

*BS) #773B*  
**COMPLETION TESTS OF EXCHANGE-AREA CABLES**  
**ANALYSIS AND REPORTS**

**1. SIGNS OF TROUBLE**

**1.01** As mentioned briefly in the 500 section, it is important to recognize trouble as early as possible. Then prompt action can be taken to clear it before the facilities are put in service.

**1.02** In general, if there is no trouble, the average resistance, average return loss, and average transmission loss will lie within their predicted ranges. Also, the individual pairs will not differ much from the average pair. The sample tallies in the 500 and 502 sections show what to expect.

**2. RESISTANCE**

**2.01** If the average resistance of a complement is within  $-7\%$  and  $+10\%$  of the computed resistance, it is considered to meet the objective. If it lies outside this range, check the calculations, including the data from the cable records. If no error is found, report the condition immediately via the line of organization.

**2.02** Any wire that deviates from the complement average by more than  $\pm 3\%$  of the average-wire resistance fails to meet the objective. Most deviations are on the high side. In such cases, there may be resistance in one or more joints at splices, especially if the splices are non-soldered. Methods for locating high-resistance joints are available in other sections of practices.

**3. RETURN LOSS**

**3.01** An average return loss within  $-2$  db of the expected value of a single-gauge complement is considered satisfactory. There is no limit on the "plus" side, since higher return losses mean higher quality.

**3.02** For a complement of mixed gauges in tandem, the average is considered satisfactory if it is within  $-3$  db of the expectancy.

**3.03** Individual pairs that fall below the average (not the expectancy) by 5 db or more should be investigated. Impedance measurements

at various frequencies are an excellent basis for locating impedance irregularities. These measurements should be made at least every hundred cycles from 300 to 3000 cycles as covered in Section A702.621/E40.658. The E Repeater Test Set with the oscillator and VTVM (the latter terminated in 900 ohms), or other impedance measuring apparatus, may be used.

**3.04** For impedance measurement, termination of the pair should be the same as for return-loss measurement, in order to minimize reflections from the terminating end.

**3.05** If a graph of impedance plotted against frequency shows distinct peaks and valleys, a location of the trouble should be possible. Follow the method given in Section E31.130.

**3.06** If there are no distinct peaks and valleys, make impedance measurements from the other (terminating) end. In this case, the termination at the "measuring" end should be determined as if it were the terminating end. For setting the BOC in Switchbox M, follow the method described in the 502 section (Part 9) for setting the BOC in Switchbox T.

**4. TRANSMISSION LOSS**

**4.01** If the expectancies for resistance and return loss are met, the 1-kc transmission loss should be within the expectancy. If it is not, however, report the fact via the line of organization.

**4.02** If the resistance expectancy is met, but the 60-kc transmission loss is not, there may be a bridged tap, a loading coil or other trouble on the pair. Troubles of this nature, affecting the ac but not the dc performance, can be located by application of the technique discussed in Part 3 of this section.

**4.03** A trouble-locating technique similar to that in Section E31.130, but suitable for nonloaded pairs, is expected to be published soon. In the meantime, request help via the line of organization.

**5. REPORTS**

**5.01** For each loaded complement, prepare a report showing the following:

- (a) Identity of the cable and of the pairs tested.
- (b) Expected average resistance.
- (c) Actual average resistance.
- (d) Identity of wires more than  $\pm 3\%$  from average after poor test contacts are eliminated. Report by pair number and T or R for "tip" or "ring." Example: 29T, +12 ohms; 35R, +14 ohms.
- (e) Location and nature of trouble found.
- (f) Expected average return loss.
- (g) Actual average return loss.
- (h) Identity of pairs having return losses out of line. Report by pair number. Example: Pair 36, 26 db; Pair 79, 22 db.

- (i) Location and nature of trouble found.
- (j) Expected average transmission loss.
- (k) Actual average transmission loss.
- (l) Identity of pairs with transmission loss out of limits. Example: Pair 2, 10.8 db; Pair 96, 12.5 db.
- (m) Location and nature of trouble found.

**5.02** For a nonloaded complement the report should include the same type of information as for loaded pairs, except for return loss. The report on transmission should cover 60-kc losses as well as 1-kc losses.

**5.03** The report should be prepared as soon as the tests are complete, and should be forwarded at once via line of organization, with the original data sheets.