10-, 11-, 26-, 27-, AND 32-TYPE BANKS ASSOCIATED WITH ROTARY SELECTORS REPAIRING FEEDER BRUSH TIPS USING THE NO. 1004A OR 1004B TOOL KIT

1. GENERAL

1.01 This section covers procedures for repairing worn tips of feeder brushes on 10- and 26-type banks associated with 200-, 206-, and 209-type selectors; on 32-type banks associated with 211-type selectors;and on 11- and 27-type banks associated with 202-, 200-, 208-, and 1202-type power driven rotary selectors by welding contacts on the feeder brush prongs. These procedures are applicable to one piece-type feeder brushes of the balanced and nonbalanced types. However, their application to a nonbalanced-type feeder brush converts this brush into a balanced-type feeder brush.

1.02 This section is reissued to cover the method of welding contacts on the selector bank feeder brush prongs. Since this section comprises material not previously covered, arrows ordinarily used to indicate changes and reasons for reissue have been omitted.

1.03 Before repairing feeder brushes on the apparatus covered herein, remove the circuit from service in accordance with approved procedures. In order to prevent adverse service reactions, in some cases it may be necessary to remove associated circuits from service or to isolate the feeder brushes or springs on which contacts are to be welded.

1.04 Before attempting to weld contacts on working apparatus, it may be advantageous to practice doing the work on spare apparatus, if available.

1.05 Reference shall be made to Section 069-310-801 for a description of the No. 1004A and 1004B tool kits and maintenance information for the No. 102A and 102B current supply set and the No. 577A and 577B welding pliers.

1.06 In repairing feeder brushes by the contact welding method covered in this section, it is necessary to remove the selector from the bank. In view of this and the advantages of precious metal contacts, it is recommended that when any feeder brushes require repair, contacts be welded on the prongs of all feeder brushes except those having precious metal contacts on 32-type banks. The procedures covered herein are not applicable for replacing these precious metal contacts.

2. LIST OF TOOLS, GAUGES, AND MATERIALS

Spec or Code No.	Description
363	Spring Adjuster
395A	Feeder Brush Spacer
425A (2 required)	Selector Holder
456A	Adjuster
676A (2 required)	Feeder Brush Spacer
1004A (or 1004B)	Tool Kit
KS-16060	Cushion Jaw Cutting Pliers
P-11A860	No. 13 Fixed Electrode
R-1051	Pillar File
-	P-long-nose Pliers
-	3-inch Cabinet Screwdriver
-	4-inch Regular Screwdriver
-	5-inch Diagonal Pliers
Gauges	
179A	Gauge
Materials	
KS-2423	Cloth
KS-8372	Trichloroethylene
P-15A847	No. 1 Metal Contact
-	No. 320 Aloxite Cloth
-	Rubber Pencil Eraser
-	Strip of Fiber (see 3.03)
-	No. 6 Cable Lacing Cord

3. PREPARATION

PREPARATION OF APPARATUS

General

3.01 Before repairing worn feeder brush tips, it is necessary to remove the selector from the bank as covered in 3.05 or 3.06. Before removing the selector, provide a support for it as covered in 3.03 or 3.04.

3.02 After removing the selector, prepare the feeder brushes for contact welding as covered in 3.07.

Supporting Selector

3.03 200-, 206-, 209-, and 211-type Selectors: Before removing the selector from the bank as covered in 3.05, provide a support for it as follows. This support is particularly desirable when working on several selector banks in the same row. Mount two No. 425A selector holders on the mounting strap below the selectors to be removed as shown in Fig. 1, and place a strip of fiber across the supports to form a shelf. If the mounting strap is too thin to provide satisfactory clamping of the support, insert a wedge between the support and the strap. If apparatus other than selectors is mounted directly below the selector to be removed, and the selector holders cannot be used, the apparatus below the selector may be used as the support for the fiber strip. If neither of these methods is practicable, suspend the selector by a piece of No. 6 cable lacing cord secured to a mounting strap. Take care not to damage the selector leads.

3.04 202-, 207-, 208-, and 1202-type Selectors: After removing the selector from the bank as covered in 3.06, suspend the selector by a piece of No. 6 cable lacing cord secured to a mounting strap. Take care not to damage the selector leads.

Removing Selector From Bank

3.05 200-, 206-, 209-, and 211-type Selectors: Rotate the selector until the rotor brushes are approximately horizontal. Remove the selector mounting screws with the 4-inch regular screwdriver. Pull the selector horizontally away from the bank until the rotor brush assembly is clear of the feeder brushes.

3.06 202-, 207-, 208-, and 1202-type Selectors: With a sharp pointed pencil, mark a line on the frames of both banks to locate the top edge of the selector frame. This will facilitate remounting the selector properly. Rotate the brushes so that they are approximately horizontal. Remove the selector mounting screws using the 4-inch regular screwdriver. Pull the selector horizontally away from the banks until the rotor brush assemblies are clear of the feeder brushes.

Preparing Feeder Brushes

3.07 Examine the tips of the feeder brushes. If the offset portion is worn off and it appears that it will not be possible to weld satisfactorily on the flat side of the spring, replace the feeder brush as covered in Section 026-706-801. Using the P-long-nose pliers, straighten the tips of all feeder brushes on the bank except those having precious metal contacts on 32-type banks so that the portion which was offset is brought into line with the brush prong. Position the No. 395A feeder brush spacer over the brushes so that the top of the spacer is slightly below the feeder brush crotches as shown in Fig. 2. This will support the feeder brushes during the clipping and contact welding operations. Insert the No. 179A gauge as far as possible between the prongs of each feeder brush as shown in the figure.

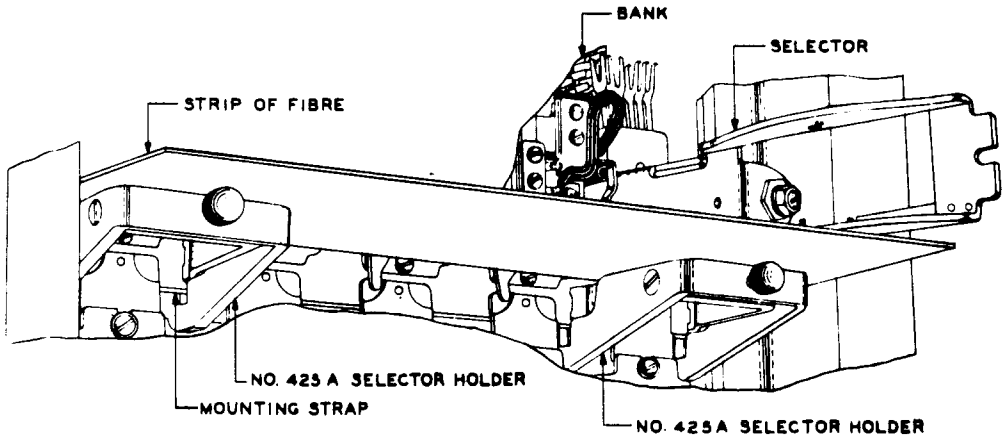


Fig. 1 - Method of Supporting Selector

Note: Feeder brushes which did not appear to require replacement upon initial examination should be replaced as covered in Section 026-706-801, if the tips of such springs are below the top surface of the No. 179A gauge.

PREPARATION OF TOOLS AND MATERIALS

Contact Holder

3.08 Handling of a contact used for replacement will be facilitated by the preparation of a contact holder as follows. Cut a piece of corrugated carton board about 4 inches square. With a sharp penknife or safety razor blade, cut a number of short longitudinal slits in the surface paper of the corrugated board opposite the concave portion of the corrugations. Using the KS-8511 tweezers, remove the contacts from the box of contacts furnished with the tool kit, one at a time, and attach them to the board by placing the tang of the contact in the slit in the board.

No. 179A Gauge

3.09 If repairing feeder brushes on 32-type banks, modify the No. 179A gauge by chamfering both long edges of the top surface of the gauge approximately 1/32 inch with the R-1051 file if the gauge is not provided with these edges chamfered.

KS-8511 Tweezers

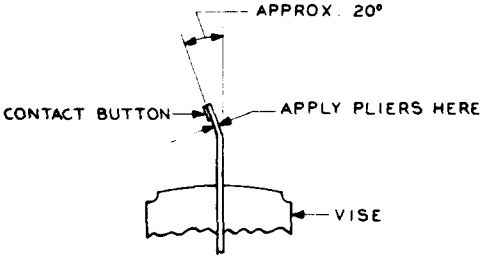
3.10 Blunt the KS-8511 tweezers, used for handling contacts, by filing off the points slightly with the R-1051 file. Clip off the pin in the tweezers using the 5-inch diagonal pliers.

Electrodes and Guides

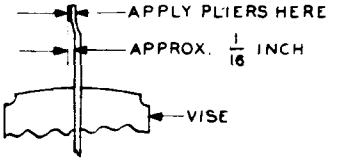
3.11 If the welding pliers are not equipped with the No. 13 fixed electrode and the No. 21 movable electrode, mount these electrodes in the pliers as covered in 3.13 and 3.14. If repairing feeder brushes on 32-type banks which have certain feeder brushes initially equipped with precious metal contacts on the front prong, it is necessary to use a No. 21 movable electrode modified as covered in 3.12 to permit welding contacts on the rear prongs. The modified electrode can be used on other types of banks but will not be suitable for use on other kinds of apparatus.

Modifying No. 21 Movable Electrode

3.12 To modify the movable electrode, remove this electrode from the welding pliers as covered in 3.14. Clamp the electrode in a vise as shown in Fig. 2 so that the tip of the electrode is approximately 1/2 inch above the jaws of the vise. Place the tips of the P-long-nose pliers over the electrode just behind the contact button at the points designated in the figure for making the first bend. Bend the tip of the electrode in the direction of the contact button so that the tip is at an angle of approximately 20 degrees with the main portion of the electrode. Then, place the tips of the pliers over the contact button at the points designated in the figure for making the second bend. Bend the tip of the electrode back so that the contact button is approximately parallel to the main portion of the electrode as shown in the figure. With this bend the contact button should be offset approximately 1/16 inch from the main portion of the electrode. After bending, make sure that the main portion of the electrode has a slight convex bow on the side of the contact buttons as provided during manufacture. This bow insures close contact between the electrode and the jaw of the welding pliers when the electrode is mounted on the jaw. After modifying the electrode, make an insulator for the electrode as follows. Cut a piece of friction tape approximately 3/4 inch long. Place the tape on the electrode approximately 1/8 inch below the contact button and trim the tape to conform with the sides of the electrode using a single-edged razor blade.



FIRST BEND



SECOND BEND

Fig. 2 - Modifying No. 21 Electrode

3.13 Fixed Electrode: To replace the fixed electrode, compress the handles of the welding pliers to open the jaws. Loosen the clamping stud by carefully turning it in a clockwise direction with the 3-inch cabinet screwdriver just enough to permit the electrode to be removed. Remove the electrode by pulling it out from the pliers. If necessary to replace the movable electrode, do so at this time as covered in 3.14. Place the slotted end of the re-

placing electrode in position so that the electrode positioning stud on the pliers fits into the slot on the electrode and then push the electrode toward the back of the pliers as far as the stud permits. Turn the clamping stud in a counterclockwise direction until the electrode is held securely.

Caution: Take care not to apply excessive pressure in tightening the clamping stud.

3.14 Movable Electrode: To replace the movable electrode, first remove the fixed electrode as covered in 3.13. Remove the screw that holds the movable electrode in place with the 3-inch cabinet screwdriver, taking care not to lose the associated stud and two washers. Remove the electrode. Insert the stud in the replacing electrode so that the shoulder of the stud rests in the recess of the electrodes. Compress the handles of the pliers and mount the replacing electrode so that the protruding end of the stud is in the hole in the longer jaw of the pliers. Holding the electrode in position, place the plain washer in the recess on the opposite side of the jaw. Mount the screw, with the lockwasher on it, in the stud. Tighten the screw so that the electrode is held securely in place but may be swung from side to side by moving the tip. Then mount the No. 13 fixed electrode as covered in 3.13.

3.15 Before welding contacts, check that the surface of the electrode on which the contacts will rest and the contact button on the movable electrode are clean. If necessary, clean these parts with a narrow rubber pencil eraser, followed by wiping with a clean dry KS-2423 cloth. If this procedure does not prove adequate in the case of the fixed electrode, clean the surface with a few light strokes of the aloxite cloth placed over the end of the KS-6320 orange stick.

3.16 Center the movable electrode. Check that the detent screws, located behind the electrode mounting screw,are turned in fully.

Contact Welding Equipment

3.17 Locate the welding equipment so that the apparatus on which the contacts are to be replaced can be reached easily with the welding pliers. In order to insure proper operation of the relays in the current supply set circuit, the set must be in a horizontal position with the bottom of the carrying case downward. The bottom of the carrying case is that side to which the cover hinge is attached. Position the No. 586A holder on the carrying case and strap it in place.

3.18 If the carrying case is to be mounted on a rolling ladder, secure it to the ladder by passing the strap around both side rails of the ladder and through each loop of the carrying case and No. 586A holder and fasten the strap.

3.19 Connect the plug of the current supply set to a source of 50- to 60-cycle, 105- to 125-volt ac supply.

3.20 Check the functioning of the circuit by holding the electrodes of the welding pliers open and then depressing and releasing the control button. Note that the relays operate and release as determined by the sound. If the relays fail to operate, check that the current supply set is properly connected to the ac supply, and if necessary, check to see whether the fuse has operated.

4. REPAIRING FEEDER BRUSHES

Clipping Off Feeder Brush Prong Tips

4.01 Remove the tips from the feeder brush prongs as covered in 4.02. Working from right to left or left to right, first clip the tips from all front feeder brush prongs. Then clip the tips from all rear prongs in similar sequence. Clip all tips before starting the welding of contacts. While clipping the tips of rear feeder brush prongs directly behind the front prongs of 32-type banks having precious metal contacts, take care not to damage these contacts.

4.02 To clip the tip from a feeder brush prong, open the jaws of the KS-16060 cutting pliers just enough to engage the prong tip. Make sure that the No. 179A gauge is fully seated in a horizontal position between the prongs of the feeder brushes. If working on 32-type banks, make sure the gauge is chamfered as covered in 3.09. If the gauge tends to tilt or rise between the prongs, hold it firmly in position using the fingers or the KS-6320 orange stick. Place the cutting edges of the pliers on the No. 179A gauge so that the tip of the feeder brush prong is between the jaws as shown in Fig. 3. Keep the jaws of the pliers closed sufficiently so they will not touch adjacent feeder brush prongs. Then, clip off the tip of the prong as close as possible to the gauge, keeping the jaws of the pliers closed to prevent the tip from falling into adjacent apparatus. These pliers have plastic inserts above the cutting edges to hold the tip until the pliers have been withdrawn from the bank. Remove the tip from the pliers before clipping the next tip.

Note: No attempt should be made to clip the tips of worn springs which did not require replacement and are level

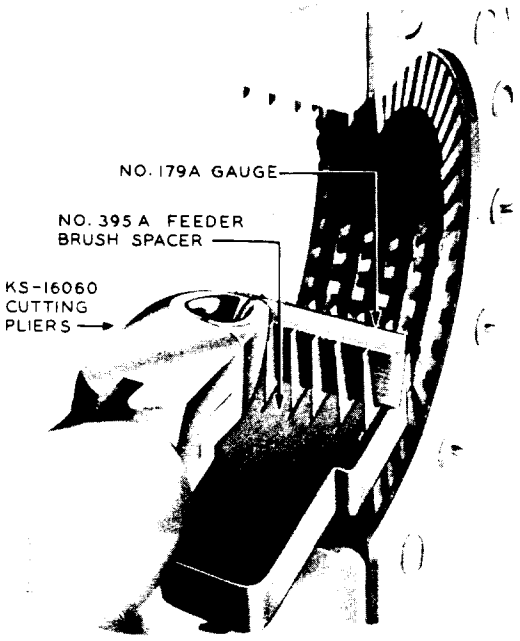


Fig. 3 - Clipping Off Feeder Brush Prong Tips

with the top of the gauge nor the tip of 32-type banks which come equipped with precious metal contacts.

4.03 After clipping off the feeder brush prong tips, check that all of the tip has been removed. If it has not, repeat the procedure described in 4.02. After all tips have been removed, remove the No. 179A gauge.

Cleaning End Portion of Feeder Brush Prongs

4.04 In order to obtain a good weld, make sure that the surfaces near the end of the feeder brush prongs are clean before welding a contact. If there is oil or grease on these surfaces clean them as follows. Place the KS-2423 cloth over the end of a KS-6320 orange stick and moisten the cloth with KS-8372 trichloroethylene. Clean both sides of the prong by rubbing the cloth over the surfaces near the end. In all cases, burnish these surfaces by lightly rubbing with a piece of aloxite cloth placed over the end of the the orange stick.

WELDING CONTACTS

4.05 General: Position the P-15A847 contact on the welding pliers as covered in 4.06. First weld contacts on all rear feeder brush prongs working from left to right as covered in 4.07 through 4.10. After contacts have been welded on these prongs, check the welds by breaking off the contact tangs as covered in 4.13. After work on the rear prongs has been completed, weld contacts on all front prongs working from right to left as covered in 4.11. Check the welds by breaking off the contact tangs as covered in 4.13.

Caution: Failure to follow the procedures covered below may result in a poor weld or burning of the feeder brush.

4.06 Placing Contact on Electrode: Open the jaws of the welding pliers and swing the movable electrode away from the slot in the fixed electrode in which the tang of the contact is to be placed. Grasp the contact with the KS-8511 tweezers so that the tang on the contact will be in correct position for insertion in the slot of the fixed electrode as follows. Hold the contact so that its beaded surface is toward the movable electrode and its tang toward the front of the pliers. Position the contact on the fixed electrode with the tang in the slot. Using the tweezers, flatten the contact against the electrode. Swing the movable electrode so that the contact button is directly above the contact and allow the jaws to close.

Welding Contacts on Rear Prongs of Feeder Brushes

4.07 Hold the welding pliers so that the fixed electrode is above and just to the left of the extreme left feeder brush. Keeping the pliers horizontal, slightly open the jaws and lower the pliers so

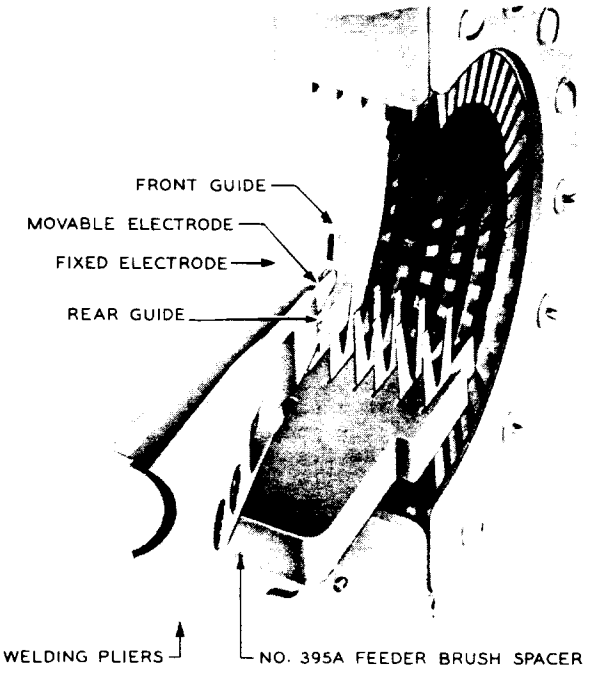


Fig. 4 - Welding Contact on Rear Feeder Brush Prong Using the No. 577A or 577B Welding Pliers

that the rear guide on the fixed electrode rests in the crotch of the feeder brush as shown in Fig. 4. Take care not to dislodge the contact and make sure that the guide is fully seated in the crotch of the feeder brush.

4.08 Hold the welding pliers horizontally in line with the feeder brush prong and allow the jaws to close so that the contact is held firmly in position against the feeder brush prong. With no hand pressure on the handles of the pliers, depress and release the control button of the current supply set. Do not operate the control button more than once for any one welding operation. Holding the control button depressed will have no effect since the time control relay in the current supply set is held locked until the control button is released.

Caution: Failure to follow these procedures may result in a poor weld or burning of the feeder brush.

4.09 Open the pliers and move them sideways until the tang on the welded contact is withdrawn from the slot in the fixed electrode and the guide on the electrode clears the feeder brush prongs. Withdraw the pliers.

4.10 Weld contacts on the remaining rear feeder brush prongs, successively, in a similar manner. Then, check the welds by breaking off the contact tangs as covered in 4.13.

Welding Contacts on Front Prongs of Feeder Brushes

4.11 After completing the welding of contacts on the rear prongs as covered in 4.07 through 4.10, weld contacts on all of the front prongs. In this case, start at the extreme right feeder brush and work from right to left. Hold the welding pliers so that the fixed electrode is above and just to the right of the extreme right feeder brush. Keeping the pliers horizontal, slightly open the jaws and lower the pliers so that the front guide on the fixed electrode rests in the crotch of the feeder brush as shown in Fig. 5. Take care not to dislodge the contact and make sure that the guide is fully seated in the crotch of the feeder brush.

4.12 Weld the contact as covered in 4.08 and 4.09. Weld contacts on the remaining front prongs in a similar manner. Then check the welds by breaking off the contact tangs as covered in 4.13.

Removing Contact Tangs and Checking Welds

4.13 Removal of the contact tang constitutes a check of the weld. Break off the tang by bending it back and forth

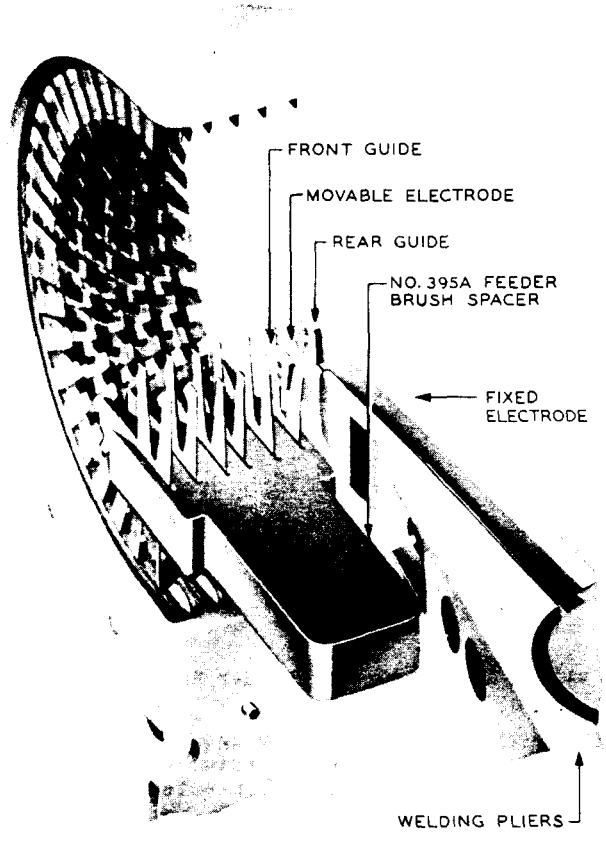


Fig. 5 - Welding Contact on Front Feeder Brush Prong Using No. 577A or 577B Welding Pliers

a few times with the KS-8511 tweezers. Take care not to drop the tang while removing it.

4.14 Failure to obtain a satisfactory weld may be due to poor contact between the feeder brush prong and the contact, or between the movable electrode and the feeder brush prong or to excessively worn feeder prongs. In the case of an unsatisfactory weld, check the surface of the feeder brush prong which contacts the movable electrode and the surface of the prong to which the contact is to be welded. If either surface appears dirty, clean as covered in 4.04. Check that the contacting surfaces of the electrodes are clean. If necessary clean them as covered in 3.15. If the feeder brush prongs are excessively worn, replace the feeder brushes as covered in Section 026-706-801.

FINAL PROCEDURES

Cleaning Welded Contacts

4.15 Clean the contacts as covered in Section 069-306-801.

Tensioning Feeder Brushes and Removing Feeder Brush Spacer

4.16 If the feeder brushes were of the nonbalanced type, straighten the feeder brushes by applying the No. 363 spring adjuster at the base of the feeder brush. Straighten any bent feeder brush prongs using the No. 363 spring adjuster for the front prongs and the No. 456A spring adjuster for the rear prongs. Then, tension the front prongs to the right and the rear prongs to the left so that there is a separation of approximately 1/16 inch between the ends of the prongs of each feeder brush. To do this, apply the spring adjuster just above the crotch and take care to adjust the front and rear prongs approximately the same amount to the right and left. After the adjustment is completed, remove the No. 395A feeder brush spacer.

Remounting Selector

4.17 200-, 206-, 209-, and 211-type Selectors: To remount the selector on the bank, place the No. 676A feeder brush spacer on the feeder brushes with the short tooth of the spacer at the right. Rotate the selector until the rotor brushes are approximately horizontal. Position the spacer so that it is approximately 1/8 inch below the welded contacts on the feeder brush prongs. Then, lower the selector into place. Take care in doing this that the rotor brushes engage the bank terminals properly, that the feeder brushes engage the proper rotor hubs, and that the dowel on the bank frame is in the hole in the selector frame. A slight sidewise movement of the feeder brush spacer will facilitate proper engagement of the feeder brushes and rotor brush hubs. After positioning the selector on the bank, insert and tighten the selector mounting screws. Remove the feeder brush spacer.

4.18 202-, 207-, 208-, and 1202-type Selectors: To mount the selector on the bank, place a No. 676A feeder brush spacer on each set of feeder brushes with the short tooth of the spacer at the left. Position the spacers so that they are approximately 1/8 inch below the welded contacts on the feeder brush prongs. Turn the rotor of the selector so that the rotor brushes nearer the driven disc are approximately horizontal and away from the bank. Lower the selector into place, using the left hand as a pivot so that the rotor brushes nearer the stirrup end of the selector engage their associated bank terminals. Take care in doing this that the rotor brushes engage the bank terminals properly and that the feeder brushes engage the proper rotor hubs. A slight sidewise movement of the feeder brush spacers will facilitate proper engagement of the feeder brushes and rotor brush hubs. After positioning the selector on the banks, insert the selector mounting screws and remove the feeder brush spacers. Locate the selector frame so that it coincides with its former position on the banks as shown by the lines marked on the bank frames as covered in 3.06 and securely tighten the mounting screws.

Check of Selector and Banks

4.19 Check that the selector and banks meet the requirements in the Division 026 section covering the apparatus and make adjustments as required.