ANSI/SMPTE 74-1988
Revision and Redesignation of
ANSI PH22.74-1965

# American National Standard for motion-picture cameras—zero point for focusing scales—16- and 8-mm

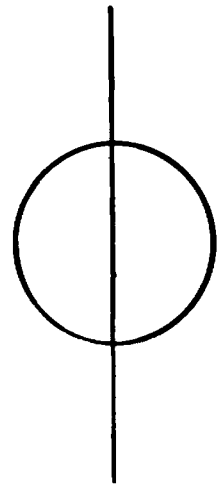
Approved January 11, 1988 Sponsor: Society of Motion Picture and Television Engineers

## 1. Scope

This standard specifies a mark and its location to indicate the film plane on 16- and 8-mm cameras having lenses which can be focused for various object distances.

## 2. Specifications

**2.1** The mark shall consist of a circle crossed by a line which has a length two to three times the diameter of the circle. Such a mark is shown in the figure.



**2.2** The index mark shall be placed on the outside of the camera so that the line across the circle coincides with the film plane in the camera aperture within 0.040 in (1.02 mm).

**2.3** The focusing scales shall indicate object distances from the film plane. Focusing scales made in conformance with this standard may have the words "from film" appear after the word "feet" or other unit designation.





# SMPTE ENGINEERING GUIDELINE

EG 16–1987

## *Measurement Methods for Motion-Picture Camera Acoustical Noise—Field Method*



1. *Scope and Field of Application*

1.1 This guideline provides a simple method for measuring the acoustical noise output of motion-picture cameras in use on the set of a production. The guideline applies to noise occuring in only one circumstance: in front of a given camera in a specific acoustical environment. Thus, the measurements given by this guideline are not comparable with others made in different situations.

1.2 This guideline also gives limits on acceptability of measured camera noise due to the combined effects of the camera and its environment. Methods for reducing camera noise which are practicable on the set are included.

2. *Background*

2.1 This guideline started with a request that the Subcommittee on Audio Production and Post-Production for Motion-Picture and Television Entertainment Programming study the question of making a noise measurement of motion-picture camera noise in a practical way on a motion-picture set. Since neither a simple method, nor a more precise one needed by manufacturers to rate camera noise, existed, this work was undertaken.

2.2 Since measuring sound pressure level at a single point does not adequately characterize the noise of machinery, which may show strong spatial characteristics, reporting sound power level has been adopted in the art for adequate precision in comparing results of different tests. See, for example, ISO 3741-3746.[1] But even the simplest measurement of sound power level is time consuming, requiring mathematical manipulation for spatial averaging, environmental reflections, background noise, and source size.

2.3 This guideline thus standardizes only the measurement positions and type of instrument to be used, with a simple correction for background noise. In addition, it gives advice on how to measure a camera spatially, so that the user can determine whether a full sound power test would reveal markedly different results.

2.4 The importance of camera noise varies greatly from scene to scene and set to set. Often, other noises on the set mask the camera noise, but in quietly played scenes on quiet sets, camera noise can be the most obtrusive noise source. For this reason, a table of acceptability has been included.

3. *Definitions*

For the purposes of this guideline, the following definitions apply:

3.1 Sound Pressure Level, $L_p$, in Decibels: Twenty times the logarithm to the base 10 of the ratio of the sound pressure to the reference sound pressure. The frequency weighting network used shall be indicated; for example, A-weighted sound pressure level, $L_{pA}$. The reference sound pressure is 20 μPa.

3.2 Reference Point: The center of the film aperture in the camera gate.

3.3 Measurement Distance: The distance between the reference point and the measurement point.

3.4 Background Noise: The A-weighted sound pressure level at the microphone position with the camera inoperative.

4. *Acoustical Environment*

4.1 Criteria for Adequacy of the Test Environment. Ideally, the test environment should be free from reflecting objects other than a single reflecting plane so that the source radiates into a free field over a reflecting plane. In practice, measurement to this guideline shows the effects of the environment. No environmental correction factor is applied in order to keep the measurement simple, but users are cautioned that the results are not directly comparable from one situation to another.

4.2 Criterion for Background Noise. At the microphone positions, the A-weighted sound pressure level due to the background noise shall be at least 3 dB below the A-weighted sound pressure level with the source operating. (Background noise levels which are less than 3 dB below the sound level of



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the source to be measured are too high for the purposes of this guideline. Under such circumstances, it is not possible to determine the A-weighted sound pressure level of the source to reasonable accuracy. However, the result determined with higher background noise levels may be useful as an indication of the upper limit of the sound pressure level of the source.)

5. *Instrumentation*

5.1 General. A sound level meter that meets the requirements of *IEC Publication 179, Precision* Sound Level Meters, shall be used switched to the "impulse" characteristic.

To minimize the influence of the observer on the measurements, a cable should preferably be used between the microphone and the sound level meter. The observer shall not stand between the microphone and the source whose sound pressure level is being measured.

5.2 *Calibration.* At least before each series of measurements, an acoustical calibrator with an accuracy of ± 0.5 dB shall be applied to the microphone for calibration of the entire measuring system, including cable, if used, at one or more frequencies. One calibration frequency shall be in the range of 250 to 1000 Hz. The calibrator shall be checked annually to verify that its output has not changed.

6. *Installation and Operation of the Camera*

6.1 General. The camera to be tested shall be installed and mounted with respect to the reflecting plane in the position that is representative of normal use. The camera shall be provided with all noise-control means normally employed, such as any "blimp," "barney," or optical clear-glass filters in front of the lens.

6.2 Auxiliary Equipment. Care shall be taken to ensure that any auxiliary equipment does not radiate significant amounts of sound energy in the test environment in conformity with 4.2. If practicable, all auxiliary equipment necessary for the operation of the device under test shall be located outside of, or acoustically isolated from, the test environment.

6.3 Operation of the Camera During Tests. During the acoustical measurements, the source shall be operated as follows:

(a) with a film load at least similar to the film stock to be used

(b) with each "phase" of perforation engagement, to produce maximum noise by trying each relative engagement between the film and the sprocket teeth in the camera, moving one perforation at a time

(c) with the lens to be used

(d) at each angle that the camera is to be tilted or panned, to find the point of maximum noise

7. *Measurement of Frequency and Time-Weighted Sound Pressure Level*

7.1 Measure the A-weighted sound pressure level with the sound level meter set to "impulse" responding.

7.2 All sound level measurements are made at a distance of 1 meter from the reference point, along lines which extend forward (toward the intended subject) from the reference point.

7.2.1 Make the primary measurement along a line extending 45° upward from the reference point *and parallel to the lens axis. (See Fig. 1.)*

7.2.2 Make four secondary measurements: Make one secondary measurement on the lens axis. Make one measurement on a line extending 45° to the right of the reference point and one measurement on a line extending 45° to the left of the reference point, both parallel to the reflecting plane. Make one measurement on a line extending 45° downward from the reference point and parallel to the lens axis. (See Fig. 1.)

7.3 Corrections for Background Noise. The sound pressure levels recorded at each of the microphone positions shall be corrected for the influence of background noise according to Table 1.

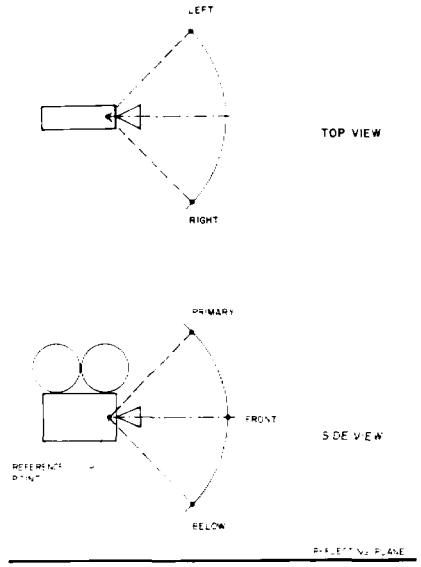


**Fig. 1**
**Measurement Locations**



**Table 1**
**Background Noise Correction**

| Difference between Sound Pressure Level Measured with Sound Source Operating and Background Sound Pressure Level Alone | Correction to be Subtracted from Sound Pressure Level Measured with Sound Source Operating to Obtain Sound Pressure Level Due to Sound Source Alone |
|---|---|
| dB | dB |
| 3 | 3 |
| 4 | 2 |
| 5 | 2 |
| 6 | 1 |
| 7 | 1 |
| 8 | 1 |
| 9 | 0.5 |
| 10 | 0.5 |
| >10 | 0.0 |

8. *Limit on Acceptability*

Limit on acceptability shall be in accordance with Table 2.

**Table 2**
**Limit on Acceptability**

| Situation | Maximum Permissible Sound Pressure Level, $L_{pA}$, Impulse Reading |
|---|---|
| *Quiet dialogue scene in* close up | 25 |
| Medium shot of two or more actors at "average" level | 30 |
| Maximum above which ordinary shooting becomes impaired | 33 |

9. *Means for Reducing Camera Noise*

9.1 Limit the source noise by:

(a) using "blimps," "barneys," and/or addition of an extra optical clear-glass filter in front of the lens or, in the worst cases, sound rooms with optically clear glass

(b) choosing the "threading phase" for lowest noise, that is, engage each perforation of the film in turn, advancing one perforation on each test, to find the lowest noise

(c) minimizing lens radiation by choice of lens

(d) eliminating vibration induced into tripod or floor by use of resilient mounting

9.2 Reduce the effective noise by:

(a) making the environment less reverberant by adding acoustical absorption

(b) moving the camera away from the actor(s) and microphone(s)

9.3 Pick up less of the camera noise by microphone techniques:

(a) use directional microphones, pointing the lowest sensitivity direction of the microphone at the camera, and the highest sensitivity direction at the actor(s)

(b) position the microphone as close to the source and as far from the camera as practical

[1]ISO 3741-1975, Acoustics — Determination of Sound Power Levels of Noise Sources — Precision Methods for Broad-Band Sources in Reverberation Rooms

ISO 3742-1975, Acoustics — Determination of Sound Power Levels of Noise Sources — Precision Methods for Discrete-Frequency and Narrow-Band Sources in Reverberation Rooms

ISO 3743-1976, Acoustics — Determination of Sound Power Levels of Noise Sources — Engineering Methods for Special Reverberation Test Rooms

ISO 3744-1981, Acoustics — Determination of Sound Power Levels of Noise Sources — Engineering Methods for Free-Field Conditions Over a Reflection Plane

ISO 3745-1977, Acoustics — Determination of Sound Power Levels of Noise Sources — Precision Methods for Anechoic and Semi-Anechoic Rooms

ISO 3746-1979, Acoustics — Determination of Sound Power Levels of Noise Sources — Survey Method