LOCAL CHANNEL
EQUALIZATION OF 5-, 8-, AND 15-KHZ
PROGRAM AND WIRED MUSIC CIRCUITS
GENERAL INFORMATION

CONTENTS PAGE

1. GENERAL

1.01 This group of sections contains information on the service order and routine equalizing tests to be performed on local program and wired music circuits. A list of all the related sections in this group of sections is also included.

1.02 Whenever this section is reissued, the reason(s) for reissue will be given in this paragraph.

1.03 The service order will usually refer to a schedule type and specify whether or not the local plant is to be equalized. If the circuit is to be equalized, the service order will specify one of the following bands of frequencies:

- 100-5,000 Hz
- 50-8,000 Hz
- 50-15,000 Hz.

2. DEFINITIONS OF TERMS

2.01 The definitions in the following paragraphs are included to assist the tester in his/her discussions with other telephone company personnel engaged in these tests as well as the customer. These definitions do not include all terms used when working on these circuits. However, the terms included are the more common ones.

2.02 A LOCAL CHANNEL PROGRAM CIRCUIT is one which is sometimes referred to as a local-loop circuit. It includes the following types of circuits:

(a) Program pickup loops from remote points to the broadcast company's studio or other control point

(b) That portion of a network circuit between the broadcast company's studio or control point and the Program Operating Center at the point of connection to the network

(c) Studio-to-transmitter circuits between the broadcast company's studio or other control point and their transmitter

(d) Circuits which tie together two studios or control points within the same local area

(e) A circuit that connects a satellite earth station with a broadcast studio.

2.03 A WIRED MUSIC CIRCUIT is one which distributes music over telephone facilities from a studio to restaurants, public buildings, office buildings, etc. Distribution amplifiers located in telephone company offices may distribute to as many as 300 remote locations simultaneously.

2.04 A FULL-TIME CIRCUIT is one which is expected to remain in service permanently such as a studio-to-transmitter circuit. A tie circuit between studios is considered to be permanent also.

2.05 A PART-TIME CIRCUIT is one which the broadcaster uses for one night pickups from

dance halls, conventions, etc. These are sometimes referred to as "one night stands."

2.06 The RECEIVING-END of the circuit is at the location of the broadcaster's transmitter in the case of a studio-to-transmitter loop. The receiving-end of a loop (circuit) which feeds a network is the telephone company toll office at which the loop connects to the network.

2.07 The SENDING-END of the circuit is the point at which the program material originates. This could be the broadcaster's studio, a dance hall, a ball park, or any other remote point.

3. DISCUSSION OF EQUALIZATION

3.01 A circuit is equalized over the desired frequency band to ensure that the level at the receiving-end is within specified limits over the band. Since the transmission loss of a nonloaded cable pair increases with frequency, it is necessary to introduce loss in the equalizer that is complementary (opposite to) the loss-frequency characteristics of the cable pair. This is known as attenuation (amplitude) equalization and may be accomplished with either series or shunt-type equalizers. When frequencies of 100 Hz or below are to be transmitted, a deliberate impedance mismatch is created by means of a repeating coil, such as the 111C, 119C, or 2552Y, connected so the windings of the "line side" (telephone line or incoming sides) of the coil are in parallel and those on the "drop side" (toward customer's equipment) are in series (1:4 ratio). The coil assists the equalizer in obtaining more loss at the lower frequencies. This connection is shown in the figures of the sections pertaining to the equalizing tests.

3.02 The repeating coil has a 3-fold purpose:

(a) It provides an impedance mismatch at the lower frequencies to assist in equalizing the overall circuit.

(b) It provides a good impedance match at the higher frequencies.

(c) It isolates the customer's equipment at the sending- and receiving-ends of the circuit from the telephone company plant.

3.03 A circuit design must also compensate for different "copper losses" due to the various gauges of cable used in outside plant. Table A shows typical cable gauges and the maximum equalized circuit lengths expected under each frequency band.

TABLE A

	RANGE (Mi.)/BANDWIDTH		
CABLE GAUGE	5 kHz	8 kHz	15 kHz
26, all types	4.0	3.5	2.5
24, all types	5.0	4.5	3.5
22, all types	6.5	6.0	5.0
19, CNB	9.5	9.5	9.0
19, DNB	10.0	10.0	10.0

3.04 The following types of attenuation equalizers are used on these circuits. For nonloaded facilities, the KS-16816, L1, 23A, modified 4A, and SD-55503-01, Fig. 14 equalizers are used. For loaded facilities, the 17-type equalizer is used. The 23A and modified 4A equalizers are connected to the line side of the repeating coil since they are balanced electrically. The SD-55503-01 equalizer is connected to the drop side of the coil since it provides a more uniform response on the 600-ohm side of the coil. The KS-16816, L1 equalizer is normally connected to the line side of the coil for 5- or 8-kHz services and to the drop side for 15-kHz services.

3.05 The 23A equalizer is used on nonloaded cable pairs to equalize 5- and 8-kHz circuits. A schematic of the equalizer is shown in Fig. 1. A detailed description of the equalizer will be found in other sections. The 23A equalizer may also be used on 16B22 loaded facilities and will provide satisfactory equalization up to 8 kHz for lengths of about 15 miles.

3.06 The modified 4A equalizer in Fig. 2 may also be used to equalize nonloaded cable pairs for 5- and 8-kHz circuits. The electrical characteristics of this equalizer are very similar to the 23A. However, it is larger in size and is more difficult to strap. The modified 4A may also be used on 16B22 loaded cable and will provide satisfactory equalization up to 8 kHz for lengths of about 15 miles. A detailed description of this equalizer will be found in other sections.

3.07 The SD-55503-01, Fig. 14 equalizer is shown in Fig. 3. It is designed for use on 15 KC circuits.

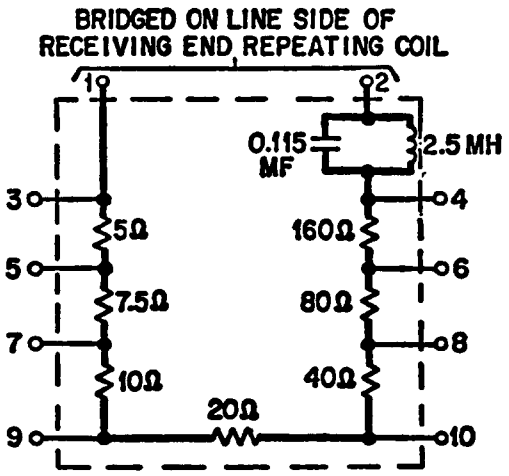

Fig. 1—23A Equalizer

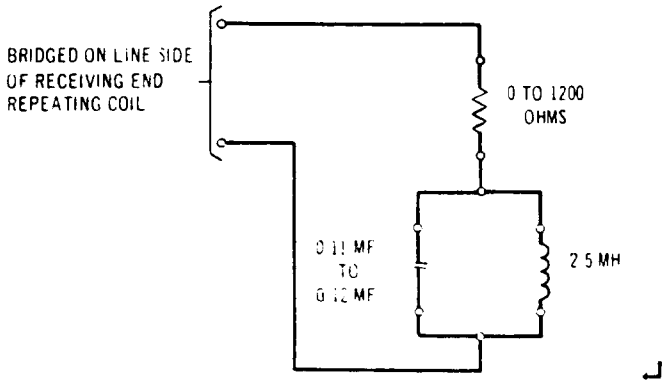

Fig. 2—Modified 4A Equalizer

This equalizer may also be used on 16B22 loaded facilities with the same length limitation as the 23A equalizer.

3.08 The KS-16816, L1 equalizer is adjustable and is designed for use on nonloaded cable pairs.

The equalizer includes a notch filter to limit the useful bandwidth to less than 8 kHz when the L/C ratio selector switch is set on 5 kHz. Its circuit is similar to the combined circuits of the 23A and SD-55503-01 equalizers, except the resistance is selected by means of an adjustable potentiometer and fixed L/C ratios are selected by means of a switch. The details pertaining to its characteristics and application are discussed in Section 320-230-100, KS-16816, L1, L2, L3, and L4, Equalizers for Program Circuits—Description.

3.09 Loaded cable pairs are usually equalized with the 17-type equalizers. Information on these is contained in other sections. Since this type of equalizer is generally not used on "local circuits" except, perhaps, on the cable pairs between central offices, it is not discussed in detail in this section.

4. OTHER POINT SECTIONS

4.01 In order to make the material on equalization more useful to the user, the information is divided into sections. The following list identifies those related sections.

SECTION	TITLE
320-300-100	Equalization of 5-, 8-, and 15-kHz Program and Wired Music Circuits — Test Equipment
320-110-106	Preequalization Tests on 5-, 8-, and 15-kHz Program and Wired Music Circuits
320-110-110	Equalization of 5- or 8-kHz Program and Wired Music Circuits
320-110-115	Equalization of 15-kHz Program Circuits

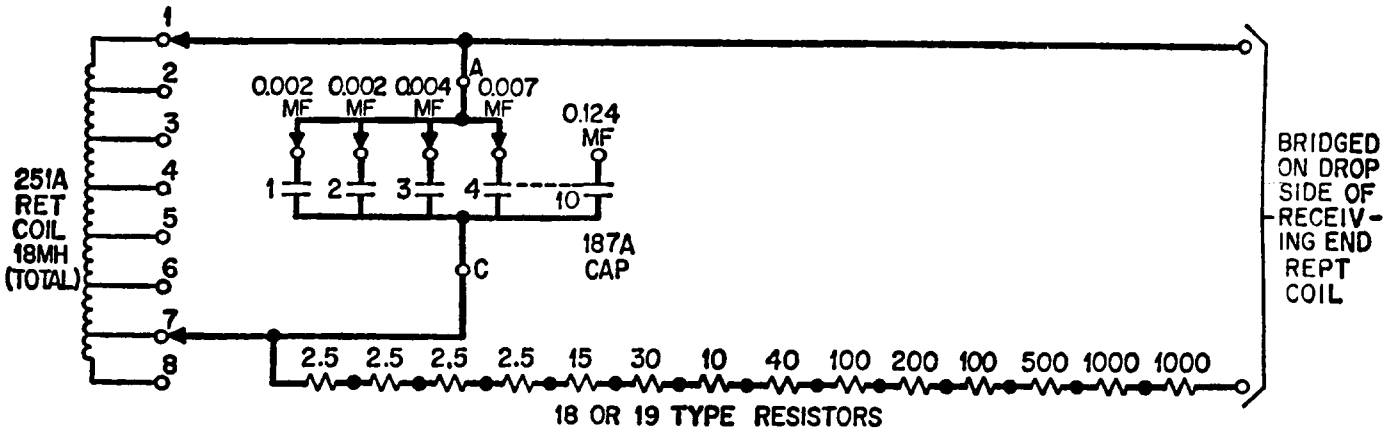

Fig. 3—SD-55503-01 Equalizer