

BELL SYSTEM PRACTICES
Outside Plant Construction
and Maintenance

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AT&T Co Standard

CABLE SPLICING—GENERAL

SPOOL TYPE AND MICA CONDENSERS

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1. GENERAL

1.01 This section outlines the method of installing spool type wire-wound condensers and fixed mica condensers that are used for capacitance unbalance reduction in toll and toll entrance cables and for capacitance building-out.

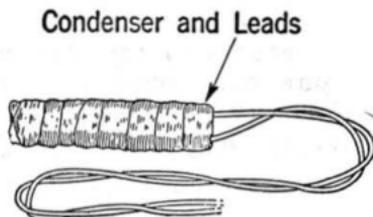
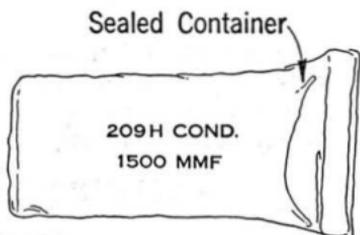
1.02 The condensers are small enough to be placed in splices, where comparatively few are required, or in a lead sleeve at the end of a stub cable installed for the purpose in the case of localized balancing of four-wire quads or other special balancing work.

1.03 This section is being reissued to include the 498-type← mica condensers which supersede the 210-type mica condensers.

2. DESCRIPTION

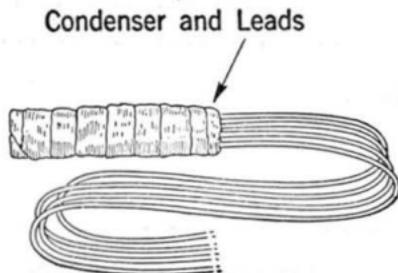
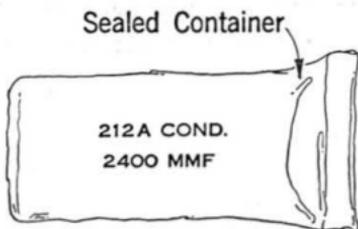
2.01 **Spool Type Adjustable Condensers:** The following sketches illustrate the two-wire and four-wire adjustable condensers. The sizes available in each type and the corresponding code numbers are indicated for reference.

SPOOL TYPE ADJUSTABLE CONDENSERS TWO - WIRE CONDENSERS



Code Number	Minimum Capacitance MMF	Maximum Capacitance MMF
209D	70	100
209E	150	200
209F	500	650
209G	1000	1300
209H	1500	1950
212B	3000	3900
212C	2200	2850

FOUR - WIRE CONDENSERS



Code Number	Capacitance Added to Phantom Circuit MMF	Capacitance Added to Side Circuit MMF
212A	2400	1200

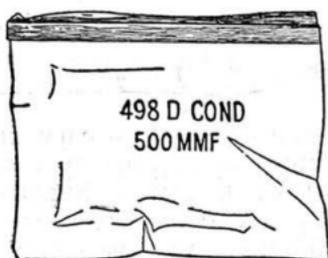
2.02 These condensers consist of a small spool on which are wound two or four fine gauge insulated conductors, depending on the type. The complete unit is wax impregnated, covered with a textile wrapping and the inner ends of the winding are brought out of the end of the spool by means of 22-gauge silk and cotton insulated conductors.

2.03 The units are enclosed in a sealed moisture resistant envelope containing a small quantity of desiccant. They should be left in the envelopes until just prior to use.

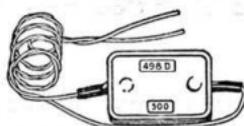
2.04 **Mica Condensers:** The following sketch illustrates the non-adjustable mica condensers which are used for building-out purposes, alone or in conjunction with wire-wound condensers, depending on the nature of the circuits involved. The sizes available in each type and the corresponding code numbers are indicated for reference.

MICA CONDENSER

Sealed Envelope



Condenser and Leads



Code Number	Minimum Capacitance	Maximum Capacitance	Superseded Code Number
498A	1400	1600	210A
498B	2800	3200	210B
498C	4200	4800	210C
498D	470	530	210D
498E	940	1060	210E
498F	1900	2100	210F

2.05 The over-all dimensions of the mica condensers, not including lead wires, are approximately 1-1/4" long, 7/8" wide and 1/4" thick. The 498-type condensers are of the silvered mica type, molded in an insulating material. The condensers are equipped with two flexible insulated leads approximately 18 inches long. The condenser and the leads are enclosed in a sealed moisture resistant envelope containing a small quantity of desiccant.

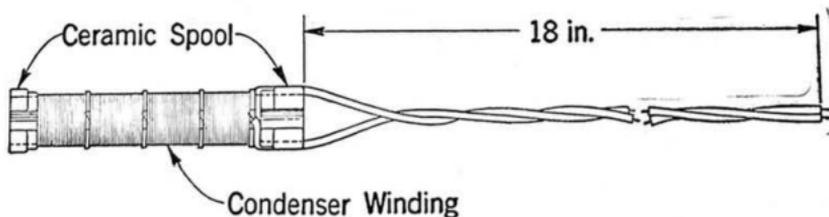
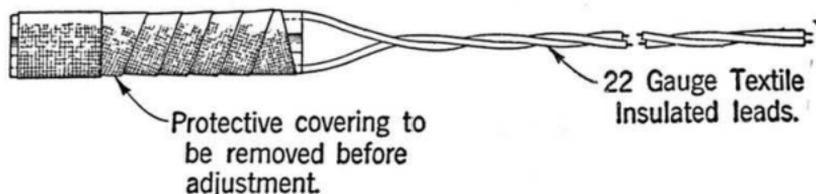
2.06 They should be left in the envelopes until just prior to use, whereupon the envelope can be removed and discarded.

2.07 Neither the adjustable wire wound condensers nor the fixed mica condensers should be boiled in paraffin either before or after placing in the splice as the heat may damage them.

3. PREPARATION OF SPOOL TYPE CONDENSERS

3.01 **Selection of Condenser:** The type condensers to be employed for a particular installation will depend on the nature of the installation and the amount of capacitance adjustment necessary. This will be determined by the tester in laying out the job.

3.02 After selecting the size condenser required and making the necessary preparations for testing and splicing, remove the condenser from the container. Do not handle the condenser any more than necessary as it will absorb moisture in the process. The following illustrations show a two-wire condenser with the protective covering in place and one with the covering removed to permit adjustment. The four-wire condenser is similar in general appearance, except that there are four wire ends to be cut and protected.

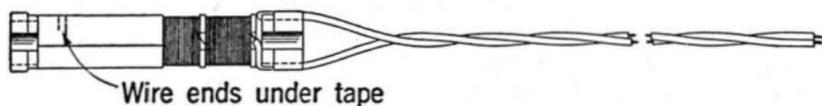
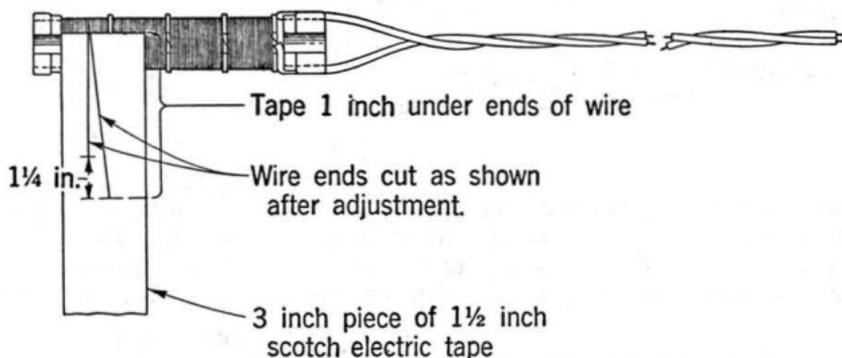


3.03 **Capacitance Adjustment:** The capacitance of the wire-wound condensers can be adjusted to the desired value by unwinding and removing a portion of the wire from the spool. As illustrated above, the ceramic spool has four sections in which the winding is divided approximately equally. This will facilitate adjustment of the capacitance to the desired value.

3.04 In using four-wire condensers, the tester will determine which leads should be associated to form pairs. The leads of each pair should be twisted together to avoid dissociation while testing and splicing.

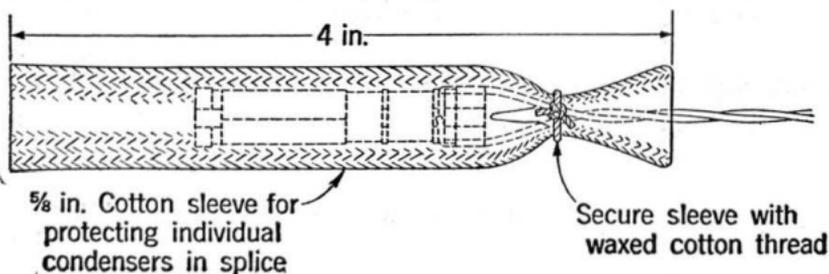
3.05 The capacitance can be measured with a 2A Capacitance Bridge. After the unit has been adjusted to the proper value it should be protected as outlined below.

3.06 **Method of Protection:** To protect the ends of the wires on the spool after adjustment, unwind $\frac{3}{4}$ inch of the outer ends, separate the wires and cut them so that the ends are staggered about $\frac{1}{4}$ inch. The following sketches illustrate the preparation of a two-wire condenser. The four-wire condensers are prepared in essentially the same manner.



Wrap the tape around the spool to cover the ends of the wires

3.07 The entire unit should be covered as shown below.



4. PREPARATION OF MICA CONDENSERS

4.01 The mica condensers require no special preparation after removal from the container.

5. INSTALLATION

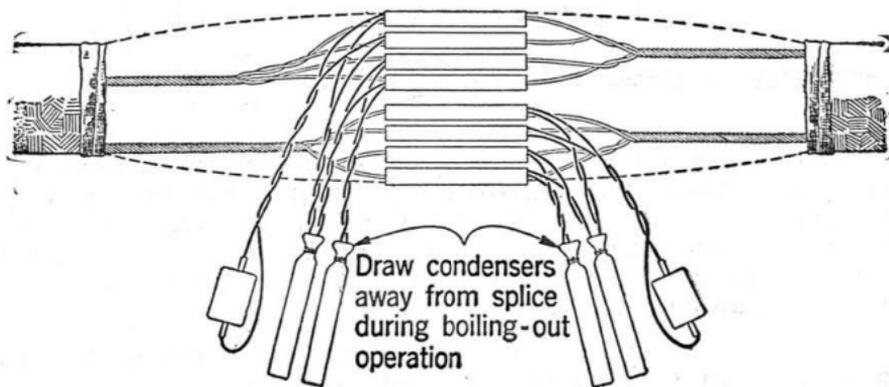
5.01 **In Main Cable Splices:** The tester will determine how the condensers are to be connected and the splicer should install them as directed.

5.02 It is essential to twist the wire leads of the condensers in pairs as illustrated in the various sketches. The wires to be used as pairs in the four-wire condensers will be determined by the tester and the leads should be twisted together accordingly.

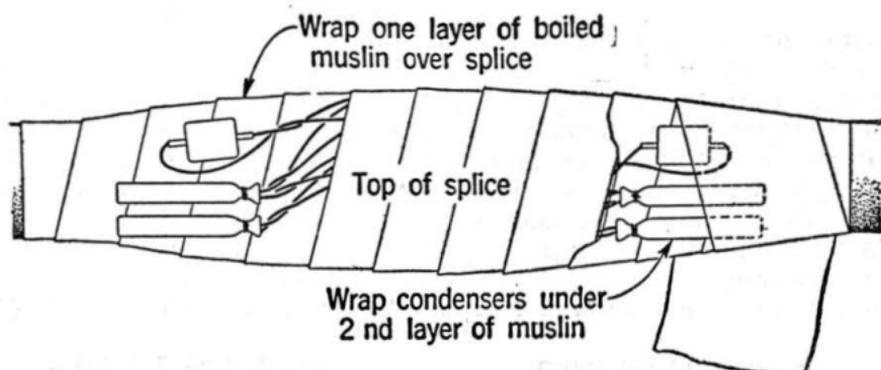
5.03 After adjustments have been made the leads should be cut to a length of approximately 12 inches, prepared for splicing and twisted to the wire joints. The tester will then make check measurements on the pairs or quads involved after which the wire joints shall be soldered.

5.04 Complete the splice in the usual manner and apply the proper quantity of desiccant.

5.05 If paraffin is used to dry the splice, the condensers should be drawn away from the splice to avoid heating them during the boiling operation. After boiling the splice it should be wrapped with muslin, the condensers being left outside the first muslin wrapping.



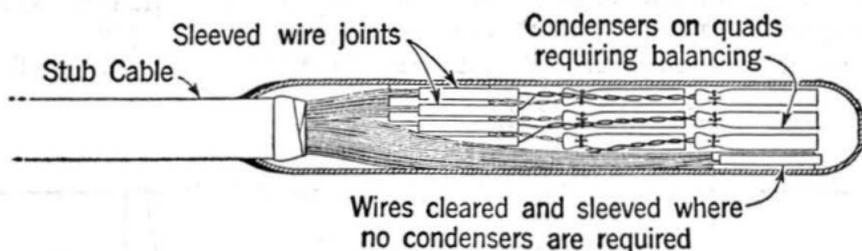
5.06 In wrapping down the condensers they should be laid at the top of the splice as illustrated below, so that desiccant can be placed around the condensers to absorb any moisture that may have been absorbed.



5.07 **Localized Balancing—New Work:** For localized balancing or other operations requiring a large number of condensers it may be necessary to stub out the quads involved and place the condensers in a lead sleeve at the end of the stub. The stubbing arrangement permits entering for maintenance purposes without disturbing the main cable splice.

5.08 If the balancing is to be done in the cable vault the stub can be lashed to the main cable and the sleeve placed on one of the cable rack hooks or if this is impracticable the stub may be clamped to the wall (except in the case of waterproofed vaults where other means of support should be used). If the balancing is done in a manhole, the stub cable can be arranged in the same manner as an ordinary stub in exchange cable.

5.09 The arrangement of the condensers in the sleeve at the end of the stub cable is illustrated below.



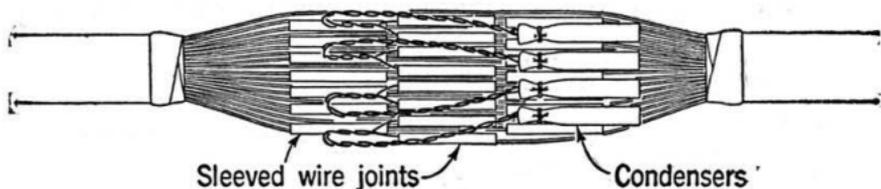
The condensers should be arranged in one or two rows at the outer end of the sleeve, the splices being made at the other end.

5.10 The condensers should be connected to the conductors as directed by the tester and the wire joints should be soldered in the usual manner.

5.11 If the splice is to be left open over night, sprinkle a medium size can of desiccant among the wires in applying the temporary protection.

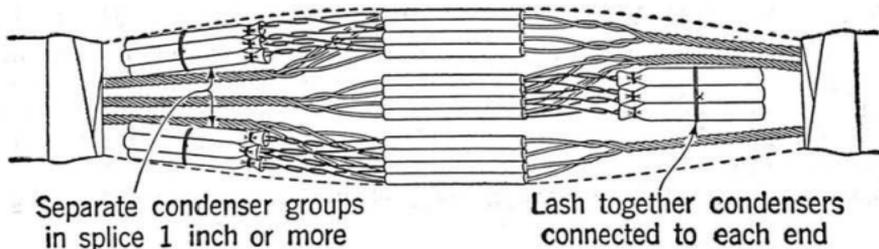
5.12 **Program Pair Building-Out:** The condenser to be used will be determined by the tester and should be connected to the pairs as directed by him. The illustration shows in a general way how the condensers can be arranged in the splice. All connections should be soldered.

AT STRAIGHT SPLICES



5.13 **Carrier Circuit Quads:** When adjustable condensers are utilized for building-out or for capacitance unbalance reduction of carrier quads, it is necessary to segregate the condensers associated with the various quads so as to minimize the crosstalk effect. The condensers connected to a particular quad should be associated by tying them together with a narrow strip of muslin.

5.14 If only a few quads in the splice have condensers connected to them, the necessary segregation can be obtained by arranging the groups of condensers in the splice so that there is an inch or more separation between them.



5.15 If a large number of quads have condensers connected to them, the necessary segregation can be obtained by sliding a close fitting length of fibre tubing over the cotton sleeve on each condenser, the condensers on a quad being tied together as before. Where the condensers are placed in a lead sleeve at the end of a stub they should be arranged in two or three evenly spaced rows, leaving approximately a 1-inch space between rows to ensure a reasonably uniform separation of the condensers within the sleeve. In other respects the installation features on carrier work will not differ from those on voice frequency or program circuits.