

197- AND 198-TYPE SWITCHES PROCEDURES FOR THE REPLACEMENT OF SUPPLY BANK INSULATORS WHERE BANKS HAVE SILVER PLATED BANK CONTACTS

GENERAL

1.01 This section covers procedures for replacing the supply bank insulators (i.e. the insulators to which the terminals are attached) of banks associated with 197 and 198 type switches where banks have silver plated bank contacts. It is intended primarily for replacing an occasional defective insulator caused by silver migration or carbonization rather than for work of a wholesale nature.

1.02 Procedures for the replacement of the insulator that separates the upper and lower terminals of the same level are covered in Section 030-705-806.

1.03 The procedures cover the replacement of the supply bank insulator to which the upper or lower bank contacts of a level are attached without replacing the bank contacts or disconnecting the wiring. See Fig. 1, typical cross-section of a bank, for the location of supply bank insulators and other parts of the bank.

1.04 Because of the hazard of breaking bank contacts loose from supply bank insulators which are not being replaced, this operation should only be undertaken by a skilled man who is thoroughly familiar with this practice.

2. LIST OF TOOLS, GAUGES AND MATERIALS

Tools

Code or Spec.No.	Description
418A	5/16" by 7/32" Double End Flat Wrench
KS-6320	Orange Stick
*KS-8237	Ratchet Socket Wrench
*KS-13855	Terminal Aligning Tool
*KS-13856	Setting Clamp
*KS-13857	Spring Clamp Pin (2 required)

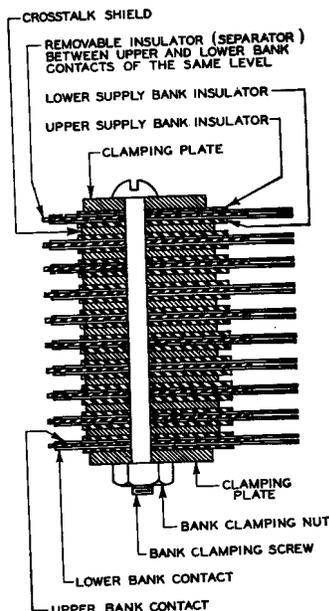


Fig. 1A - Cross Section of Bank

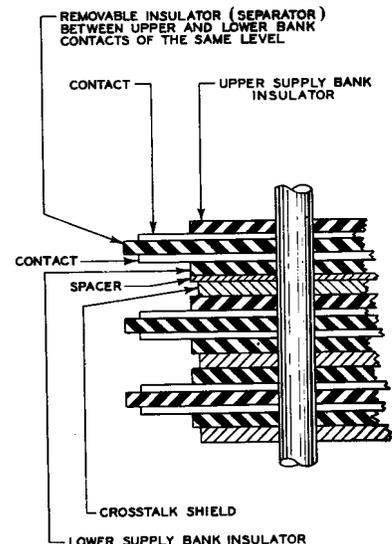


Fig. 1B - Enlarged Cross Section of Part of Bank

Fig. 1 - Typical Bank

SECTION 030-705-807

Code or
Spec.No.

3. DESCRIPTION OF TOOLS

Tools

Description

*KS-13858	Push Plate
*KS-13859	Scraper
*KS-13860	Fiber Pilot Pin (2 required)
*KS-13861	Nozzle
*KS-13862	Carrying Case
*KS-13863	Bracket
*KS-14164	Artists Show Card Brush
*D-158524	Double End Screwdriver
* -	Plastic Crochet Needle, Size E
*D-170283	Offset Tweezers
-	3" Cabinet Screwdriver
-	Electricians Scissors

Gauge

79F	0-6000 Gram Push-Pull or
R-2771	0-6 Pound Gauge

Materials

KS-1092	Proprietary Solvent Alcohol
KS-2423	Cloth
KS-6824	Sealing Compound
P-252078	Screw (Bank Clamping) for 20A Bank
P-252079	Nut (Bank Clamping)
P-252082	Screw (Bank Clamping) for all except 20A Bank
*P-483577	Insulator
* -	Tube of Duco Household Cement
* -	1 Ounce Glass Jar
-	No. 6 Cable Lacing Cord
-	Petroleum Jelly
-	No. 000 Sandpaper
-	Hardwood Toothpicks, Flat at One End and Pointed at Other

* Part of KS-13854 Tool Kit

3.01 KS-13855 Terminal Aligning Tool: This tool consists of a plastic base with arrangements for clamping in the correct positions both ends of the 10 bank contacts associated with one supply bank insulator. The soldering ends of the contacts are held in place by means of a circular clamping device with 10 notches against 10 stationary pins arranged in an arc. The circular clamping device may be rotated by hand to a position which holds the soldering ends of the contacts which are in the notches, against either the left or right sides of the pins. (Left side for lower and right side for upper supply bank insulator.) After the clamping device is rotated in a direction to clamp the soldering terminals against the pins it is held in this position by means of a wire spring at the front of the tool. This spring is attached to the tool at the middle and has two free ends, one end for pressing against and holding the clamping device in a clockwise position and the other end for pressing against and holding it in a counterclockwise position. To release the soldering end of the contacts, the spring is removed from its position against the clamping device and this device is rotated in the opposite direction from that used to secure the contacts in place. The wiper ends of the contacts are held in the correct position by means of 10 sets of pins. There are 3 pins for each contact, one for the front end and one for each side of the contact. The wiper ends are clamped under the 10 fingers attached to the knob. The knob can be rotated so that the fingers are on top of the contacts. Above this knob is another knob for locking the lower knob and associated fingers in position. To hold the wiper ends of the contacts in position, the lower knob is rotated in a clockwise direction. The upper knob is then rotated in a clockwise direction which locks the lower knob and associated fingers in position. To release the contacting ends, the upper knob is turned in a counterclockwise direction to unlock the lower knob. The lower knob can then be turned in a counterclockwise direction which will rotate the fingers off from the contacts. This tool, with the terminals and insulator in place in the tool, is illustrated in Fig. 10.

3.02 KS-13856 Setting Clamp: This tool is used to hold the 10 terminals associated with one insulator securely in their correct positions against the new supply bank insulator while the cement, used to secure the terminals to the insulator, is setting. This tool consists of two "C" shaped parts which are held together by 3 thumb screws while in use as a setting clamp. One part of the tool is placed on the lower side of the terminals and insulator and the other part on the upper side of the terminals and insulator and the screws holding the two parts together are securely tightened in place. The clamped terminals and new insula-

tor may then be removed from the KS-13855 terminal aligning tool. This is illustrated in Fig. 11. The setting clamp is left in position on the terminals and new insulator until the cement hardens. This is illustrated in Fig. 12.

3.03 KS-13857 Spring Clamp Pin: Two KS-13857 spring clamp pins are provided in the tool kit. These pins are flexible with a head on one end and a coil spring clamping arrangement which may be attached to the pin at any desired point on the pin. It is used to hold the parts of the bank together while the bank clamping screws are out of the bank and the bank is being opened preparatory to replacing an insulator. The clamping arrangement may be placed on the pin by sliding the coiled spring over the pin and at the same time squeezing the clamp at the end of the coiled spring. After the clamp is in the desired position on the pin it may be secured in that position by releasing pressure on the clamp.

3.04 KS-13858 Push Plate: This is a "C" shaped plastic tool equipped with a knob. It is used to aid in positioning the terminals and old insulator in the KS-13855 terminal aligning tool. This is illustrated in Fig. 9. It may also be used for holding the terminals against the insulator while untangling the wires associated with the terminals and those on an adjacent supply bank insulator.

3.05 KS-13860 Fibre Pilot Pin: Two fibre pins are provided for use as pilot pins in aligning the bank levels when reassembling the parts and before inserting the bank clamping screws.

3.06 KS-13861 Nozzle: This nozzle is designed to be attached to the tube of Duco Household Cement to control spreading the cement over the portion of the terminals to be attached to the insulator. The nozzle is threaded at the part which is attached to the tube so that it can cut a thread on the neck of the tube. It is offset to make it more convenient to use.

3.07 KS-13863 Bracket: This bracket is designed to be attached to the bottom of the carrying case and to the framework. The carrying case and tools may then be mounted on the frame so that the tools and other parts needed are convenient during the replacing operation.

4. PREPARATION

4.01 Before replacing any supply bank insulators make the switch busy in accordance with approved procedures.

4.02 When it is necessary to open the circuit to the release magnet of the switch, block the vertical off-normal springs in their unoperated position by

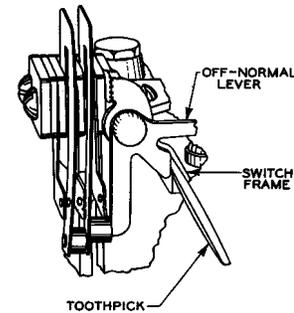


Fig. 2 - Method of Blocking Vertical Off-Normal Springs in Their Unoperated Position

means of a toothpick as shown in Fig. 2. Where the springs cannot be satisfactorily blocked with a toothpick, use the KS-6320 orange stick. When necessary, insulate the contacts of the rotary off-normal springs that close the circuit to the release magnet.

4.03 Remove the switch as outlined in the section covering 197- and 198-type switches.

4.04 Where the switch is equipped with a commutator mounted on the banks, remove the commutator mounting screws with the 3" cabinet screwdriver and remove the commutator.

4.05 Sand down the left rear corner of a spare insulator (P-483577) to a sharp edge with a long taper. Use No. 000 sandpaper.

4.06 Mount the KS-13854 tool kit in a convenient position on the frame by means of the KS-13863 bracket. To do this insert the hooked end of the bracket above a switch cover and hook it over the framework. Attach the KS-13862 carrying case to the bracket by means of the thumb screw in the bracket and metal insert with tapped hole in the bottom of the carrying case.

5. METHOD

Opening of Bank Assembly

5.01 If possible insert the large end, marked L, of the D-158524 double end screwdriver in the slot of the bank clamping screw. If, due to the slot in the head of the screw being too narrow, this end of the screwdriver does not fit, use the small end, marked S, of the screwdriver. Where the spacing between banks is such that the D-158524 screwdriver cannot be inserted in the slot of a bank clamping screw, lower the bank slightly. To do this, loosen the bank rod collar clamping screws with the 3" cabinet screwdriver, rotate the collars toward the front of the switch and lower the bank slightly. Then tighten the bank rod collar

clamping screws sufficiently to prevent the lower bank from sliding off the bank rods. Do not wedge the screwdriver between the head of the bank clamping screw and the bank clamping nut on the bank above, since this may cause bending of the clamping plate and deformation of the bank.

5.02 Where the bank clamping screws are not staked or are not heavily staked, hold the screw securely with the D-158524 screwdriver and remove the nuts with the No. 418A wrench. Where the screws are heavily staked, alternately tighten each bank clamping nut with the KS-8237 wrench as shown in Fig. 3. Hold the screwdriver until the nut grabs and then allow the screwdriver to move with the screw until it rests against the bank rod. After each nut has been tightened, tighten one of the nuts until the screw is twisted off. Repeat the operation on the other bank clamping screws and remove the bottom bank clamping plate. Extreme caution must be exercised during these operations to prevent damage to the equipment due to accidental slippage of the tools.

5.03 Mark the bank rods to indicate the left and right rod and the rotary position of each rod so that after they are removed, they can be replaced in the same positions from which they were removed. Loosen the bank rod collar clamping screws with the 3" cabinet screwdriver and remove the bank rods.

5.04 Tilt upward the bank or banks above the bank being worked on and with the No. 6 cable lacing cord, hold the upper banks out of the way making use of the upper angle iron as shown in Fig. 4. If the bank being worked on is at the end of the multiple, an additional cord may be required to support the outer end of this bank.

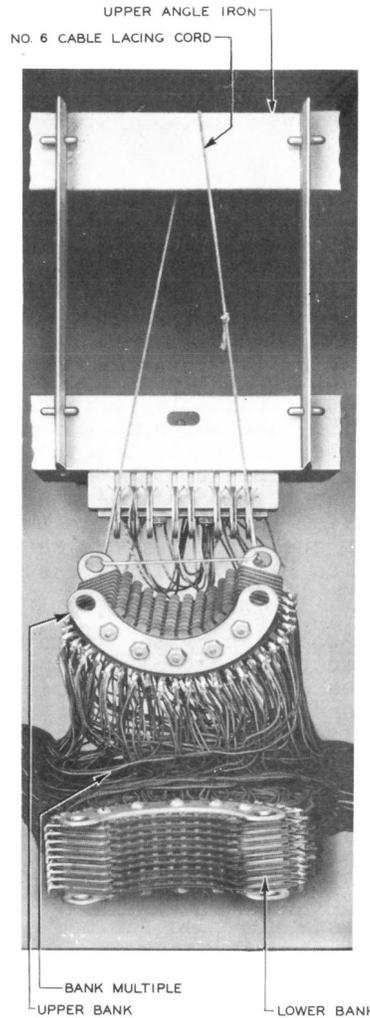


Fig. 4 - Method of Supporting Upper Bank

5.05 Remove the bank clamping screw second from the left while maintaining clamping pressure on the bank with the fingers. This operation may be facilitated by turning the screw in a counterclockwise direction while it is being removed. After the screw is removed, insert a KS-13857 spring clamp pin in this position. Repeat this operation at the second screw position from the right. See Fig. 5. After both spring clamp pins are in place remove the remaining screws.

Gaining Access to the Level

5.06 General: The method of removing the supply bank insulator depends upon the location of the level in the bank and whether it is the upper or lower insulator in the level. When more than one supply bank insulator is to be replaced make accessible one level at a time. In assembling banks during manufacture, correct vertical spacing may have been obtained by insulating spacers be-

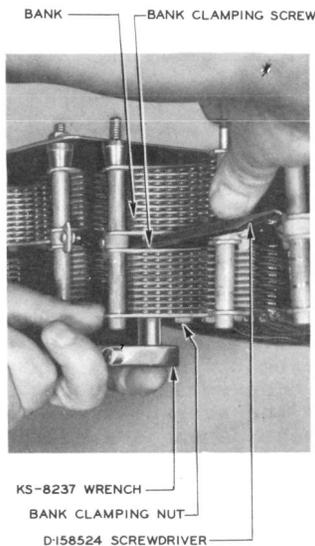


Fig. 3 - Method of Tightening Bank Clamping Screws

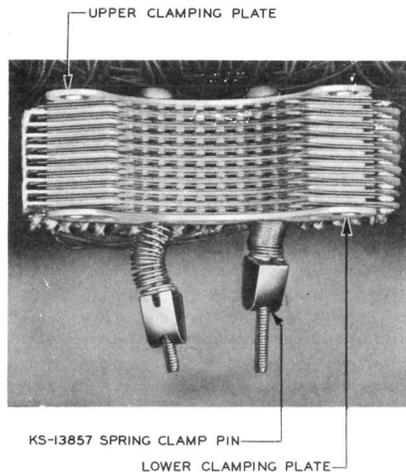


Fig. 5 - Bank With KS-13857 Spring Clamp Pins in Place

tween levels next to the crosstalk shields. Where these spacers are encountered treat them in the procedure as part of the cross-talk shield. If the wiring level insulator interferes with work on any level remove it until the operation interfered with is completed but be sure to replace it before re-assembling the bank.

Level 1

Lower Supply Bank Insulator:

5.07 Tilt the bank up to obtain access to the wiring from the front of the bank. If the wires on the upper contacts of the level are tangled with those on the lower contacts, separate them from each other with the aid of a KS-6320 orange stick. The separation of the wires associated with the upper and lower contacts of the level is essential to avoid pulling off of bank contacts from the supply bank insulator when the bank is subsequently opened.

5.08 Carefully free the lower supply bank insulator from its associated separator in the following manner. Reduce tension on the spring clamp pins. Support the bank with one hand and starting at the right-hand side of the bank carefully slide the tapered edge of the modified insulator (modified as covered in 4.05) between the separator and the terminals of the supply bank insulator to be replaced. Continue sliding the tapered edge to the left wedging it between the separator and the bank contacts in order to free the supply bank insulator and its associated contacts from the separator. In performing this operation, take care to prevent accidentally loosening bank contacts on this or other levels. If any contacts are loosened, relocate and secure them in position during reassembly of the bank as outlined in 5.29 where the contact is on the insulator being replaced or in 5.36 if the contact is on another insulator.

5.09 Cut two pieces of No. 6 cable lacing cord each approximately 20" long. Thread one of the cords through one of the outer screw holes and the other cord through the other outer screw hole. With the crocheting hook pull the cords out just above the lower supply bank insulator of level 1 until one inch projects in front of the contacts. Exercise care to keep the cords in the screw holes of the upper supply bank insulator and the associated separator of the level. Tie together the portion of the bank above the supply bank insulator to be replaced and then tie this part of the bank to the bank above in order to provide working space as shown in Fig. 6. Remove the spring clamp pins and the bottom clamping plate.

Upper Supply Bank Insulator:

5.10 Tilt the bank up to obtain access to the wiring from the front of the bank. If the wires on the lower contacts of the level are tangled with those on the upper contacts, separate them from each other with the aid of a KS-6320 orange stick. The separation of the wires associated with the upper and lower contacts of the level is essential to avoid pulling off of bank contacts from the supply bank insulator when the bank level is subsequently opened.

5.11 Carefully free the upper supply bank insulator from its associated separator in the following manner. Reduce tension on the spring clamp pins. Support the bank with one hand and starting at the right-hand side of the bank carefully slide the tapered edge of the modified insulator (modified as covered in 4.05) between the separator and the terminals of the supply bank insulator to be replaced. Continue sliding the tapered edge to the left wedging it between

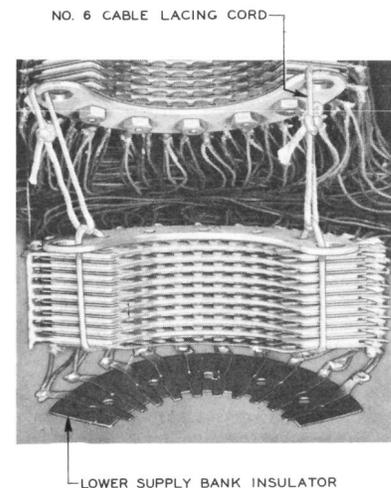


Fig. 6 - Method of Gaining Access to Lower Supply Bank Insulator of Level 1

the separator and the bank contacts in order to free the supply bank insulator and its associated contacts from the separator. In performing this operation, take care to prevent accidentally loosening bank contacts on this or other levels. If any contacts are loosened, relocate and secure them in position during reassembly of the bank as outlined in 5.29 where the contact is on the insulator being replaced or in 5.36 if the contact is on another insulator.

5.12 Cut two pieces of No. 6 cable lacing cord each approximately 40" long. Double the cords and thread one of the doubled cords through one of the outer screw holes and the other doubled cord through the other outer screw hole. Cut each cord at the point where it is doubled. With the crochet hook pull the cords in one screw hole out immediately above the upper supply bank insulator of level No. 1 until approximately one inch projects in front of the contacts. Associate one of the two cords thus formed with the portion of the bank above this insulator. Remove the other cord from the supply bank insulator being replaced and associate it with the portion of the bank below this insulator. Repeat this with the cords in the other screw hole. Tie the upper portion of the bank together and support it from the bank above in order to provide working space. Tie together the separator and lower supply bank insulator and bottom clamping plate to avoid pulling off bank contacts associated with this insulator. Remove the spring clamp pins.

Level 10

Lower Supply Bank Insulator:

5.13 If the wires on the upper contacts of the level are tangled with those on the lower contacts, separate them from each other with the aid of the KS-6320 orange stick. The separation of the wires associated with the upper and lower contacts of the level is essential to avoid the accidental pulling off of bank contacts from the supply bank insulator when the bank is subsequently opened.

5.14 Carefully free the lower supply bank insulator from the associated separator in the following manner. Reduce tension on the spring clamp pins. Support the bank with one hand and starting at the right-hand side of the bank carefully slide the tapered edge of the modified insulator between the separator and the terminals of the supply bank insulator to be replaced. Continue sliding the tapered edge to the left wedging it between the separator and the bank contacts in order to free the supply bank insulator and its associated contacts from the separator. In performing this operation, take care to prevent accidentally loosening bank contacts on this or other levels. If any contacts are loosened, relocate and secure them in position during reassembly of

the bank as outlined in 5.29 where the contact is on the insulator being replaced or in 5.36 if the contact is on another insulator.

5.15 Cut two pieces of No. 6 cable lacing cord each approximately 40" long. Double the cords and thread one of the doubled cords through one of the outer screw holes and the other doubled cord through the other outer screw hole. Cut each cord at the point where it is doubled. With the crochet hook pull the cords in one screw hole out immediately below the lower supply bank insulator of level 10 until approximately one inch projects in front of the contacts. Associate one of the two cords thus formed with the portion of the bank below this insulator including the bottom clamping plate. Remove the other cord from the insulator being replaced and associate it with the portion of the bank above this insulator including the top clamping plate. Repeat this with the cords in the other screw hole. Tie the upper portion of the bank together and support it from the bank above in order to provide working space as shown in Fig. 7. Tie together the lower portion of the bank. Remove the spring clamp pins.

Upper Supply Bank Insulator:

5.16 If the wires on the lower contacts of the level are tangled with those on the upper contacts, separate them from each other with the aid of a KS-6320 orange stick. The separation of the wires associated with

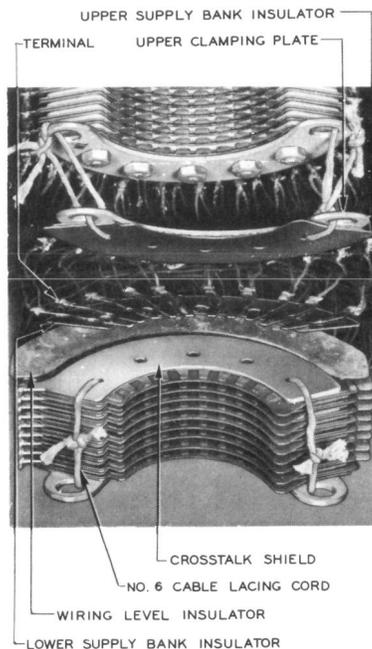


Fig. 7 - Method of Gaining Access to Lower Supply Bank Insulator of Level 10

the upper and lower contacts of the level is essential to avoid pulling off of bank contacts from the supply bank insulator when the bank is subsequently opened.

5.17 Carefully free the upper supply bank insulator from the separator in the following manner. Reduce tension on the spring clamp pins. Support the bank with one hand and starting at the right-hand side of the bank carefully slide the tapered edge of the modified insulator (modified as covered in 4.05) between the separator and the terminals of the supply bank insulator to be replaced. Continue sliding the tapered edge to the left wedging it between the separator and the bank contacts in order to free the supply bank insulator and its associated contacts from the separator. In performing this operation, take care to prevent accidentally loosening bank contacts on this or other levels. If any contacts are loosened relocate and secure them in position during reassembly of the bank as outlined in 5.29 where the contact is on the insulator being replaced or in 5.36 if the contact is on another insulator.

5.18 Cut two pieces of cable lacing cord, each approximately 20" long. Thread one of the cords through one of the outer screw holes and the other cord through the other outer screw hole. With the crochet hook pull the cords out just below the upper bank insulator of level 10 until approximately one inch projects in front of the contacts. Tie together the part of the bank below this insulator including the bottom clamping plate. Remove the spring clamp pins and the top clamping plate.

Levels 2 to 9 Inclusive

Lower Supply Bank Insulator:

5.19 Where provided, open the soldered crosstalk shield bond at the left of the bank with a soldering copper to obtain access to the level containing the defective supply bank insulator. A KS-6320 orange stick wedged between the bonds will aid in breaking the soldered connection.

5.20 Cut two pieces of No. 6 cable lacing cord each approximately 40" long. Double the cords and thread one of the doubled cords through one of the outer screw holes and the other doubled cord through the other outer screw hole. Cut each cord at the point where it is doubled. Reduce tension on the spring clamp pins. Insert the KS-6320 orange stick immediately under the supply bank insulator being replaced in order to gain access to the cords. With the crochet hook pull the cords in one screw hole out immediately under the supply bank insulator being replaced until approximately one inch projects in front of the contacts. Associate one of the two cords thus formed with the upper portion of the bank including the insulator to be replaced and the top

clamping plate and tie this portion of the bank together with a knot that can be readily untied. Associate the other cord with the lower part of the bank including the bottom clamping plate and tie this part of the bank together. Repeat this with the cords in the other screw hole. Remove the spring clamp pins. Tilt up the upper portion of the bank sufficiently to gain access to the wiring. If the wires associated with the upper contacts of the level are tangled with those associated with the lower contacts, separate them from each other with the aid of the KS-6320 orange stick. The separation of the wires associated with the upper and lower contacts of the level is essential to avoid the pulling off of bank contacts from the supply bank insulator when the bank level is subsequently opened.

5.21 Carefully free the lower supply bank insulator from the associated separator in the following manner. Support the upper portion of the bank with one hand and starting at the right-hand side of the bank carefully slide the tapered edge of the modified insulator (modified as covered in 4.05) between the separator and the terminals of the supply bank insulator to be replaced. Continue sliding the tapered edge to the left wedging it between the separator and the bank contacts in order to free the supply bank insulator and its associated contacts from the separator. In performing this operation, take care to prevent accidentally loosening bank contacts on this or other levels. If any contacts are loosened relocate and secure them in position during reassembly of the bank as outlined in 5.29 where the contact is on the insulator being replaced or in 5.36 if the contact is on another insulator. Untie the cords supporting the upper portion of the bank and with the aid of the crochet hook remove them from the supply bank insulator to be replaced. Retie the cords. If the wires to the contacts on the insulator being replaced are tangled with the wires to an adjacent level, separate them with the aid of a KS-6320 orange stick. Holding the terminals against the insulator with the KS-13858 push plate while the wires are being untangled will help prevent loosening terminals from the insulator. Support the upper portion of the bank from the bank above as shown in Fig. 8.

Upper Supply Bank Insulator:

5.22 Where provided, open the soldered crosstalk shield bond at the left of the bank with a soldering copper to obtain access to the level containing the defective supply bank insulator. A KS-6320 orange stick wedged between the bonds will aid in breaking the soldered connection.

5.23 Cut two pieces of No. 6 cable lacing cord, each approximately 40" long. Double the cords and thread one of the doubled cords through one of the outer screw holes and the other doubled cord through the

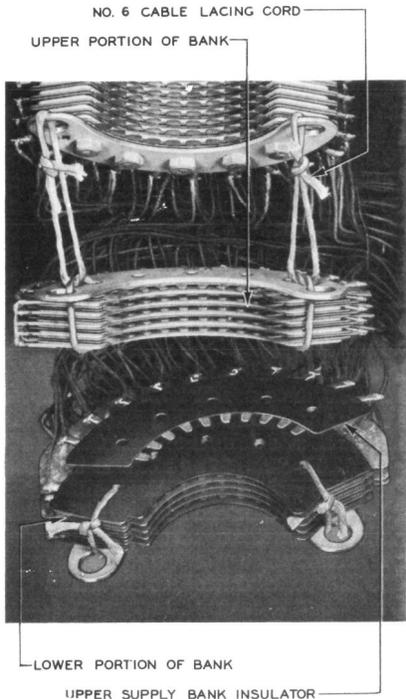


Fig. 8 - Method of Gaining Access to Supply Bank Insulator of Intermediate Levels

other outer screw hole. Cut each cord at the point where it is doubled. Reduce tension on the spring clamp pins. Insert the KS-6320 orange stick above the supply bank insulator being replaced in order to gain access to the cords. With the crochet hook pull the cords in one screw hole out immediately above the upper supply bank insulator of the level being worked on until approximately one inch projects in front of the contacts. Associate one of the two cords thus formed with the upper portion of the bank including the top clamping plate and tie this part of the bank together. Associate the other cord with the lower part of the bank including the level being worked on and the bottom clamping plate and tie this part of the bank together with a knot which can be readily untied. Repeat this with the cords in the other screw hole. Remove the spring clamp pins. Tilt up the upper portion of the bank sufficiently to gain access to the wiring of the level being worked on. If the wires associated with the lower contacts of the level are tangled with those associated with the upper contacts of the level, separate them from each other with the aid of the KS-6320 orange stick. The separation of the wires associated with the upper and lower contacts of the level is essential to avoid the accidental pulling off of bank contacts from the supply bank insulator when the bank is subsequently opened.

5.24 Carefully free the upper supply bank insulator from the associated separator in the following manner. Support the lower portion of the bank with one hand and starting at the right-hand side of the bank carefully slide the tapered edge of the modified insulator (modified as covered in 4.05) between the separator and the terminals of the supply bank insulator to be replaced. Continue sliding the tapered edge to the left wedging it between the separator and the bank contacts in order to free the supply bank insulator and its associated contacts from the separator. In performing this operation take care to prevent accidentally loosening the bank contacts on this or other levels. If any contacts are loosened, relocate and secure them in position during reassembly of the bank as outlined in 5.29 where the contact is on the insulator being replaced or in 5.36 if the contact is on another insulator. Untie the cords in the lower portion of the bank and with the aid of the crochet hook remove them from the supply bank insulator to be replaced. Retie these cords. If the wires to the contacts on the insulator being replaced are tangled with the wires to an adjacent level, separate them with the aid of the KS-6320 orange stick. Holding the terminals against the insulator with the KS-13858 push plate while the wires are being untangled will help prevent loosening the terminals from the insulator. Support the upper portion of the bank from the bank above as shown in Fig. 8.

Replacement of Supply Bank Insulator - All Levels

5.25 Place a KS-2423 cloth immediately below the supply bank insulator being replaced to protect the lower levels.

5.26 Loosen the fingers on the KS-13855 terminal aligning tool by first turning the upper knob on the tool in a counter-clockwise direction and then turning the lower knob in the same direction. Insert the terminal aligning tool under the supply bank insulator to be replaced. The bank contacts are on the lower surface of the upper insulators and on the upper surface of the lower insulators. The clamping device at the back of the terminal aligning tool may be turned in a direction to hold the contact soldering terminals against either the left or right side of the pins. Place the contact soldering terminals on the right side of the pins at the back of the terminal aligning tool if the supply bank insulator being replaced is an upper insulator or on the left side of the pins if it is a lower insulator. Lower the wiper ends of the contacts so that they are between their respective pins. Use the KS-13858 push plate to assist in inserting the supply bank insulator in the terminal aligning tool as shown in Fig. 9. Secure the soldering terminals against the pins by turning the clamping device at the back of the terminal aligning tool in a direction to hold the terminals

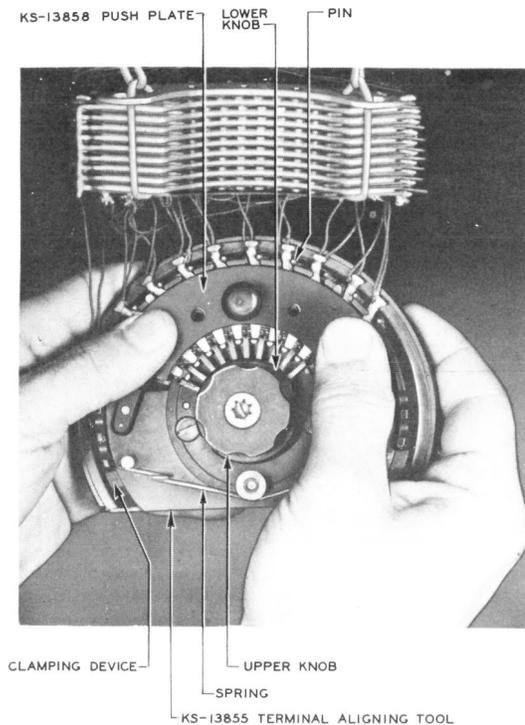


Fig. 9 - Method of Pressing Supply Bank Insulator in Place Using KS-13858 Push Plate

against the pins. (Clockwise for a lower supply bank insulator and counterclockwise for an upper supply bank insulator.) Where an excessive amount of solder on a contact soldering terminal interferes with clamping the terminals in place, proceed as outlined in 5.29. Secure the clamping device in this position by means of the spring at the front of the tool. For an upper supply bank insulator place the spring in front of the pin on the left and against the right end of the clamping device. For a lower supply bank insulator place the spring in front of the pin on the right and against the left end of the clamping device.

5.27 Turn the lower knob on the terminal aligning tool in a clockwise direction in order to rotate the fingers of the terminal aligning tool over the front of the contacts. Tighten the terminals in place by turning the upper knob in a clockwise direction. The contacts are now locked in alignment at both front and back.

5.28 Remove the insulator from the contacts by pressing it away from them with an orange stick as shown in Fig. 10. For insulators made of varnished cambric it may be necessary to apply alcohol with the KS-14164 brush along the edges of the contacts and when the adhesive has softened, remove the insulator. In some cases several applications may be necessary. In applying the al-

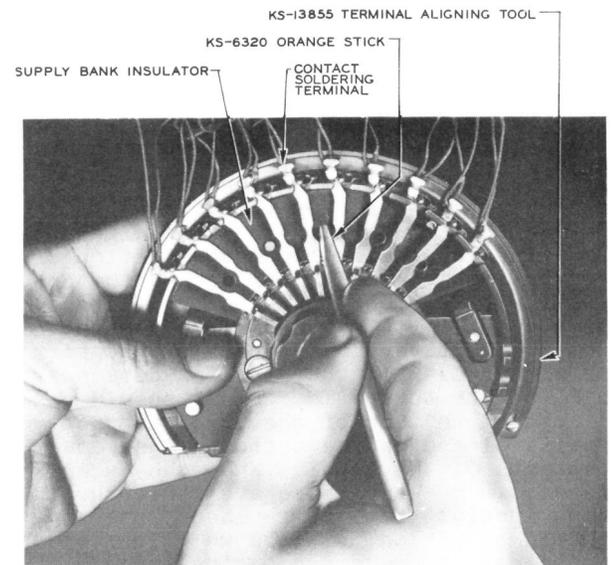


Fig. 10 - Method of Removing Supply Bank Insulator from Contacts

cohol use extreme care in order to avoid getting it on the tool or on other parts of the bank. If necessary, clean the terminals with the KS-13859 scraper.

5.29 If any contact soldering terminal has an amount of solder which interferes with the clamping action, remove the particular contact by slightly loosening the terminal clamping device at the back of the tool and the fingers at the front of the tool. The fingers may be loosened by slightly turning the upper knob in a counterclockwise direction. Remove the terminal using the D-170283 tweezers. Remove the excess solder with a soldering copper. Replace the contact in position in the terminal aligning tool by slightly lifting the associated clamping finger and slightly loosening the terminal clamping device. When the contact is in place retighten the clamping device at the back of the tool and tighten the fingers by turning the upper knob in a clockwise direction. The same method of positioning a contact in the tool is used if a contact has broken loose from the supply bank insulator before being placed in the tool.

5.30 Check that the front ends of all contacts are seated against their respective pins under the fingers on the tool and that both ends of the contacts are in their proper positions. Use the KS-6320 orange stick to place the terminals.

5.31 Using the tweezers remove the KS-13861 nozzle from the glass jar containing the alcohol and attach it to the tube of Duco Household Cement. Replace the cover on the alcohol container. The nozzle is

threaded so that threads can be cut on the neck of the tube. When a tube is used for the first time, cut the threads before breaking the seal in the tube in order to prevent squeezing cement out of the tube while cutting the threads. In order to remove the alcohol from the nozzle, squeeze a small quantity of cement out of the nozzle and wipe the nozzle on the KS-2423 cloth. Spread the cement with the nozzle in a narrow line lengthwise along the portion of the contacts which will be bonded to the new insulator. In order to prevent getting cement on the tool or wiper end of the contacts do not apply it beyond the neck of the terminal or within 1/4" of the clamping device at the back of the tool. The cement should be placed on the top of the upper contacts of the level and on the bottom of the lower contacts of the level. When the cement tube is not in use and there are other supply bank insulators to be replaced, the tube should be placed nozzle down in the alcohol container to prevent clogging. Place a P-483577 insulator on top of the contacts for the upper contacts of the level or on the bottom of the contacts for the lower contacts of the level. Attach the KS-13856 setting clamp to the insulator and contacts as shown in Fig. 11 with the lower portion of the clamp under the insulator and contacts. The terminal aligning tool may be removed immediately. Rotate first the upper and then the lower knob in a counterclockwise direction. Place both ends of the spring at the front of the tool against the pins and rotate the part of the aligning tool that holds the soldering terminals in position in a direction to release them. The setting clamp should be left in place as shown in Fig. 12 for at least five minutes to allow the cement to harden.

5.32 Remove the clamp, being careful not to loosen the contacts. If necessary, clean the clamp with a KS-2423 cloth moistened with alcohol.

5.33 Gauge the contacts by eye to see that they are properly positioned. If any contact is out of position, loosen it and re cement it in the correct position.

5.34 Put the two parts of the bank together and insert the two KS-13860 fibre pilot pins in the second from the left and second from the right bank clamping screw holes. Remove the cable lacing cords from the screw holes.

5.35 Insert bank clamping screws in the screw holes not occupied by pilot pins. Turning the screws in a clockwise direction will facilitate inserting them in the holes. Put nuts on these screws finger tight. Remove the two pilot pins and insert bank clamping screws in the remaining holes and put nuts on these screws finger tight. If the wiring level insulator at the back of the bank is not satisfactorily positioned, relocate it by means of the orange stick.

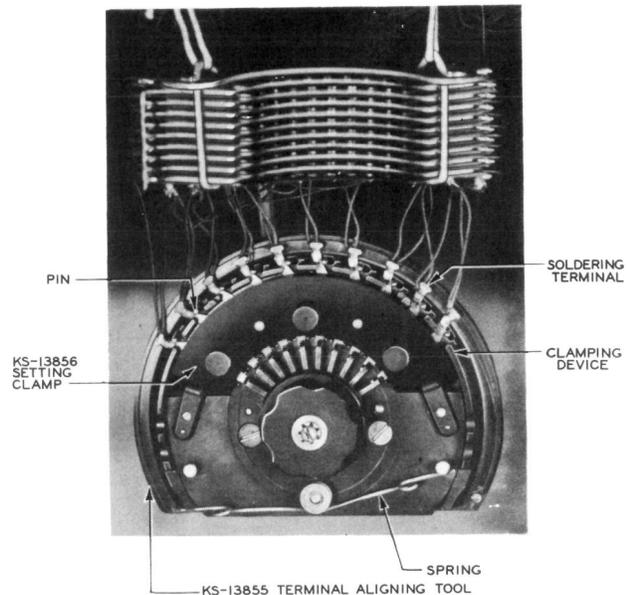


Fig. 11 - Method of Clamping Insulator to Contacts

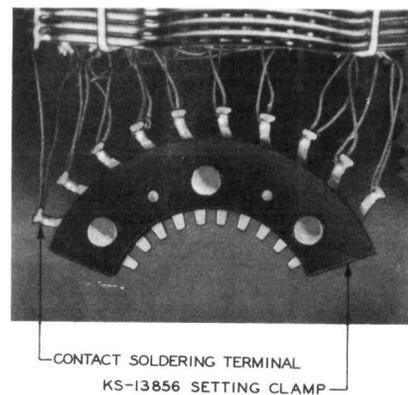


Fig. 12 - Method of Holding Contacts in Place on Insulator While Cement Hardens

5.36 If any of the bank contacts have become displaced, position them properly at this time using the orange stick. Starting at the center and using the D-158524 screwdriver and the KS-8237 wrench, alternately tighten the nuts in a manner that will keep the pressure on the clamping plates approximately evenly distributed and will keep the bank contacts securely in place. About one-quarter to one-half turn of the nut after it is seated against the bank is usually sufficient to tighten the bank contacts.

5.37 To check whether the nuts are satisfactorily tightened apply the R-2771 gauge approximately 2 inches back of the

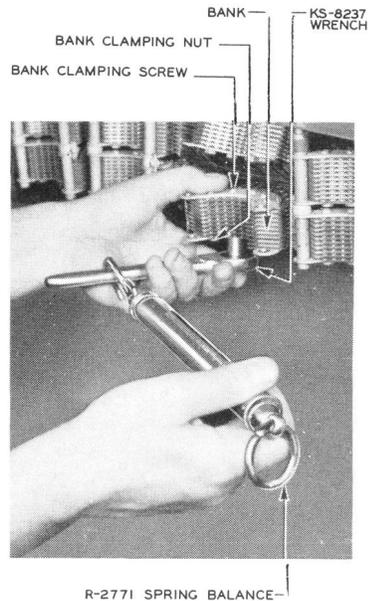


Fig. 13 - Method of Checking Tightness of Bank Clamping Nut

free end of the wrench as shown in Fig. 13 or if a hole is provided in the handle of the tool, insert the hook of the gauge in the hole. A pull of 4 to 4-1/2 pounds at this point without moving the nut is an indication that the nut has been satisfactorily tightened. Where a No. 79F gauge is used instead of the R-2771 gauge attach a loop of cable lacing cord around the handle approximately 2" back of the free end or through the hole in the handle, where a hole is provided, and apply the gauge to this loop. A pull of 1800 to 2050 grams without moving the nut indicates that the nut has been satisfactorily tightened.

5.38 Check the soldering terminal and contact alignment of other levels. If any terminals or contacts are out of alignment, loosen the bank clamping screws enough to place them in alignment and then retighten the screws as described in 5.36 and 5.37.

5.39 After the nuts are tightened dip a toothpick into the KS-6824 sealing compound and apply it to the threaded part of the screw that projects beyond the nut.

5.40 Where banks are bonded resolder any of the bonds which may have been broken or opened.

5.41 Remount the banks being sure that the left and right bank rods are mounted on the left and right respectively and in the same rotary position. Tighten the bank rod collar clamping screws with the 3" cabinet screwdriver.

5.42 Remount the switch as described in the section covering 197- and 198-type switches. Remount the commutator if it was removed.

5.43 Check the bank and wiper adjustments noting especially that the wipers cut in properly on each level.

5.44 Check whether any of the wires have been broken off and if necessary resolder them.

5.45 Clean and treat the bank as described in the section covering cleaning and treating 197- and 198-type switches.

6. CARE OF TOOLS

6.01 KS-13855 Terminal Aligning Tool: Before this tool is used the first time, lubricate it with petroleum jelly. To lubricate the tool, disassemble the moving parts which is done as follows. Remove the screw at the right hand side near the periphery, using the 3" cabinet screwdriver. Remove the metal retaining ring projecting from the tool immediately back of the position from which the screw was removed, using the D-170283 tweezers. Lift the plastic lock ring from the base. Lubricate the bottom and sides of the groove into which the lock ring fits with petroleum jelly and also lubricate the groove in the periphery of the lock ring with petroleum jelly. Replace the lock ring and then the metal retaining ring and screw.

6.02 If necessary, clean the tool after use with a KS-2423 cloth, moistened with alcohol.

6.03 If the movable parts of the tool do not move freely, treat it as outlined in 6.01.

6.04 KS-13856 Setting Clamp: If this clamp has any cement on it, clean it with a KS-2423 cloth, moistened with alcohol.

6.05 KS-13861 Nozzle: Clean all cement from the inside and outside of the nozzle using alcohol as a solvent. Force a wire through the inside of the nozzle to insure that there is an adequate opening through the nozzle.