B S m # 778 B

TELEPHOTOGRAPHY

GENERAL DESCRIPTIVE INFORMATION

FREQUENCY WEIGHTING NETWORK FOR NOISE MEASUREMENTS

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1. GENERAL

1.01 This section describes a frequency weighting network which should be used when measuring steady random noise on telephotograph circuits with a 2-type noise measuring set. Noise which has basic single-frequency components should be measured with a frequency selective type analyzer as described in other sections of the Bell System Practices. The noise limits for telephotograph circuits are contained in other sections of the Bell System Practices.

1.02 This issue supersedes Issue 1 dated January, 1957 and is issued to provide additional test information and clarify the application information.

1.03 This weighting network is used in conjunction with the 2-type noise measuring set using F1A LINE weighting to attenuate the noise frequency components outside the picture band and to weight the noise within the picture frequency band of 1.2 to 2.6 kc in proportion to its interfering effect.

2. DESCRIPTION

2.01 The frequency weighting network used in making noise measurements on telephotograph facilities is a locally assembled item of testing equipment, consisting of two 441-QR 0.25 mf capacitors and one 251-B inductor. This network is shown in Fig. 1.

2.02 The inductor and capacitor listed above are replacement items for the 182-B inductor and 141-QR capacitor of which manufacture has been discontinued. Use of either type in the preparation of the network should prove satisfactory.

3. TEST OF WEIGHTING NETWORK

3.01 In order to be assured that the characteristic of the weighting network is correct, tests should be made to determine its loss at various frequencies.

3.02 Table 1 shows the average loss vs frequency characteristic of a typical telephoto noise weighting network taken between 600-ohm impedances. Manufacturing tolerances may cause deviations from the average value shown. However, these deviations should fall within the values shown in Table 1 following:

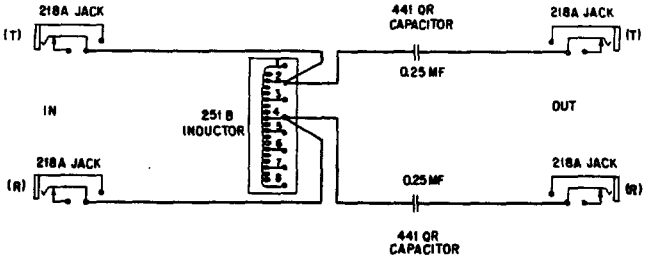

Fig. 1

TABLE 1

Requirements For A Telephoto Weighting Network

FREQUENCY IN CYCLES	AVERAGE LOSS IN DB	PERMISSIBLE DEVIATION IN DB
300	27.2	±1.5
500	20.0	±1.5
800	12.3	±1.0
1000	8.8	±1.0
1500	3.5	±0.7
2000	1.7	±0.5
2500	0.8	±0.5
3000	0.5	±0.3

Should the loss-frequency characteristics of the weighting network not meet the limits given above, the component part causing the deviation should be replaced. Under no circumstance should terminals other than 2 and 4 be used on the 251B inductor.

3.03 Section E40.459.1 outlines a biannual check of the 2-type noise set response vs. frequency. This check consists of measuring single-frequency tones of a 600-ohm impedance variable frequency oscillator with a 2-type noise set arranged for the various weightings. The meter and dial readings of the 2-type noise set are converted into dbm and compared with tables furnished in the section. In addition to checking F1A LINE weighting, a check should be made of the F1A LINE weighting plus telephoto weighting network. The requirements and limits for such a check are shown in Table 2. These limits assume the 2-type noise set arranged for F1A LINE weighting has a frequency response which meets the requirements of E40.459.1 and the telephoto weighting network meets the requirements of Table 1.

TABLE 2

Requirements For 2-type Noise Set Arranged For F1A LINE Weighting Plus Telephoto Weighting Network

FREQUENCY IN CYCLES	AVERAGE POWER IN DBM	PERMISSIBLE DEVIATION
400	—42.0	±3.5
600	—32.5	±2.0
800	—25.3	±2.0
1000	—20.8	±1.0
1500	—17.5	±1.7
2000	—17.7	±1.5
3000	—21.5	±3.3

Fig. 2 illustrates typical response curves of a 2B noise set arranged for F1A LINE weighting with and without a telephoto weighting network.

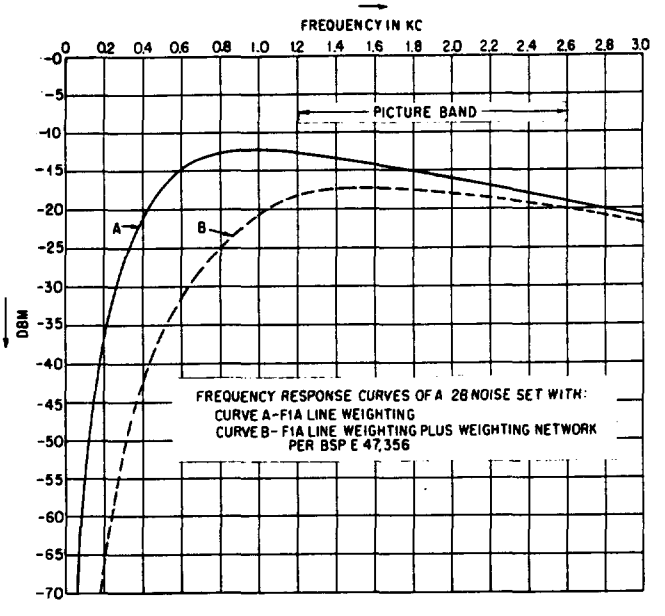

Fig. 2

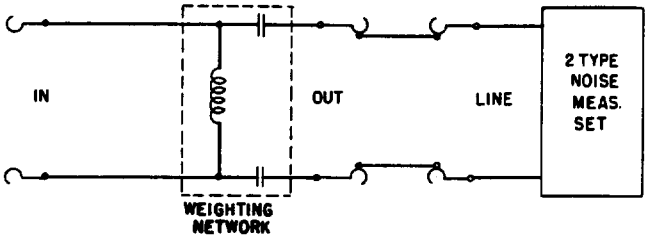

Fig. 3

4. APPLICATION

4.01 Fig. 3 indicates the method of connecting the telephotograph network and 2-type noise measuring set to the facility to be tested. This connection is used to make random noise measurements on all types of telephotograph facilities.

4.02 A meter plus dial reading is derived when a noise measurement is made using the arrangement per Fig. 3. The meter plus dial reading should always be corrected to a zero level indication, i.e. if the arangement per Fig. 3 is connected to a +7 db point, 7 db should be subtracted from the meter plus dial reading. Conversely, if connected to a —16 db point, 16 db should be added to the meter plus dial reading. The zero level meter plus dial reading is an indication of the signal-to-noise ratio. The signal-to-noise ratio for measurements of random noise having a relatively flat spectrum over the voice-frequency band may be determined as follows:

$$X = 90 \text{ db} - 21 \text{ db} - A$$

X = S/N ratio in db

The S (signal) is the picture carrier which is considered 2000 cycles. The N (noise) is random noise having a relatively flat spectrum over the voice-frequency band.

90 db = Amount by which 1 milliwatt (0 dbm) exceeds noise reference (—90 dbm).

21 db = Reduction of the sensitivity of the 2B noise set. This reduction due to:

17.0 db = Reduction in sensitivity of the least affected frequency caused by the telephoto weighting network plus F1A LINE weighting as indicated on Curve B of Fig. 2.

4.0 db = Additional reduction in sensitivity as compared to flat weighting due to the frequencies above and below the least affected frequency being affected more by varying amounts as indicated on Curve B of Fig. 2.

21.0 db

A = The zero level meter plus dial reading of the 2B noise set used per Fig. 3.

Example: A meter plus dial reading of 41 db has been obtained while measuring random noise at a +7.0 db point.

41 db — 7 db = 34 db zero level meter plus dial reading.

$X = 90 \text{ db} - 21 \text{ db} - 34 \text{ db}$

X = 35 db S/N ratio