INTERNATIONAL STANDARD

ISO 10330

First edition
1992-11-15

Photography — Synchronizers, ignition circuits and connectors for cameras and photoflash units — Electrical characteristics and test methods

Photographie — Interrupteurs synchronisés, circuits d'amorçage et connecteurs pour appareils de prise de vue et sources d'éclairs — Caractéristiques électriques et méthodes d'essai

Reference number
ISO 10330:1992(E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 10330 was prepared by Technical Committee ISO/TC 42, *Photography*.

Annex A forms an integral part of this International Standard. Annexes B and C are for information only.

International Organization for Standardization
Case Postale 56 • CH-1211 Genève 20 • Switzerland

Printed in Switzerland

Introduction

When a camera is used in conjunction with a photoflash unit, the photoflash unit can fail to fire, depending upon the combination. The possible causes include a failure of the camera or photoflash unit, poor electrical contact at the connection between both, and the signal transferred to the photoflash unit for firing it being improper.

Malfunctioning of the synchronization switch in the camera can cause the photoflash unit to be not fired. When a photoflash unit having an ignition circuit of high-voltage and/or high-current type (see B.1) is used with a camera, operating the shutter can produce a spark discharge across the synchronization contacts, resulting in the metallic surfaces of the contacts being deteriorated. With the synchronizer having such a fault, the contact resistance of the contacts is increased, therefore, when a photoflash unit with an ignition circuit of low-voltage and/or low-current type is operated with the synchronizer having such a contact fault, it can fail to fire.

When more than one photoflash unit is connected in parallel and the ignition circuit terminal voltage and polarity for one photoflash unit differ from those for the other(s), the different voltages and polarities can interfere with each other, resulting in a part of the units failing to fire or being damaged. When more than one photoflash unit having an ignition circuit of high-voltage and/or high-current type is connected in parallel, the synchronizer contacts in the camera can become welded, with the result that the synchronizer loses its function as the switch.

With some photoflash units having an ignition circuit of high-voltage and/or high-current type, releasing the camera shutter permits a current as high as several tens of amperes to flow through the synchronization contacts, and depending upon the construction of the camera synchronizer terminals and the handling of the photoflash unit, the operator can be subjected to electrical shock.

To avoid these problems, this International Standard defines the characteristics of the camera synchronizer and photoflash unit.

For information concerning the safety of ignition circuits for use with photoflash units, refer to IEC 491.

This page intentionally left blank

Photography — Synchronizers, ignition circuits and connectors for cameras and photoflash units — Electrical characteristics and test methods

1 Scope

This International Standard specifies the electrical requirements of the camera synchronizer, the ignition circuit in the photoflash unit and the cable to connect these and the test methods to secure positive firing of the photoflash unit.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 516:1986, *Photography — Camera shutters — Timing.*

ISO 518:1977, *Photography — Camera accessory shoes, with and without electrical contacts, for photoflash lamps and electronic photoflash units.*

ISO 519:1974, *Photography — Small flash connections for hand-held cameras — Dimensions.*

ISO 8581:—[1], *Photography — Electronic flash equipment — Connectors to synchro-cord.*

1) To be published.

3 Definitions

For the purposes of this International Standard, the following definitions apply.

3.1 synchronizer: Provided in a camera or shutter unit to fire the photoflash unit in synchronization with the operation of the camera shutter, it consists of synchronizer terminals, a synchronization switch and a circuit which connects these.

NOTE 1 For details of synchronization, refer to ISO 516.

3.2 synchronizer terminals: Part of the synchronizer, these couple the camera or shutter unit with the photoflash unit. The same as the accessory shoe with electrical contacts that is defined in ISO 518 and the socket defined in ISO 519.

3.3 ignition circuit terminals: Part of the photoflash unit, these are connected to the synchronizer terminals to couple the camera or shutter unit with the photoflash unit for permitting firing operation. The same as the foot with electrical contacts that is defined in ISO 518, the plug defined in ISO 519 and the sockets defined in ISO 8581.

3.4 synchronization switch: Switch provided for firing the photoflash unit. It may be a mechanical or electronic switch.

3.5 synchronizer leakage current: Current flowing through the synchronizer when the specified voltage is applied across the synchronizer terminals with the synchronization switch turned off.

3.6 dynamic characteristics of synchronizer: Variation with time of the voltage appearing across the synchronizer terminals when the camera synchronizer is operated.

3.7 ignition circuit: Part of the photoflash unit provided to receive the signal from the synchronizer and fire the electronic flash tube or flash bulb.

4 Requirements

4.1 Polarities for synchronizer terminals and ignition circuit terminals

The polarity of the synchronizer terminals in a camera and that of the ignition circuit terminals in a photoflash unit coupled with the camera are defined in 4.1.1 and 4.1.2. The polarity of the camera synchronizer terminals must be matched to that of the ignition circuit terminals in the coupled photoflash unit. When more than one photoflash unit is connected to a single camera in parallel by use of a device such as an adapter, it is recommended that a reverse current prevention circuit be incorporated in the adapter or the respective photoflash units to avoid an electrical interference of one photoflash unit with another.

4.1.1 For the "camera accessory shoe with electrical contacts" and the "foot of photoflash equipment with electrical contacts" defined in ISO 518, the contact P shown in figure 1 shall be the positive pole, while the surface Q shall be the negative pole and when the photoflash unit is connected to the camera, the potential for P shall be higher than that for Q.

4.1.2 For the "socket and plug in small flash connections for hand-held cameras" defined in ISO 519, the part P shown in figure 2 shall be the positive pole, while the part Q shall be the negative pole and when the camera is connected to the photoflash unit, the potential for P shall be higher than that for Q.

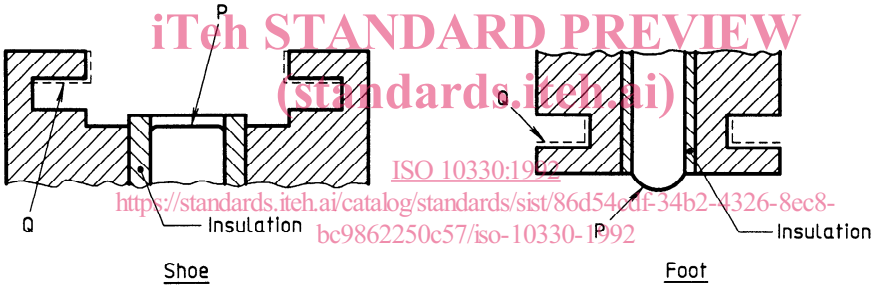


Figure 1 — Polarities for camera accessory shoe with electrical contacts and foot of photoflash equipment with electrical contacts

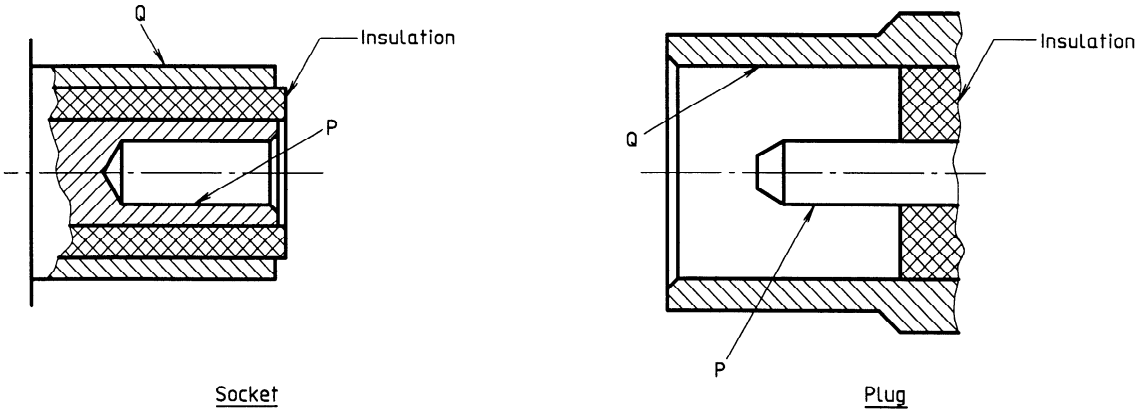


Figure 2 — Polarities of socket and plug in small flash connection for hand-held cameras

4.2 Voltage across and current through synchronizer terminals and ignition circuit terminals

The voltage applied across the camera synchronizer terminals and that developed across the ignition circuit terminals in the photoflash unit shall not exceed 24 V d.c.

NOTE 2 The 24 V d.c. value is the same as the value of the "safety extra low voltage" specified in 8.1 in IEC 335-1:1976.

The synchronization current flowing through the camera synchronizer terminals shall be 100 mA at maximum and the current flowing through the ignition circuit terminals in any one of the photoflash units shall be 30 mA max.

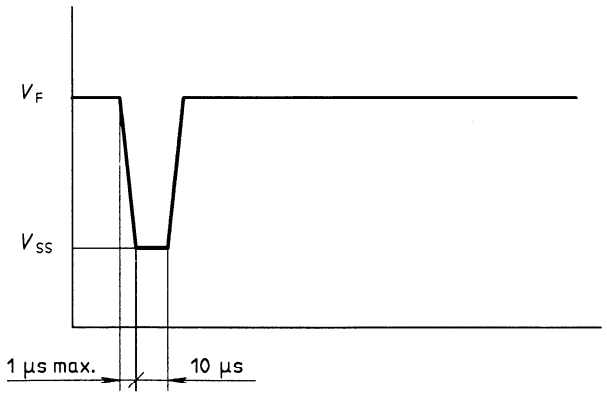
4.3 Ignition circuit operation

When a 4,4 MΩ resistor is connected across the ignition circuit terminals and a pulse voltage as shown in figure 3 is applied across the terminals, the photoflash unit shall be fired.

NOTES

3 The resistance value of 4,4 MΩ is specified in consideration of the synchronizer leakage current and the cable insulation resistance.

4 See A.2 for the requirements for a photoflash unit having an ignition circuit which is equipped with precautions against accidental firing and failure to fire due to noise or chattering of the synchronization contacts.



V_F : Voltage developed across ignition circuit terminals in photoflash unit (24 V d.c. max.)
V_{SS}: 1,6 V

Figure 3 — Voltage waveform across ignition circuit terminals

4.4 Dynamic characteristics of synchronizer

When the camera is operated with a 24 V d.c. power supply and 240 Ω resistor connected across the camera synchronizer terminals in series (see figure 6) and the synchronizer has an electronic switch, then the terminal voltage for the synchronizer shall be maintained at 1,5 V or less until the synchronization switch is turned off (see the continuous thick line in figure 4).

On the other hand, when the synchronizer has a mechanical switch, at least one of the time periods (T_1 to T_n) between the moment the synchronizer terminal voltage reaches 21 V and the moment a time of 150 µs elapses and during which the voltage across the synchronizer terminals is maintained at a value of 1,5 V or less, shall be 10 µs or more (see the broken line in figure 4).

NOTES

5 When the synchronizer has a mechanical synchronization switch, it is desirable that after a time of 150 µs elapses, the synchronizer terminal voltage be maintained at 1,5 V or less over as long a time period as possible.

6 It is desirable that the synchronization switch be opened after the shutter closing operation is started.

4.5 Synchronizer leakage current

When a 24 V d.c. voltage is applied across the camera synchronizer terminals with the camera synchronization switch turned off, the leakage current shall be 5 µA or less.

4.6 Electrical characteristics of cable

4.6.1 Cable resistance

When the cable is short-circuited at one end, the resistance across the terminals at the other end shall be 2 Ω or less.

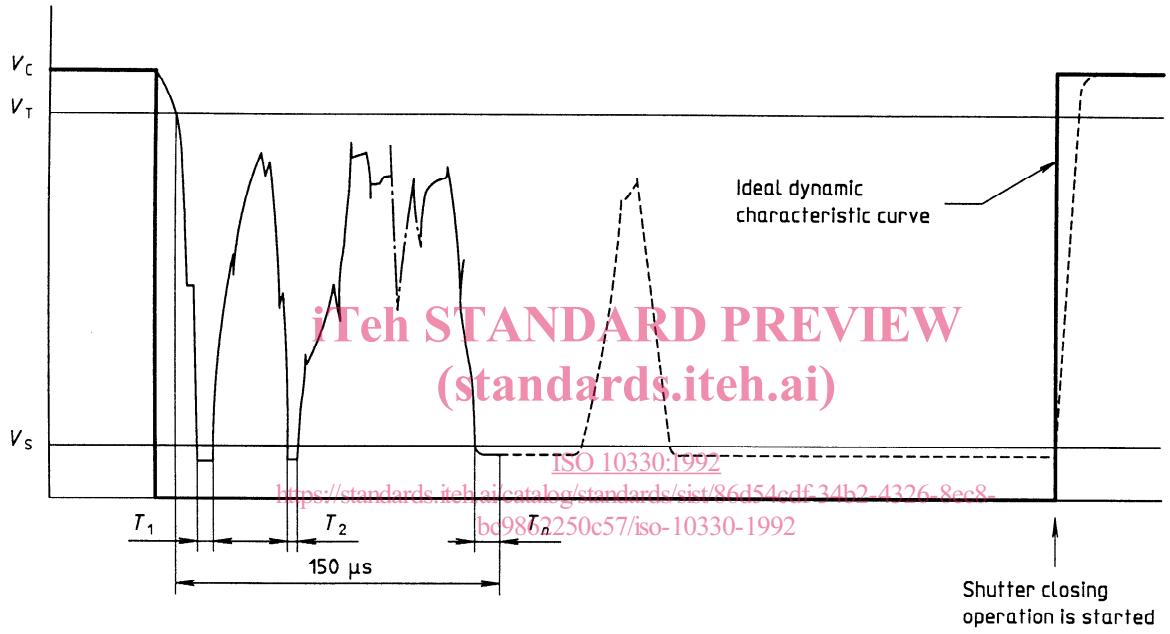
NOTE 7 When an extremely long or special cable is used, it should be checked for inductance and capacitance.

4.6.2 Cable capacitance

The cable shall have a capacitance of 3 000 pF or less.

4.6.3 Cable insulation resistance

The insulation resistance of the cable shall be 50 MΩ or higher at 100 V d.c.



V_C: Testing voltage, 24 V
V_T: Defined synchronizer starting voltage, 21 V
V_S: Upper limit of defined synchronizer on-state voltage, 1,5 V

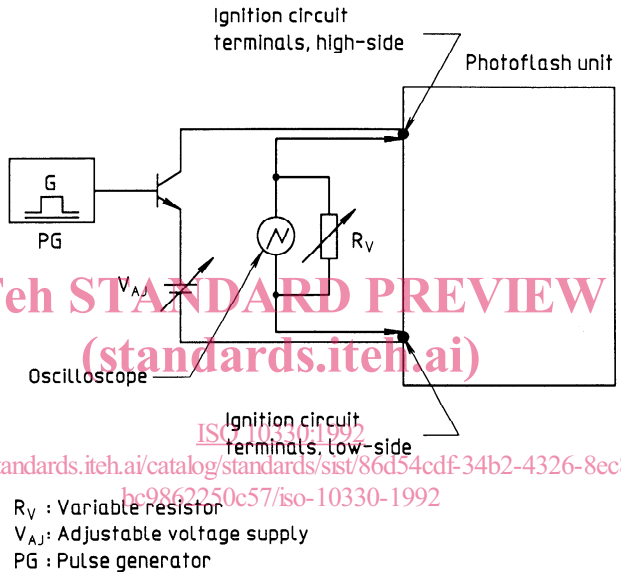
Figure 4 — Dynamic characteristics of synchronizer

5 Test methods

5.1 Ignition circuit operation

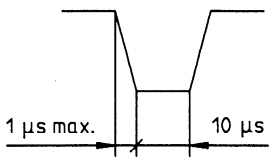
Connect a pulse generator, a variable-voltage type d.c. voltage generator, a transistor switch, an oscilloscope and a variable resistor across the ignition circuit terminals in the photoflash unit as shown in figure 5 a). Adjust the resistance value for the variable resistor (R_V) so that the combined resistance value of the resistance value for the variable resistor (R_V) and the input impedance across the measuring terminals in the oscilloscope connected in parallel with the variable resistor is 4,4 MΩ.

Drive the pulse generator PG with the waveform shown in figure 5 b), adjust the variable voltage supply V_{AJ} so that the value of V_{SS} in figure 3 is 1,6 V, and see if the voltage pulse thus provided fires the photoflash unit.



NOTE — The measuring terminals in the oscilloscope shall be connected directly to the ignition circuit terminals.

a) Test circuit

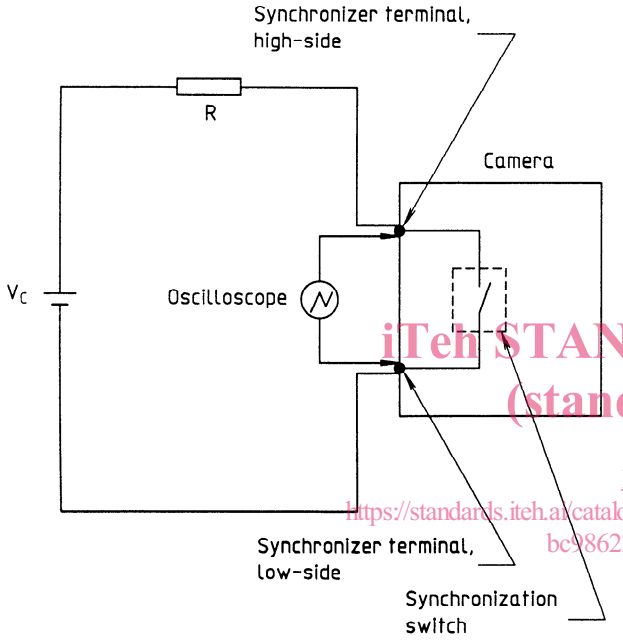


b) Input waveform at ignition circuit terminals

Figure 5 — Ignition circuit operation

5.2 Synchronizer dynamic characteristics

Connect a 24 V d.c. power supply and a 240 Ω resistor across the camera synchronizer terminals in series and an oscilloscope in parallel with these components, as shown in figure 6. Operate the camera shutter, and measure the time period(s) (T_1 to T_n as shown in figure 4) between the moment the voltage across the synchronizer terminals reaches 21 V and the moment a time of 150 µs elapses and during which the synchronizer terminal voltage is maintained at 1,5 V or less.



V_C: d.c. power supply, 24 V
R : Resistor, 240 Ω

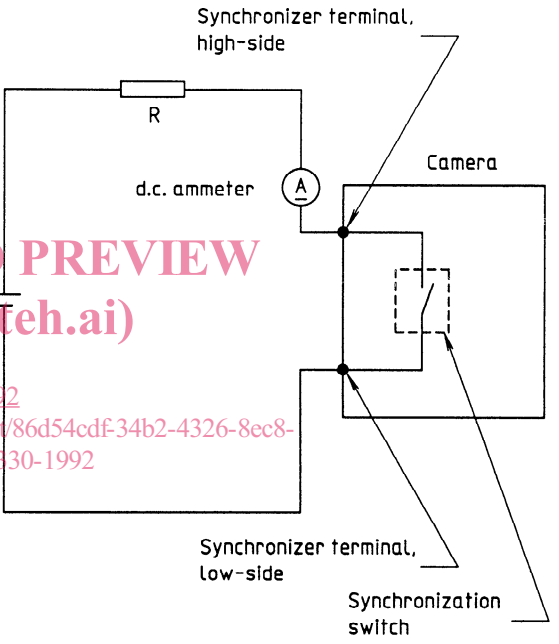
NOTE — The oscilloscope measuring terminals shall be connected directly to the synchronizer terminals.

Figure 6 — Synchronizer dynamic characteristic testing circuit

5.3 Synchronizer leakage current

Connect a 24 V d.c. power supply, a 10 kΩ resistor and a d.c. ammeter in series across the camera synchronizer terminals as shown in figure 7.

Make the camera ready for functioning (complete the shutter cocking, film feed or other necessary set-up operation) and read the ammeter.



V_C: d.c. power supply, 24 V
R : Ammeter protection resistor, 10 kΩ

Figure 7 — Synchronizer leakage current testing circuit

Annex A
(normative)

Requirements and test methods

A.1 Requirements and test method for synchronizers and photoflash units using thyristor type electronic switches

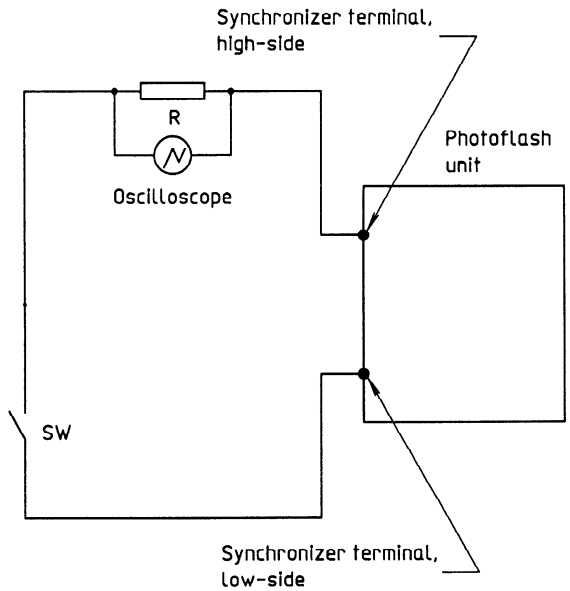
Camera synchronization switches can be divided into two broad general categories: mechanical and electronic. The mechanical synchronization switch consists of contacts made of a phosphor bronze or other spring material which is plated with gold, silver or other metal, while the electronic one consists of a semiconductor device. The thyristor is a typical semiconductor device which is used as the electronic synchronization switch.

Having no contacts, the electronic switch is free from chattering. The thyristor has features including high overcurrent strength, thus it is widely used as the synchronization switch. However, the thyristor is a self-holding type device. Once it is turned on, it maintains the on-state as long as the current flowing through it is over a certain value, and while it is kept turned on, it cannot fire the photoflash unit again.

To eliminate this problem, any photoflash unit for connection to a thyristor type synchronizer shall be designed so that the current flowing after it is fired is 300 µA or less over a time period of 300 µs or longer. To make sure that this requirement is met, the testing circuit as shown in figure A.1 can be used.

For photoflash units which are designed to be connected to the thyristor type synchronizer in parallel, it is desirable that the current per unit is 100 µA or less.

With a camera designed to be used with a photoflash unit with which a higher current flows after firing, the synchronization switch which is turned on by operating the shutter shall be turned off before the set-up for the subsequent shutter operation is completed.



R : Current observing resistor
SW: Testing switch

Figure A.1 — Photoflash unit testing circuit