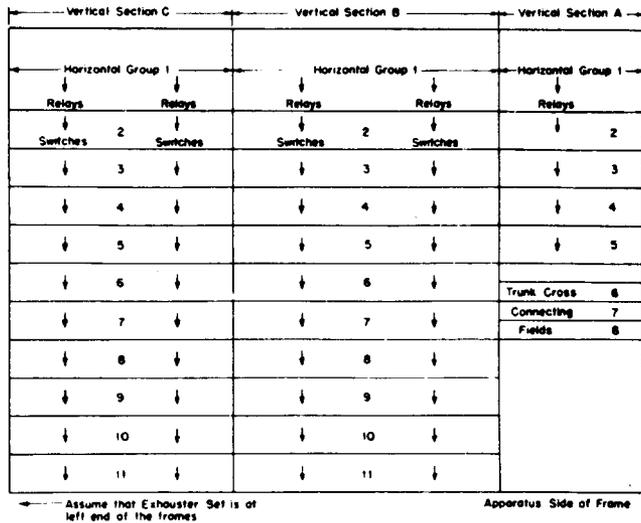
**2.06** The sides of the same frame may be divided into arbitrary horizontal and vertical sections of a width that will facilitate orderly cleaning progress. (See Fig. 2).



**Fig. 1—Curtain Enclosed Frame With Exhauster Sets in Place**

**2.07** Starting at the top of the frame, exercising care not to blow dust over the top of the enclosure, clean progressively each vertical section from top to bottom as shown in Fig. 2. Repeat the procedure for each section.

**2.08** Following the general methods described in 2.05 through 2.07, clean the wiring and forms on the frame by directing and moving the air nozzle in the manner indicated by Fig. 3, 4, and 5. Exercise care that insulation is not damaged.



**Fig. 2—Apparatus Side of District Frame Group**

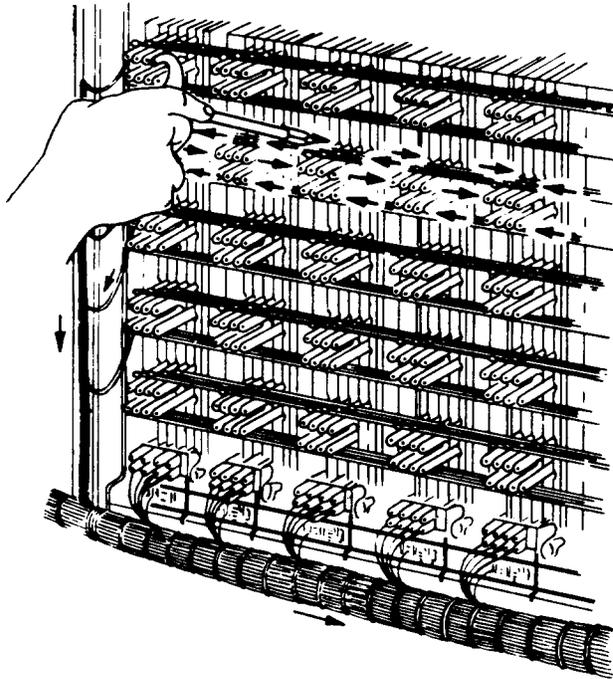
When cleaning the wiring side of wire-spring type relays, point the nozzle downward over the wiring at an angle approximately 30 degrees from vertical, as shown in Fig. 4, so that dust and lint will not be blown through openings in the mounting plates onto the springs and contacts of the relays.

**2.09** When cleaning the crossbar switch, clean the rear of the vertical units, as shown in Fig. 3. Clean the wiring at the bottom of the switch, as shown for relays in Fig. 4. Clean the wiring at the side of the switch, as shown for multicontact relays in Fig. 5.

**2.10** Where horizontal strapping has been placed on crossbar switches and multicontact relays, care shall be exercised to see that the dust is removed from the location where the strapping is connected to the lugs.

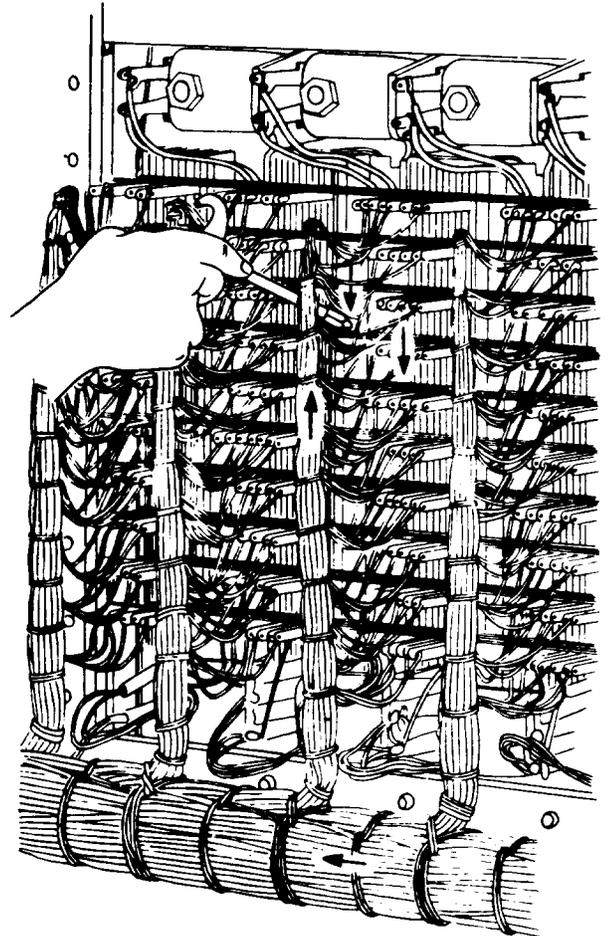
**2.11** After the wiring side of the frame has been cleaned, follow the same general methods outlined in 2.05 through 2.07 and clean the apparatus side of the frame.

**Caution:** Care must be exercised when pressure cleaning relay springs and crossbar switches. Excessive air pressure directed toward the moving springs of relays and crossbar switches may cause contacts to make or break falsely or selecting fingers to blow out of position. Refer to Section 069-306-801 for additional cleaning procedures.



First operation to remove dirt from vertical forms and wiring.  
 Second operation to remove dirt where wiring lugs enter spring pile up.  
 Third operation to remove dirt where multiple strapping is soldered to wiring lugs.  
 Repeat operations two and three for each row of solder lugs.  
 Final operation to remove dirt from horizontal form and wiring at bottom of switch.

Fig. 3—Rear of Crossbar Switch

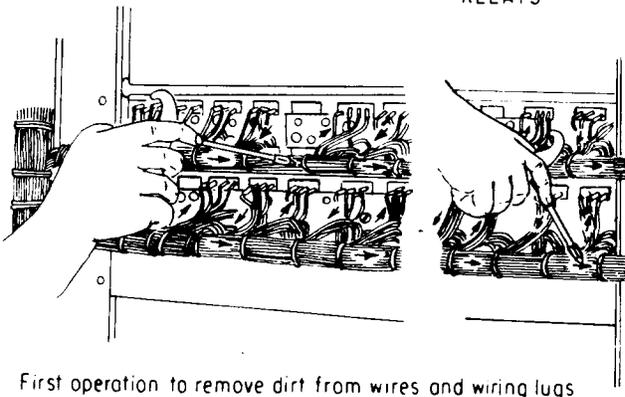


First operation downward to left or right of vertical form to remove dirt from wires and wiring lugs.  
 Second operation upward to remove dirt from vertical form.  
 Third operation downward to right or left (opposite side to first operation) of vertical form to remove dirt from wires and wiring lugs. Repeat operations 1, 2 and 3 for each relay or switch.  
 Last operation to remove dirt from horizontal wiring form.

Fig. 5—Rear of Multicontact Relay or Multicontact Switch

REAR OF B,E,U,Y, ETC TYPE RELAYS

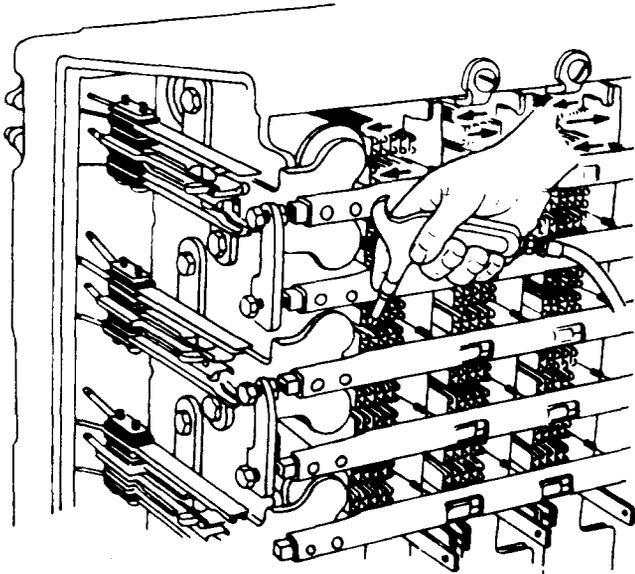
REAR OF WIRE-  
 SPRING-TYPE  
 RELAYS



First operation to remove dirt from wires and wiring lugs  
 Second operation to remove dirt from wiring forms.

Fig. 4—Method of Directing Nozzle for Cleaning Rear of B-, E-, U-, Y-, etc, and Wire-Spring Type Relays

2.12 When cleaning the apparatus side of the crossbar switches, point the air nozzle downward at an angle of about 45 degrees in order to clean two rows of contacts from above the selecting bar associated with the two rows of contacts. (See Fig. 6.)



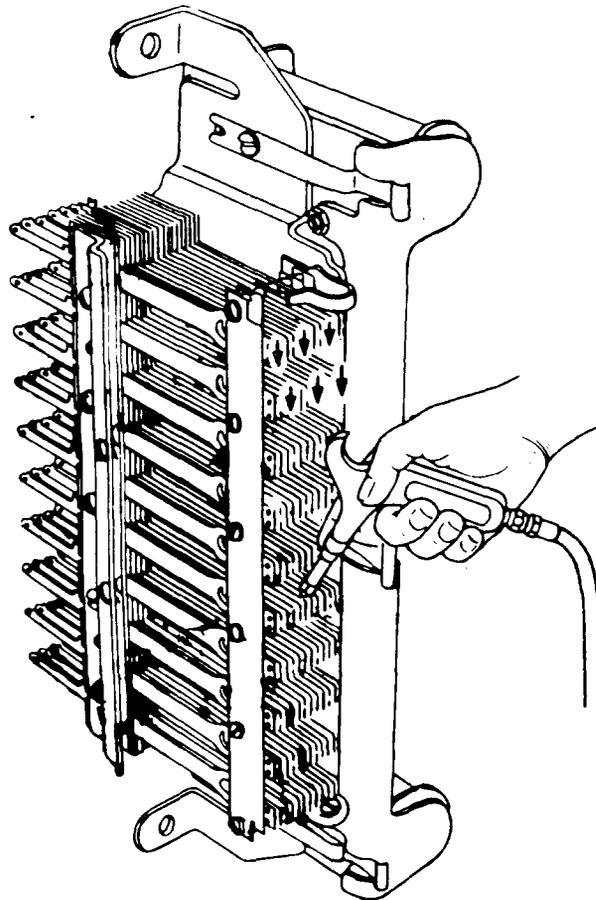
First operation to remove dirt where springs enter pile up and to remove dirt from select magnet coils.  
 Second operation to remove dirt from upper contacts.  
 Third operation to remove dirt from lower contacts.  
 Fourth operation to remove dirt from select off normal springs.  
 Repeat operations one, two, three and four for each two rows of contacts associated with a selecting bar.  
 Final operations  
 A. To remove dirt from hold off normal springs and contacts.  
 B. To remove dirt from hold magnet coils.\*

Fig. 6—Front of Crossbar Switch

2.13 When cleaning multicontact relays other than wire-spring type multicontact relays, proceed as indicated by the arrows in Fig. 7. Point the air nozzle directly at the end of the relay springs, and work from the top of the relay toward the bottom. [See 2.02(c) and 2.15.]

2.14 When cleaning U-type and similar-type relays, as for example those mounted in section B of Fig. 2, progress across the relay mounting plate in the manner indicated by Fig. 8.

2.15 When pressure cleaning relays (other than wire-spring type) from which covers or caps are not removed, hold the nozzle at least 6 inches from the front of the mounting plates where the



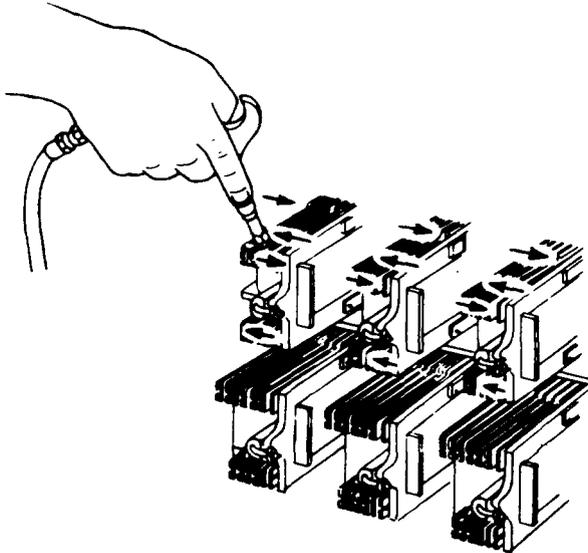
Each operation shall be downward to remove dirt from contacts and where springs enter pile up.

Fig. 7—Front of Multicontact Relay

cover is located and avoid directing the nozzle between two adjacent covers to prevent dirt from being blown under the covers. At the rear of the mounting plate, point the nozzle downward over the wiring so that the dirt will not be blown into the cover through openings in the mounting plate.

2.16 When cleaning wire-spring type relays, have the nozzle tipped slightly downward and about 8 inches away from the relays; then direct the nozzle over the equipment using slow horizontal strokes starting with the relays at the top of the frame farthest from the exhausters moving downward and toward the exhausters. Exercise care not to direct the nozzle in such a manner as to dislocate or blow off the plastic covers since this might cause false contacts or displaced springs.

2.17 After both sides of the enclosed frames have been cleaned and before the final dusting



First operation to remove dirt where springs enter pile up.  
 Second operation to remove dirt from relay coil.  
 Third operation to remove dirt from upper contacts.  
 Fourth operation to remove dirt from lower contacts.

**Fig. 8—Front of Relay**

operation is performed, replace the relay covers and selecting off-normal spring covers. All dusting operations are performed using a 3/32-inch nozzle. In performing this operation, start at the top of the frame farthest from the exhausters, as in the previous cleaning, and with the nozzle pointed slightly downward, work toward the floor removing any dust that may have settled out during cleaning. This final dusting shall be done first on the wiring side and then the apparatus side. Include the curtains and ladders in this operation.

**2.18** Permit the exhauster sets to operate for at least 5 minutes after completing the operations described in 2.08 through 2.17 so that any dust suspended in the air inside the enclosure will be removed before proceeding as in 2.19.

**2.19** Move the curtains to the next frame pulling them along the sash cords from which they are suspended. In this connection it will be necessary to remove and relocate any auxiliary supports, such as insulated "S" hooks, that were used to prevent the sash cords from sagging.

**2.20** Exercise care in moving the curtains along the sash so that they will be agitated as little as possible, thereby reducing to a minimum the possibility of dislodging any dust or lint that may be on their surfaces.

**2.21** Wipe off the flat surfaces of the frame just cleaned using a KS-14668 polishing cloth. Sweep the floor area around the frame using the method described in Division 700 of the appropriate BSP on damp dustless sweeping in switchrooms.

**2.22** Test the circuits in the approved manner, and return them to service.

**2.23** Proceed as in 2.01 through 2.22 for the next group of frames.

#### **Circuit Enclosed in Cabinets**

**2.24** With the curtains in place and the apparatus set up as covered in Section 069-703-801, make all circuits busy, insofar as possible, on the frame to be cleaned.

**2.25** Clean the structural details and other apparatus and wiring above the equipment casings.

**2.26** Open the casing doors on the front and rear sides of all cabinets on one vertical frame. No relay covers or cover caps shall be removed from relays located in cabinets. Clean from the inside of the casing any relay wear products from baffles, and remove any dust from the inside bottom of the cabinet with the vacuum cleaner. Clean the wiring side of the apparatus in each casing, as indicated by Fig. 4 and 5. (See 2.15.)

**2.27** Then clean the apparatus side of the equipment in the cabinets in the manner indicated by Fig. 6 and 8 beginning with the top mounting plate in the cabinet and working downward to the bottom mounting plate. When all apparatus in one cabinet and the inside bottom of the cabinet have been cleaned, direct the air stream over all apparatus inside the casing using long sweeping strokes as a final dusting operation. Close the front door of each cabinet before proceeding to the next cabinet below.

**2.28** When the apparatus side of a frame has been cleaned, wipe the inside of the cabinet and doors (front and rear) and the base of the enclosure with a KS-14668 polishing cloth and close the respective doors (front and rear) after the operations are completed.

**2.29** Repeat the cleaning as described in 2.24 through 2.28 on the next frame enclosed in the curtains.

**2.30** When all frames enclosed in the curtains have been cleaned, wipe the outside of the cabinets and framework with a KS-14668 polishing cloth and proceed as covered in 2.18 through 2.22.

**2.31** Proceed to the next group of frames and repeat 2.24 through 2.30.

#### Flat-Type Cross-Connecting Frames

**2.32** When cross-connecting frames are enclosed with the curtains, as in the case of marker and block relay frames, the terminals on both sides of the frame shall be cleaned with slow horizontal strokes starting at the top moving downward and toward the exhausters. Clean the cross-connections with vertical downward strokes, always starting from the top of the frame moving downward and toward the exhausters.

**2.33** When cleaning the block relay frames, clean the wiring side of the entire frame. (See Fig. 4 and 5.) Then clean the apparatus side of the relays. [See 2.02(c) and (d), 2.03, and Fig. 7 and 8.]

**2.34** Replace any relay covers removed, and then clean the cross-connecting fields as indicated in 2.33.

**2.35** When all frames enclosed in the curtains have been cleaned, wipe the framework with a KS-14668 polishing cloth and proceed as covered in 2.18 through 2.22. Then clean the next group of frames.

#### Rotary-Type Selectors

**2.36** With the curtains in place and the apparatus set up and the circuits made busy, clean the wiring forms on the wiring side of the frame associated with the rotary selectors in the same general manner as that used to clean the wiring associated with relays; ie, direct the stream of air from the air nozzle, with nozzle pointed slightly downward, slowly over the wiring forms following the same direction in which the wires are formed. (See Fig. 4 and 5.)

**2.37** When cleaning rotary selectors, it is important not to dislodge or spray any excess oil or grease that may be present at the ends of the rotor brush shaft bearings on other parts of the

selector. Where excess oil is present on the selector frame, etc, it should be removed by means of a KS-14668 polishing cloth prior to the cleaning with compressed air in order to prevent spraying oil on contacting elements of the selector.

**2.38** To clean rotary selectors, it is desirable to have the rotor brushes in motion. Clean by moving the air nozzle slowly across the top of the selector bank in the manner suggested by Fig. 9, exercising care that the brushes do not strike the nozzle. Then with the nozzle directed at the rotor brush shaft, move it slowly across the length of the shaft. The selector, if in motion, may then be stopped.

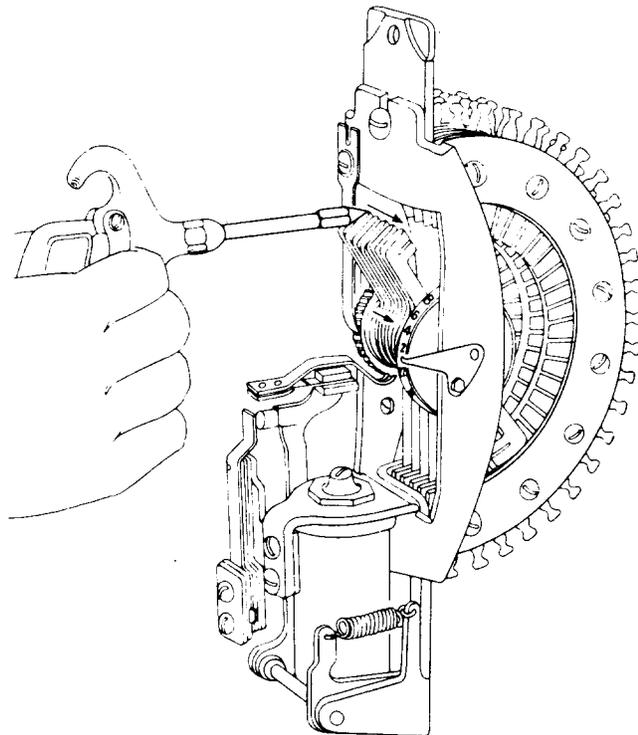


Fig. 9—206-, 209-, and Similar-Type Selectors

**2.39** Clean the selector magnet coil, driving spring, frame, interrupter springs, etc. The space between the outside and inside interrupter springs should be cleaned by directing the nozzle at this space near the insulator between the springs in order to remove dust and the products of wear that may have become lodged at this location.

**2.40** After all the equipment within the enclosure has been cleaned, wipe the frames with a KS-14668 polishing cloth and perform the dusting operations, with nozzle, on the ladders and curtains. The nozzle shall be held some distance away from the curtains. Allow the exhauster to run about 5 minutes before moving the cleaning equipment to the next group of bays. When handling curtains, use care not to abrade the fabric.

### **3. SUMMARY OF WORK OPERATIONS**

**3.01** This summary is provided for ready reference to facilitate review of the pressure cleaning operation without referring to the entire section. All cleaning shall be done with compressed air, pressure regulated to less than 30 PSI, using a 3/32-inch nozzle.

**SECTION 069-703-802**

METHOD	REFERENCE	METHOD	REFERENCE
A. Clean cable runs and superstructure.	Section 069-703-801 Par. 1.07 through 1.11	F. Apparatus side shall be pressure cleaned, using the same pattern for cleaning as outlined for the wiring side.	
1. Clean ventilating ducts as required.		1. U-, Y-, E-, and similar-type relays.	Par. 2.14 Fig. 8
B. Set up curtains and pressure cleaning equipment.	Section 069-703-801 Part 4	2. Crossbar switches.	Par. 2.12 Fig. 6
C. Remove relay covers and off-normal select covers (other than polarized relays, B- and G-type, wire-spring type and multi-contact relays).	Section 069-703-802 Par. 2.02	3. Multicontact relays (other than wire-spring type).	Par. 2.13 Fig. 7
D. Clean relay covers.	Par. 2.03	4. Wire-spring type relays. Reduce compressor pressure. Hold nozzle correct distance away from plastic covers.	Par. 2.16
E. Wiring side shall be cleaned first, starting at a point farthest from the exhausters and cleaning from the top down.	Par. 2.08	G. Flat-type cross-connecting frames.	Par. 2.32 through 2.35
1. Wiring side of multi-contact relays.	Par. 2.09 Fig. 5	H. Rotary-type selectors.	Par. 2.36 through 2.40 Fig. 9
2. Wiring side of crossbar switch.	Par. 2.09 Fig. 3	I. Final dusting.	Par. 2.17 and 2.18
3. Wiring side of wire-spring type relays. Reduce compressor pressure. Use correct angle.	Par. 2.08 Fig. 4	J. Move curtain.	Par. 2.19 and 2.20
4. Wiring on circuits enclosed in cabinets.	Par. 2.25 through 2.30	1. Exercise care in moving not to dislodge dust or lint that may be on its surface.	
5. Wiring side of relay mounting plates.	Par. 2.08 Fig. 4	K. Wipe off flat surfaces of equipment just cleaned.	Par. 2.21
		L. Damp dust sweep floor area.	Section H51.104
		M. Make operating tests as required.	Section 069-703-802 Par. 2.22