WIRING AND CABLING

REPAIR OF INSULATION

GENERAL EQUIPMENT REQUIREMENTS

1. GENERAL

1.01 It is sometimes necessary to recondition wiring and repair frayed or missing insulation. This section covers the methods of making such repairs and should be followed as far as practicable in the repair of wiring not specifically mentioned herein.

1.02 ▶This section is reissued to include:

(a) Reference to RM-591127 for friction tape.

(b) Note 2 in 1.03(c) on application of KS-14090 plastic tape.

(c) Note in 3.03(a) indicating that painting or discoloring of wire insulation to meet color code requirements is not permissible.

(d) Requirements in 3.01, 3.02, and 3.03 to include information on insulation types and to cover repair of insulation using heat-shrinkable tubing and repair of irradiated polyvinyl chloride (IPVC) insulation.◀

1.03 The following substitutions may be made for materials specified herein:

(a) Where cellulose acetate lacquer is not available or its application is not desirable locally for repairing frayed or missing insulation, shellac may be used.

(b) Varnish impregnated sleeving per KS-7851, or nonrigid polyvinyl chloride (PVC) tubing per ASTM, designated D-922.

(c) Gray friction tape ▶per RM-591127,◀ or gray plastic adhesive tape per KS-14090. The plastic tape does not require shellacking.

Note 1: Plastic tape or nonrigid PVC tubing should not be used in locations where a hot soldering iron or other heat producing device might come in contact with the tape or tubing.

▶***Note 2:*** The last two turns of KS-14090 plastic tape shall be put on without tension.◀

2. TOOLS AND MATERIALS

2.01 See Table A.

3. METHODS

3.01 Damage to ▶cotton-braided insulation (such as DACB-, DACBL-, DNCB-, and PVCCBL-type insulations)◀ on wires that are sewn into a form or on exposed skinners with braided insulation may be repaired with one wrapping of friction tape ▶per RM-591127,◀ applied with a half-lap over the damaged insulation on each lead. Apply a light coat of shellac to the tape. ▶Damage to cotton braided insulation may also be repaired, where practicable, using heat-shrinkable tubing as specified in 3.03 (c) for repairing PVC insulation.◀

3.02 Damage to served textile insulation ▶(such as AC-, DACL-, and PVCCL-type insulations)◀ on exposed skinners (such as type C wire) may be repaired by wrapping the damaged portion with insulation of the same type and color and applying a light coating of cellulose acetate lacquer to the added insulation. ▶Where cellulose acetate lacquer is not available, or its application is not desirable locally for repairing frayed or missing insulation, shellac may be used. Damage to served textile insulation may also be repaired, where practicable, using heat-shrinkable tubing as specified in 3.03 (c) for repairing PVC insulation.◀

3.03 Damage to PVC insulation ▶or IPVC insulation◀ may be repaired by coating the damaged portion with wire insulation coating R-3155 or by taping with gray friction tape ▶per RM-591127◀ or with gray plastic tape per KS-14090 ▶as specified in (a) and (b). PVC and IPVC insulation and the PVC outer jacket of Teflon-insulated shielded wire

TABLE A

CODE OR SPEC NO.	DESCRIPTION
—	6-1/2 Inch P Long-Nose Pliers
—	5-Inch Diagonal Pliers
KS-6320 R-1102	Orange Stick or Fiber Spudger
— —	Cellulose Acetate Lacquer (RM-644743) or Shellac (RM-646726)
KS-7851 L1	Varnish Impregnated Sleeving, Black (Available in 36-Inch Lengths): No. 0 (0.330-Inch ID) No. 7 (0.148-Inch ID) No. 8 (0.133-Inch ID) No. 9 (0.118-Inch ID) No. 11 (0.095-Inch ID)
—	Polyvinyl Chloride Tubing, Black, per ASTM, Designated D-922 Alpha Wire Co., Linden, N.J., or Equivalent (Normally Available in 100-Foot Coils): No. 0 (0.330-Inch ID) No. 7 (0.148-Inch ID) No. 8 (0.133-Inch ID) No. 9 (0.118-Inch ID) No. 11 (0.095-Inch ID)
—	◗Heat-Shrinkable Tubing per Material Specification 59074, L4◖
RM-591127 KS-14090	3/4-Inch Gray Friction Tape or Gray Plastic Adhesive Tape
KS-14777	Adhesive Tape (Polyester Film) 3/8-Inch Wide
R-3155	Wire Insulation Coating

and cable may also be repaired, where practicable, with heat-shrinkable tubing as specified in (c).◖

(a) On exposed skinners of sewn forms and between the fanning strips and terminals of fanned forms, use wire insulation coating R-3155 when the damaged area is less than 1/4 inch. Where the damaged area is 1/4 inch or larger, the skinner should be replaced by splicing ◗on wire of the same color coding as covered in Section 800-612-158.

Note: Painting or discoloring insulation on wire to conform to specified colors is not permissible.◖

(b) On exposed skinners of fanned forms between the fanning strip and the cable butt and on wires in sewn or loose wire forms, use wire insulation coating R-3155 when the damaged area is less than 1/4 inch. Where the damaged area is 1/4 inch or larger, cover it with gray friction tape ◗per RM-591127◖ or gray plastic tape per KS-14090. Apply a light coat of shellac to the friction tape when located on the surface of the form. Do not apply shellac to plastic tape.

(c) ◗PVC or IPVC insulation, or the PVC outer jacket of Teflon-insulated shielded wire or cable having Teflon-insulated center conductors, the outer PVC jacket may also be repaired, where practicable, with polyolefin heat-shrinkable tubing per Material Specification 59074, List 4. The tubing shall extend approximately 1/2 inch beyond each side of the damaged area. To avoid damaging the wire or cable, the tubing should be carefully applied with low-temperature hot-air type tools designed specifically for shrinkable tubing applications. The tubing and PVC jacket shall not be discolored or distorted upon completion of the repair.

Note: Heat-shrinkable tubing shall not be used where the disconnection of leads would be required to apply the tubing.◖

3.04 Damaged type AR stranded multiple-bank wiring, where the damage is limited only to the insulation and no wire strands have been damaged, may be repaired by wrapping the exposed portion with sufficient half-lap turns of 3/8-inch wide polyester-film adhesive tape per KS-14777 to adequately insulate the wire. Where the wire at the clinch is damaged, but not the terminal, the terminal lug shall be tinned and both ends of the wire terminating at that clinch shall be wrapped once around the lug and then soldered. This is necessary since in all instances where heat is applied to the terminal, the clinch connection shall no longer be relied upon to maintain a connection.

RECONDITIONING AND REPAIR OF LOOSE-WRAPPED INSULATION ON EXISTING EQUIPMENT

3.05 On some older equipment wired with loose-wrapped waxed wire, it is sometimes necessary to recondition wiring and repair frayed or missing insulation. This is particularly desirable in places where high potential and vibration due to moving parts are encountered.

3.06 Where reconditioning and repair of wiring is necessary, the following procedure should be followed:

(a) On wiring to relays, sequence switches, or any wiring where similar skinner dress is used and the skinner insulation is badly dried out, frayed, or otherwise damaged, the skinners should be sleeved with varnish impregnated sleeving per KS-7851. The skinners should be sleeved individually using No. 9 sleeving, except where more than one connects to the same terminal, in which case these skinners should be enclosed in one sleeve, using No. 9 or larger sleeving, as required. Slightly frayed insulation should be given an application of cellulose acetate lacquer and twisted into place. All skinners, including those which were sleeved, should be redressed to simulate the original dress as nearly as practicable.

(b) On wiring to 200- and 206-type selectors or similar cases where the wiring lies in contact with metalwork and the insulation is badly frayed or the protective tape has become dried out to the extent that it does not adequately protect the wiring, the leads should be sleeved with varnish impregnated sleeving per KS-7851. The leads should be sleeved individually using No. 9 sleeving, except where more than one connects to the same terminal, in which case these leads should be enclosed in one sleeve, using No. 9 or larger sleeving, as required. Where the wiring is sewn, stitches should be removed, as required, to permit redressing the sleeved leads, as necessary, to present the best maintenance conditions. Larger sleeving should be used, where necessary, to enclose a form for protection against metalwork. Fig. 1 shows the recommended method of sleeving wiring to 200- and 206-type selectors in which No. 9 sleeving should be used to enclose one or two leads to a particular terminal and No. 0 sleeving to enclose the local cable. Where the insulation is only slightly frayed and the wiring, including the protective tape, is otherwise in good condition, cellulose acetate lacquer should be used to recondition the wiring.

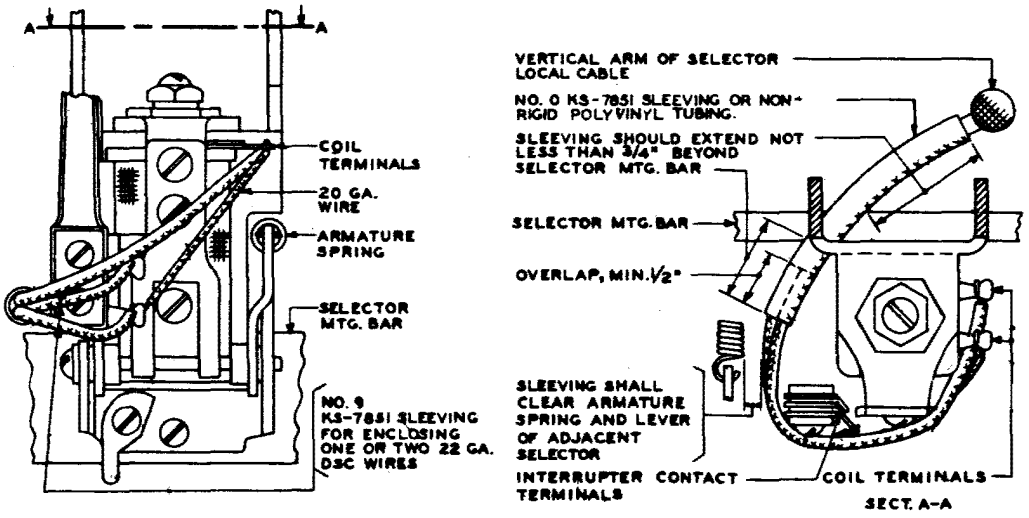

Fig. 1—Protection of DSC Leads to Coil and Interrupter Spring Contacts of 200- and 206-Type Selectors