

## 8A ANNOUNCEMENT SYSTEM

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### 1. GENERAL

**1.01** ¶This section is reissued to cover application of the KS-16765, L1 Announcement Set. This section describes the transmission features of the 8A Announcement System.¶ This system is a customer-operated line terminal system in which the customer may record his own announcement or message for playback to other customers who dial the call number of the announcement system. Live announcements may also be transmitted directly in cases of emergency. The 8A system has a capacity of either 20 or 100 lines. The two arrangements use somewhat different equipment and have different transmission features.

**1.02** The 8A system is designed to operate in step-by-step, panel, No. 1, or No. 5 crossbar offices. Either single channel or dual channel

systems may be used depending on the degree of service continuity required.

**1.03** Both the 20-line and the 100-line systems operate from low-impedance outputs. These provide high-loss paths between any two simultaneously connected customers. Idle circuit terminations are provided with each connecting line circuit to keep level changes to a minimum.

### 2. EQUIPMENT ARRANGEMENT

#### A. 20-Line System

**2.01** The general arrangement of the 20-line 8A Announcement System is shown in Fig. 1. ¶For single-channel operation, one 2A telephone answering set or a KS-16765, L1 Announcement Set is provided on the customer's premises and operated by him.¶ For dual channel operation, two such sets are required. A 500-type telephone set is used for recording and may also be used in emergencies to transmit announcements directly.

**2.02** ¶The announcement equipment is connected over a subscriber loop to the distribution amplifier in the central office.¶ This amplifier feeds the distribution circuit to connect up to 20 simultaneous incoming calls.

**2.03** ¶For dual operation, the two announcement sets are connected through a transfer key.¶ This permits announcements to be recorded on an idle machine and checked for correctness of content, speech quality, and level before being connected to the central office equipment.

**2.04** ¶The announcement equipment provides a minimum of 2.5 seconds to a maximum of 60 seconds of recording time.¶

**2.05** The central office equipment used with the 20-line system consists of a KS-16547 L1 amplifier (Section 024-150-108) and a 20-line trunk distribution system. This amplifier will deliver 4 watts into a 4-ohm load at 1000 cycles with less than 5 percent total harmonic distortion. The amplifier input has an internal impedance of about 850 ohms and is connected directly to the subscriber

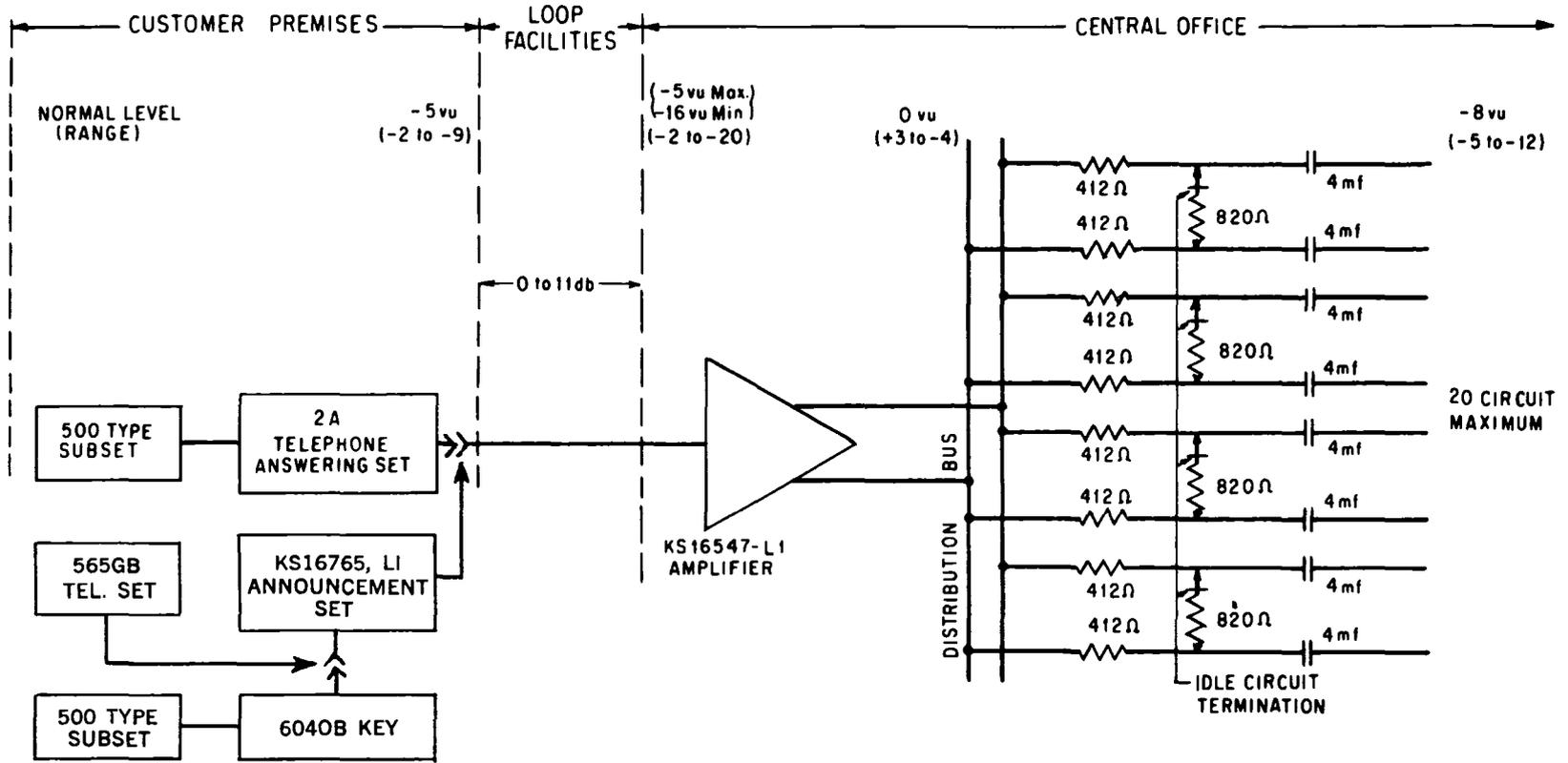


Fig. 1—8A Announcement System—20-Line Arrangement

loop from the recorder. The output load impedance of the amplifier is nominally 4 ohms, and the output is connected directly to the distribution bus. The internal output impedance of this amplifier winding is approximately 1.0 ohm.

## B. 100-Line System

**2.06** When it is necessary to provide more than 20 simultaneous connections to the announcement system, the 100-line arrangement is used. The general layout of this equipment is shown in Fig. 2. In this system, only the control equipment is located on the customers' premises and the recorder-reproducer unit is located in the central office.

**2.07** The equipment on the customers' premises consists of a KS-16504 handset for recording, a KS-16536 desk-mounted control unit, and a KS-16537 wall cabinet containing a KS-16550 constant loudness amplifier. Headset and loudspeaker equipment for monitoring may also be used, if desired.

**2.08** The KS-16504 handset (Section 024-192-100) has a dynamic-type microphone for better speech quality. The associated amplifier is monitored with a high-impedance volume indicating meter to regulate recording speech level. A jack is also provided for input from an external speech source such as a tape recorder.

**2.09** The equipment in the central office consists of a KS-16534 recorder-reproducer with amplifier, control, and distribution circuits. Equipment required depends on whether single or dual channel operation is provided and which of two types of control is provided. In cases where the customer equipment is close to the central office, "Local-Remote" control may be used. For longer loops "Remote" control is used. Requirements for these loop facilities are discussed in Part 3.

**2.10** The central office equipment units used for these various types of operation are as follows:

(a) Single Channel, Local-Remote Operation:

1—KS-16535-L2 Coupling Unit

1—KS-16534 Recorder-Reproducer

1—KS-16508 Amplifier

(b) Single Channel, Remote Operation:

1—KS-16535-L1 Coupling Unit

1—KS-16534 Recorder-Reproducer

1—KS-16508 Amplifier

(c) Dual Channel, Local-Remote Operation:

1—KS-16586 Coupling Unit

1—KS-16587 Distribution Unit

2—KS-16534 Recorder-Reproducer

2—KS-16508 Amplifiers

(d) Dual Channel, Remote Operation:

1—KS-16588 Coupling Unit added to all items in (c) above.

**2.11** The KS-16534 recorder-reproducer uses a magnetic band recording medium and has a recording interval of from 12 seconds minimum to 4 minutes maximum. This minimum period may be reduced to 6 seconds if the voice alarm feature described below is not required. The announcement to be recorded is fed to the 600-ohm input of the unit when in the "record" condition and stored in the magnetic band. In the "reproduce" condition, the message is fed to the KS-16508 amplifier and then to the distribution bus.

**2.12** The KS-16508 amplifier (Section 024-150-101) is designed to deliver 8 watts of 1000-cycle power into a 1-ohm load with less than 5 percent total harmonic distortion. The nominal 600-ohm input winding of the amplifier has an internal input impedance of about 850 ohms. The output winding has an internal output impedance of less than 0.3 ohm.

**2.13** This system usually includes a voice alarm circuit to check for the presence of voice on the distribution bus. If a voice signal is absent for a certain time interval, a gas tube circuit will time-out. This operates an alarm in the central office and places busy tone on all calls coming to the distribution bus. This alarm system may also

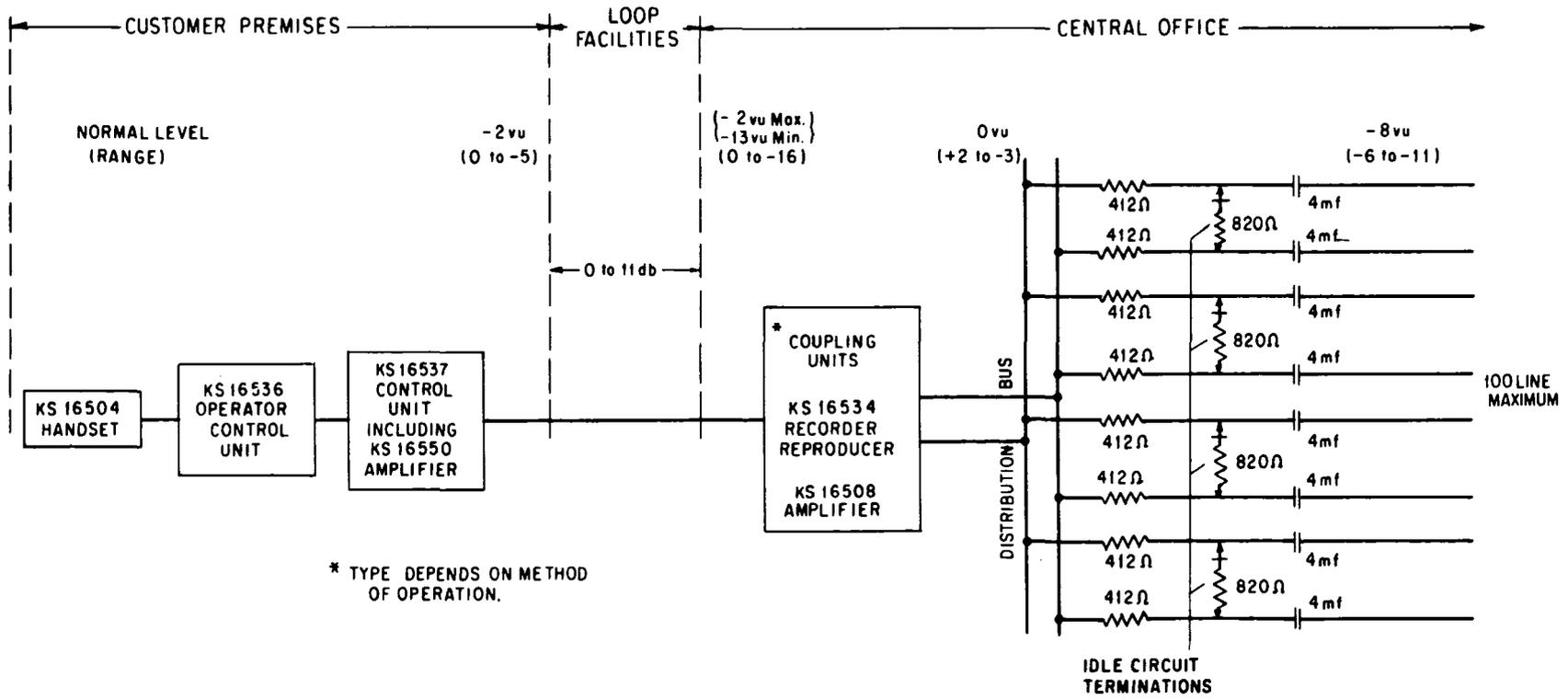


Fig. 2—8A Announcement System—100-Line Arrangement

be used on the 20-line announcement system if desired.

### 3. INTERCONNECTING FACILITIES

**3.01** For the 20-line announcement system, facilities between the customers' premises and the central office consist only of a single subscriber loop. There are no special requirements for these facilities except that they should meet the transmission requirements of regular subscriber loops within the office area.

**3.02** For the 100-line announcement system, the loop facilities required depend on the method of operation (2.09). For "Local-Remote" operation where the customer location is close to the central office, 9 conductors are required for single channel operation and 16 conductors for dual channel. "Remote" operation, however, which is probably more suitable to the majority of installations, requires only two subscriber loops for single-channel operation and three loops for dual operation.

**3.03** Because of the large number of conductors required, it is felt that "Local-Remote" operation will generally not be used for conductor lengths of more than 1000 feet. However, the equipment will permit single channel "Local-Remote" operation up to a loop resistance of 400 ohms and dual-channel operation up to a loop resistance of 100 ohms. "Remote" operation, either single or dual channel, may be used up to a loop resistance of 1640 ohms. All loops should meet the regular transmission requirement for normal subscriber loops in the area. When available, loaded loops should be used because of their better loss-frequency characteristics.

### 4. CENTRAL OFFICE TRUNK CIRCUITS

**4.01** Announcement trunk circuits connect the calling subscriber to the announcement bus. These circuits are identical for either the 20-line or the 100-line system. For relatively short messages, they may be arranged to cut the calling party into the announcement bus only at the beginning of the message. For longer messages, where the waiting time would be undesirable, the circuit may be arranged to cut in immediately at any point in the message. The trunk circuit is designed to provide either one or two complete announcements to the calling subscriber.

**4.02** The terminating arrangement of the announcement trunk circuits is shown in Fig. 1 or 2. The output transformer of the amplifier is directly connected to the distribution bus which is connected to a group of trunk circuits. Each trunk circuit is terminated in a balanced arrangement of 412-ohm resistors and 4 MF capacitors as shown. The 820-ohm idle circuit termination is connected at all times except when the trunk circuit is actually terminated by a calling line. This presents a practically constant load to the amplifier regardless of the number of calling subscribers. This load is approximately 82 ohms for 20 lines and 16 ohms for 100 lines.

### 5. TRANSMISSION PERFORMANCE

#### A. Level Characteristics

**5.01** The 8A Announcement System is designed to supply either one to twenty or one to a hundred simultaneously connected lines with no appreciable reduction in level into any line. In general, announcement level into any connected line will be approximately  $-8$  vu.

**5.02** In the 20-line system, the announcement equipment employs automatic volume control (AVC) during the recording cycle. This restricts level variations from talker to talker to about 7 db. Average speech level out of the set is about  $-5$  vu.

**5.03** In the 20-line system, the  $-5$  vu speech level output is applied to the loop to the central office. Loop losses of from 0 db to 11 db are assumed. This results in an input range to the KS-16547-L1 amplifier located in the central office of from  $-5$  vu to a minimum level of  $-16$  vu (Fig. 1). The amplifier is adjusted to give an average level of 0 vu across its output terminals with the distribution bus disconnected. This results in an average level of  $-8$  vu being applied to any connected line. Due to the idle circuit terminations, this level is essentially independent of the number of connected lines. The level into the line is also essentially independent of the line impedance. The source impedance is about that of the series resistors and capacitors, or about 900 ohms, and will result in reflection losses of only about 0.5 db for any loop impedance between 450 and 1800 ohms.

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**5.04** In the 100-line system, the input-output response of the KS-16550 amplifier at the customer's location is controlled by AVC action to restrict level variations from talker to talker to about 5 db. Average speech output level should be about -2 vu. (The green area on the face of the volume indicating meter corresponds to a range of from 0 vu to -5 vu.)

**5.05** For loop facilities with losses ranging from 0 to 11 db, the average input level to the central office equipment will range from -2 vu to -13 vu (Fig. 2). In the recorder, this signal is amplified, and recording and reproducing levels are adjusted to give a level of 0 vu across the amplifier output with the distribution bus disconnected. This results in a -8 vu speech level into connected lines.

### B. Frequency Response

**5.06** The frequency response of the 20-line announcement system is the sum of the characteristics of the announcement equipment, the KS-16547 central office amplifier, and the connecting loop from the answering set location to the office. The KS-16547 amplifier is essentially flat from 200 to 5000 cycles, but the answering set has appreciable roll-off at both upper and lower ends of the band.

**5.07** The response of the announcement equipment is down from its 1000-cycle response about 11 db at 300 cycles and 3 db at 3000 cycles. This determines the overall response of the 20-line system when connected with a loop of zero loss. This response is shown in Fig. 3. When connected with an 18 kf loop of nonloaded 26 gauge cable, the overall response is down from its 1000-cycle response by about 7 db at 300 cycles and 10 db at 3000 cycles. This curve is also shown in Fig. 3. The use of loaded facilities with properly spaced coils in the connecting loop should approach the response of the zero loop condition and such facilities should be used whenever available.

**5.08** The frequency response of the 100-line announcement system is a summation of the characteristics of the connecting loop, the KS-16550 amplifier at the customer's location, the KS-16534 recorder-reproducer at the central office, and the speech network in either the KS-16535-L1 or the KS-16588 coupling unit whichever is used. The KS-16550 amplifier at the customer's location is bypassed when speech input is taken from a

source other than the KS-16504 handset (such as a tape recorder). This amplifier is down from its 1000-cycle response only about 2 db at 300 cycles and 1 db at 3000 cycles so that its use or omission has little effect on the overall characteristic.

**5.09** The overall response of the 100-line system on a zero loop when recording from the KS-16504 handset is down from its 1000-cycle response about 5.5 db at 300 cycles and up 1 db at 3000 cycles. When operated over an 18 kf nonloaded, 26 gauge loop, the response is down about 1 db at 300 cycles and 6 db at 3000 cycles. This overall response is also shown in Fig. 3. As in the case of the 20-line system, the zero-loop response may be approached by the use of properly loaded loop facilities when these are available.

### C. Return Loss

**5.10** The return loss presented by the announcement system to intertoll facilities should be adequate to meet return loss objectives for direct distance dialed and other toll connections. The impedance at the central office presented to the calling line is equivalent to about 824 ohms and 2 MF in series with the low-impedance amplifier output. When computed against a calling line impedance of 900 ohms plus 2 MF, this results in a singing return loss of 28 db at 200 cycles and 27 db at 3000 cycles and higher frequencies. Echo return loss over the frequency band from 500 to 2500 cycles is about 27 db. These values are to be expected in either the 20-line or the 100-line system.

### D. Talk-Through Suppression

**5.11** To reduce attempted communication between subscribers connected to the distribution bus and the resulting interference to the announcement system, the loss between any two such subscribers should be as high as possible. This loss between connected stations consists of the line losses and the shunt suppression provided by the announcement system. This suppression loss is largely dependent on the internal impedance of the output winding of the distribution amplifier and the series resistance in the trunk connection to the bus.

**5.12** In the 100-line system, the conductor resistance from the amplifier output to the bus is limited to a maximum of 4.4 ohms. The impedance back into the amplifier is approximately 0.3 ohm. This results in a calculated loss between two zero

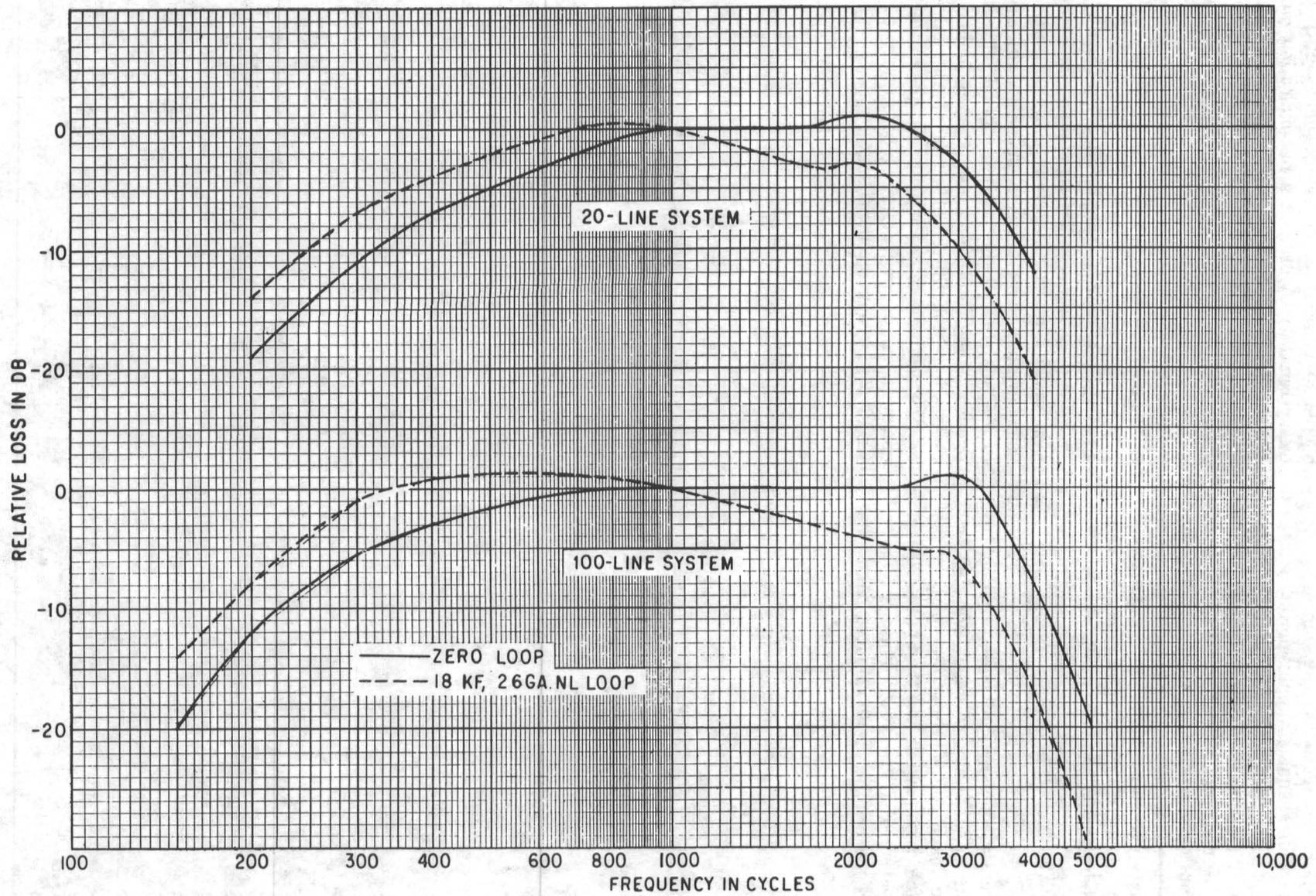


Fig. 3—8A Announcement System—Response Characteristics (Based on 2A Telephone Answering Set)

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loop subscribers connected to the bus of 53 db and should provide adequate suppression.

**5.13** In the 20-line system, the conductor from amplifier to bus is not restricted as to resistance but is expected in most cases to be short. The impedance into the KS-16547 amplifier is approximately 1 ohm. Assuming a short pair to the bus of about 0.5 ohm, the loss between zero loop subscribers should be about 61 db.

### E. Noise

**5.14** The major component of noise in either the 20-line or 100-line system is noise in the reproducing machine. The output noise in the 100-line system is somewhat less than in the 20-line. In either system, that measured noise, exclusive of the telephone loop, is 35 db or more below the

maximum undistorted single-frequency output of the system as measured on a flat indicating meter. Measured with a 2B or 3A noise meter with F1A weighting, the noise should be 40 db or more below the signal.

### F. Flutter

**5.15** In the 100-line system, good speech quality with no appreciable flutter should be obtained from the KS-16534 recorder-reproducer. In the 20-line system using 2A sets, speed variations due to irregularities in the magnetic band drive may result in some flutter and poor speech quality. In cases where the flutter effect is objectionable, it may be desirable to check other 2A units to obtain one with minimum flutter, or to substitute the KS-16765, L1 announcement set.