

## EGN 7B

### Production activities, using up to 6kW of mains power, no electrician present

#### 1 Introduction

This EGN deals with any production activities where up to 6kW of mains electrical power is used indoors or outdoors without the presence of an electrician and where no vehicle with installed electrical equipment is involved.

This EGN covers activities that require the setting up of a temporary electrical distribution and equipment and include particularly Radio 'carry in' and TV single camera shoots using up to 6kW of power and other production activities where this quantity of power may be used. It is a part of a series of documents forming EGN 7 Power Distribution and Rigging on Location and Outside of Permanent Studios.

This EGN replaces all previous safety documentation issued by BBC Safety or the former Engineering Management Safety Committee that related to production activities described above using less than 6kW of power without the presence of an electrician and where no vehicle with installed electrical equipment is involved and under the circumstances set out within this EGN. It does not however, replace documents issued at Divisional or Departmental level, although such documents must neither conflict with nor set standards which are not as rigorous as those given here.

This EGN sets safety standards and procedures and gives guidance for the temporary distribution and use of mains electrical power for these activities. The EGN 7 series is based upon the document 'Risk Assessment for the Temporary Use of Electrical Supplies at Locations' (referred as RATUESL) see: <http://resources.gateway.bbc.co.uk/obtechinfo/Power/BBC-published/RA-temp-power.html> for details. Where appropriate in this EGN, references are made to RATUESL and also to EGN 7 for further information. The activities covered are outlined in RATUESL section 3.3.2.

There are several parts of this EGN that have a close interrelationship with other EGNs including:

- EGN 1 Management of electrical safety
- EGN 3 Residual Current Devices
- EGN 9 Portable appliance electrical safety and testing
- EGN 12 Safety evaluation of locally purchased electrical equipment
- EGN 14 Water and electrical safety: Studios and Locations
- EGN 18 Batteries
- EGN 20 Mains extension leads – use and testing

The use of the words 'temporary', 'temporary systems', 'activities', 'locations and venues', 'locations', 'duty as the electrically instructed person (EIP)' and 'single source of power', have particular meanings and these are as set out in a glossary shown in appendix A2 in sections A2.1 to A2.7.

#### 2 Scope

The activities covered in this EGN include particularly a range of Radio OBs including 'carry ins' and TV single camera shoots. These will cover interviews, newsgathering, documentaries and similar productions, events or other production related activities where:

- the activities take place within the UK; (for foreign working see EGN 13)
- the total power required does not exceed 6kW (5kW in domestic premises) used indoors or outdoors and obtained from an installed electrical system conveniently available at the location, business or domestic premises where the activity takes place;
- no generators are used;
- the crew does not include a competent electrician;
- no vehicles with installed electrical systems are present;

This EGN deals with the management responsibilities and working procedures involved with any aspect of the temporary supply, distribution and use of electrical power for the above activities. Those involved must understand their responsibilities and carry out their duties under the Electricity at Work Regulations and BBC requirements, and must work safely. These requirements apply to the people outlined in section 2.1.

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The use of equipment covered by this EGN will include that owned and supplied by the BBC and also that owned and supplied by others e.g. on hire, see also EGN 9 and EGN 12. Occasions may arise where equipment is provided by others without charge, this is mentioned in section 6.2 and further details are given in EGN 7 section 8.

#### 2.1 People to whom this guidance applies

This guidance applies to people within the BBC and others not permanently employed by the BBC who have a direct or indirect responsibility that includes the temporary distribution and use of electrical power for activities covered in this EGN. The requirements apply to all people working on behalf of the BBC whether they are BBC employees, contractors, freelance or in some other way assisting in the pursuit of BBC interests.

These people will or may include the following:

- 2.1.a. Senior staff who have responsibility for appointing other people who will work on activities where the temporary supply, distribution and use of electrical power is part of their responsibility. *[guidance...]* Such senior people are likely to be producers or news editors and similar people, or others who will be selecting or arranging for crews to be sent out on assignments.
- 2.1.b. Those who are present at and responsible for the activity at any location or venue; *[guidance...]* For the activities dealt with in this EGN it is assumed that one person present at the location will be in charge of the activity and how it is carried out. For these activities this person is likely to be a director, correspondent or journalist; it could be the person described in paragraph 2.1.c. though this is unlikely.
- 2.1.c. Those who will be given the duty of Electrically Instructed Person (EIP) for the provision and use of a temporary electrical system at the location. *[guidance...]* This duty must be given to someone with adequate electrical knowledge and competence, this may be the person operating the camera or sound equipment or other suitable person who will be present for the work.
- 2.1.d. Those who provide or maintain equipment for use on the activities covered in this EGN. *[guidance...]* Those organisations or people who in any way provide the equipment to be used on Single Camera shoots or other production related activities must ensure that it is safe and suitable for the purpose.

### 3 Legislation

The people with the responsibilities and duties outlined in section 2.1 will require an understanding and awareness of the following legislation:

- The Management of Health and Safety at Work Regulations 1999;
- The Provision and Use of Work Equipment Regulations 1998; (PUWER)
- The Electricity at Work Regulations 1989; (EWR)

with particular reference to the parts that deal with the following:

- a. The competence of people employed to carry out duties associated with the provision and use of a temporary electrical system. It is essential that the competence of such people is adequate to cover the complexity of the work they will carry out.
- b. The safety and suitability of equipment involved in the use of any temporary electrical system.
- c. The safety and suitability of the source of power used for any temporary electrical system.

The safety of these systems and their use is highly dependant upon these three aspects. There are further matters that affect the safety of such electrical systems; these are dealt with in EGN 7 section 2 and appendix A1 and also in RATUESL section 2. In addition to the legislation there are two standards that are particularly relevant, these are BS 7671 and BS 7909. See EGN 7 appendix A1.1b.

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#### 4 Hazards and Risks

##### 4.1 Outline of the hazards and risks

The use of mains electrical power in a temporary system has all the hazards and risks associated with the electricity available from a permanently installed system and its use inside the building or elsewhere; these include electrocution, electric shock, burns, fire and explosion. There are additional hazards and risks that include:

- a. The safety and suitability of the source of power at the location.
- b. The safety and suitability of the equipment for the purpose it will be used for.
- c. The possible lack of detailed electrical knowledge of those setting up and using the temporary electrical system.
- d. There may be little time to fully plan the use of power before arrival at the location.
- e. The possibility of high temperatures created by lighting as part of a temporary electrical system, causing burns to people or fires.
- f. The potential for equipment to be knocked over or for people to trip on equipment or cables.
- g. Clear access and exit routes; doorways, particularly fire doors must be not impeded.

There are additional local factors that can vary significantly on each occasion and at each place and these will have their own effects on the hazards and risks. Such factors include the following:

- h. The location: its geographical position; urban or rural surroundings; at petrol stations or similar hazardous zones; near roads, railways, airports, or water; indoors or outdoors. For the use of electricity close to water see EGN 14 Water and electrical safety.  
[guidance...] The reference to petrol stations and hazardous zones, includes the possibility of explosions that could result from a spark caused by switching on or off electrical equipment. This possibility can arise in flammable atmospheres such as petrol vapour, gas, dusty areas such as flourmills or similar, or in mines etc.
- i. The local environment: weather conditions; hot or cold, wet, dry, humid or the possibility of lightning; time of day or night; ease of access and escape.
- j. Presence of others: artists, contributors or crewmembers; owners or occupiers of premises or those present including children in the area being used; any animals.
- k. Time and budget pressures: these may tend to compromise planning, the assessment of risks, or the checking of supplies or equipment.
- l. If HMI, MSR or similar lighting is used the possible risk associated with UV radiation must be taken into account.
- m. Where an activity is to take place at or in a quarry or mine there are special requirements set out in the Electricity at Work Regulations themselves that do not appear in the HSE memorandum of guidance on EWR (see EGN 7 appendix A1.2d.) Such activities must be discussed in advance with the manager responsible for the quarry or mine.

All such hazards and risks must be fully taken into account, competently assessed and measures implemented so that the risks are removed or reduced to a safe level and controlled. As work progresses the ongoing circumstances must be monitored and re-assessed, and revised measures put in place as necessary. This will generally mean considering the possible consequences before taking any action and maintaining an awareness of what is happening around the activity.

##### 4.2 Risk Assessment for the activity

A risk assessment must be produced for the activities covered in this EGN as required in EGN 1 Management of Electrical Safety, section 2. Risk assessments for activities using temporary electrical systems must be completed by the appropriate person and include the electrical aspects of the work. Further general information is given in EGN 7 section 4.

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RATUESL deals with the safety and suitability of the source of electrical power used at locations. The hazards and risks are explained in RATUESL section 4 and possible corrective measures are addressed in section 5; the principle concerns affecting this EGN are that:

- a. The source of power has the correct polarity;
- b. The earth loop impedance is low enough for the protective devices used to operate correctly;
- c. The socket outlets available appear to be in good order;
- d. The equipment is the most appropriate available to use with the type of supply likely to be found at locations visited. [*guidance...*] The electrical inspection and testing of such equipment is dealt with in EGN 9 and EGN 12. Further guidance is given in sections 5.3.k and 5.3.p and q and section 6.
- e. The format of the supply to be used for the temporary electrical system is acceptable. [*guidance...*] For the purpose of this EGN provided the requirements of a. b. and c. are confirmed as satisfactory by test and inspection and any tungsten filament lighting connected to this supply shows a continuous steady unwavering illumination then the supply may be used. However there remains one specific risk that cannot be entirely removed, for this risk to be present the following conditions will need to exist:
  - i. The source of power to be used at a location is in TN-C-S format, this will be the case for a significant and increasing number of premises that may be visited. In the context of this EGN it is assumed that this is the case, as it will be very difficult to show that it is otherwise;
  - ii. The temporary supply from such a source is taken outdoors for use;
  - iii. The equipment using this power outdoors has class 1 insulation, that is it needs an 'earth wire' connection;
  - iv. The public electricity distribution network supplying power to this location has a specific but unusual fault known as a PEN failure. This fault is very rare but does occur, it can show itself through lighting fluctuating noticeably in an apparently random fashion and when other equipment is switched on or off at the premises.

Where all the circumstances in i. to iv. are present it is possible for a person to receive an electric shock at close to 230V between the metallic/conductive casing of any class I electrical equipment they are touching and the ground they are standing upon outdoors. This is true even when there is no fault with the equipment.

RATUESL deals with these issues in sections 4.1, 4.2, 4.3 explaining the risks, and in sections 5.1.3, 5.1.5, 5.2, 5.7.1 and 5.7.2 explaining the possibilities and difficulties of removing the risk from the activities covered by this EGN. RATUESL section 6.1 and its referenced sections deal with the risk assessment of this issue and show the risk of this occurring and causing an electric shock to be 2 in 10 million per year, which is acceptably small for work to proceed.

This particular risk does not occur where the supply format is TT or TN-S, the risk is not present where the supply format is TN-C-S and all the temporary electrical system and equipment is used indoors within the confines of the premises from which the supply is taken, and the electrical system installed in the premises is to BS 7671 (The IEE wiring regulations).

## 5 Management responsibilities

In all cases the principles of EGN 1 Management of Electrical Safety, Management responsibilities, Section 1 Organisation of electrical safety apply. Further general information on the related responsibilities carried by people at different levels is given in EGN 7 section 5.

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People with specific responsibilities or duties related to the use of temporary electrical systems and covered by this EGN are shown with the section where details are given:

- Producers or News Editors or similar having overall responsibility; see section 5.1
- Those present at a location and responsible for controlling an activity covered by this EGN; see section 5.2
- Those assigned the duty of Electrically Instructed Person (EIP) at a location for provision and use of a temporary electrical system for an activity covered by this EGN; see section 5.3
- Other people involved with the activity at a location. see section 5.4
- Those organisations or people providing or maintaining electrical equipment for use on activities covered by this EGN see section 5.5

The people at any of these levels may be BBC employees, contractors or freelance people and they may or may not have worked together on previous occasions. In these circumstances the safety and success of any activity will require that the people selected have an appropriate level of competence, and the ability to work together as a team. In the context of activities covered by this EGN this requires that:

- Everyone involved must be aware of the significance of electrical safety;
- A person with an appropriate level of competence is given and accepts the duty as the EIP on the crew for the use of the temporary electrical system(s).

[*guidance...*] This must be done to properly meet the requirements of ‘BS 7909 Code of Practice for Design and installation of temporary distribution systems delivering ac electrical supplies for lighting, technical services and other entertainment related purposes’. This person must have sufficient competence to deal with the complexity of the temporary supply, distribution and use of electrical power that may be expected at the location and any emergencies that may occur. A very brief overview of BS 7909 is given in appendix A2.7, or see EGN 7 appendix A1.5 and A1.5c in particular for greater detail.

- The organisation or person providing or maintaining electrical equipment for use in the activities covered by this EGN must ensure that such equipment is safe and suitable for the purpose.

#### 5.1 Producers and News Editors

Producers, News Editors and those in similar positions or their deputies who have an overall responsibility for the activities covered by this EGN must ensure that:

- those carrying out the work are competent;
- the equipment provided for their use is safe and suitable for the purpose.

##### a. Appointing a person to the duty of EIP

Any crew assigned to an activity where temporary electrical systems will be used must include one person with the competence to accept the duty of the EIP for a temporary electrical system using up to 6kW (5kW in domestic premises) of power obtained from the location in the conditions that will exist. Producers, News Editors and those in similar positions or their deputies who have overall responsibility and who will assign or deploy crews to such activities must have checked that the person selected has adequate competence before they are assigned to the duty of EIP.

The person assigned this duty must understand the conditions applicable and positively accept the duty. If the duty is not accepted an alternative person should be found who has the competence to accept the duty, or an electrician should be provided. Those with overall responsibility must pay due attention to any advice, risk assessments or working procedures offered by those accepting this duty.

A person accepting this duty must be able to ensure that:

- i. the provision and use of such temporary electrical systems is carried out safely and without risk to people or property.

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ii. all the electrical equipment used in the activity is safe for the purpose and in good order.

Competence for such activities is dealt with in EGN 7 section 7; section 7.5.c deals with the BBC cameras and lighting course, which provides a minimum qualification for the activities described in this EGN. Whilst this EGN deals with activities where no competent electrician needs to be present, it is entirely acceptable and beneficial if such a person is present and accepts the duty of EIP.

**[guidance...]** It is not required that Producers, News Editors and similar are electrically competent or instructed persons themselves, however they must appreciate the importance of working safely with electricity and what is required to achieve this. Temporary electrical systems do increase the risks that may be present, see section 4. Those assigning the duty of EIP to a person must ensure that the views and advice offered by the EIP are upheld and supported by the crew and all those involved with the activity.

Particular note should be taken of section 5.3.d.iv. which describes a case where power is lost and the EIP is unable to take corrective measures themselves, in this case those with overall responsibility for the activity must be informed. Competent assistance, such as an electrician, must be called in to resolve the problem. There is a duty to ensure that the installed electrical system is left in at least as good order as it was found.

Note that if the total electrical load to be supplied exceeds 6kW (5kW in a domestic premises) then an electrician should be taken on and reference should be made to EGN 7C that deals with the use of more than 6kW of power.

#### b. Provision of safe and suitable equipment

Producers, News Editors and those in similar positions or their deputies who have overall responsibility and who will assign or deploy crews to such activities must ensure that the electrical equipment provided for use in the activities described in this EGN is safe and suitable for the purpose. This electrical equipment is typically supplied by others. Any supplier of such equipment must be competent to decide upon the safety of the equipment and its suitability for use under the control of the EIP and that it is maintained in good and safe order. See also sections 5.5 and 6.

**[guidance...]** It is not required that Producers, News Editors and similar are competent to decide upon the safety or suitability of the electrical equipment themselves, however they must appreciate the importance of the safety of the equipment and its suitability to be under the control of the EIP. The supplier should be chosen from one of the BBC's recognised competent suppliers (see also section 6.1.b).

### 5.2 Person present and responsible for controlling an activity at a location

The person present at the location and responsible for controlling the work must ensure that:

- a. Someone competent has accepted the duty of EIP for the temporary electrical systems at the location under the conditions that exist;
- b. Adequate time is allowed for the EIP to make any checks that may be necessary on supplies, distribution or equipment forming the temporary electrical systems;
- c. Due regard is taken of any advice or directions given by the EIP with regard to risk assessments, or working procedures related to the use of the temporary electrical system;
- d. The crew as a whole support such advice or direction for the safe use of electricity so that the risks are minimised.

This person may or may not be the EIP at the location.

### 5.3 Person with the duty of EIP on a crew for the use of temporary electrical systems as set out in this EGN

Those accepting the duty of EIP for the use of temporary electrical systems must understand the conditions involved and, as a minimum, have successfully completed a BBC Cameras and Lighting

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Course or other equivalent course that adequately covers the use of electricity described in this EGN. Others with greater technical knowledge of electrical systems coupled with experience may also carry this duty. Further details are given in EGN 7 section 7. If the person assigned this duty feels that their knowledge and experience is inadequate for the conditions that exist they should acknowledge this and not accept the duty.

Those taking this duty must be able to competently carry out the following:

- a. Consider the detail of the location where the activity will take place, assess any special conditions or risks present that may affect the use of temporary electrical systems. If the conditions or risks are sufficient to prevent the activity taking place this must be clearly stated;

**[guidance...]** The range of conditions and risks that need to be considered is extensive and includes the following:

- The presence or proximity to water;
- The presence of others, including children, not involved with the activity; such as those working in their normal place such as offices, factories, hospitals, etc and including the public in any area;
- The presence of animals, wild or domesticated;
- The presence of walkways or escape routes that may be obstructed by cables or equipment, or where cables and equipment may be damaged;
- Working indoors;
  - The presence of any combustible material that may become heated through the use of electrical power, such as lighting and its proximity to furnishings or ceilings;
- Working outdoors;
  - Working near or on roads, railways, or airports; or at petrol stations or similar hazardous areas;
  - The time of day, daylight or darkness;
  - Weather conditions.

- b. Decide or agree upon the electrical equipment to be used;

**[guidance...]** The equipment must be safe and suitable for the purpose for which it is to be used. When practicable class II insulated mains powered equipment should be used where this is available and suitable; this helps to reduce some of the risks involved with using mains power. Battery operated lighting equipment may be used as this will reduce the risks associated with mains powered equipment. However the use of battery operated lighting can introduce concerns about time and quantity of charge remaining. This may cause work to be rushed and so possibly reduce attention to working safely, which should not be allowed to happen. If mains operated battery chargers are used these should ideally be of class II insulation (see also EGN 18 on batteries).

- c. Work out the total electrical load involved with an activity or part of an activity;

**[guidance...]** The total power used for these activities must not exceed 6kW (5kW in domestic premises) and this should include all lighting and technical equipment as well as any electrical equipment brought by the crew or others involved with the activity. This should be considered the absolute maximum that can be taken from a typical 32A ring main, it should be reduced wherever possible. It may be necessary to plan and schedule the use of power so that these totals are not exceeded. Where mains powered tungsten filament, or discharge lighting (HMI or MSR) is used the maximum load to be switched on at one time is 2kW. Wherever possible lamps should be switched on one at a time as this significantly reduces the chance of tripping the supply. In some areas a local uninterruptible power supply (UPS) may be used to power local equipment. Any socket on this supply should be labelled as supplied from a UPS or be clearly a socket fitted to a UPS unit. Such sockets should not be used; 2kW or more may well overload a UPS in this situation.

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- i. In business or similar non-domestic premises it is reasonable to expect that the installed electrical system is in good order and that evidence of a successful inspection and test should be available if requested. Therefore the 6kW of power could be taken by sharing the power between a minimum of two and preferably three 13A socket outlets. Although it is permitted to have two plugs in a double or triple 13A socket outlet it is preferable that only one plug is used in each. Where 16A Ceeform (aka BS 4343) connectors are used two socket outlets will be required each supplying up to 3kW.
  - ii. In domestic premises the maximum total power used must not exceed 5kW. Every effort should be made to stay well within this limit. The reduction in total power is to allow for domestic circuits that may not be installed to the technical quality that the presence of a 13A socket outlet suggests. This limitation of power will reduce the chance of tripping the supply or causing damage to a domestic circuit that is not of a good standard. The power should be taken from at least two 13A sockets that are not on the same double or triple socket outlet.
  - iii. In some premises legacy 15A and 5A round pin sockets may be found; these should not be used.
  - iv. Adaptors made as one single unit where a 13A plug is integral with two or more 13A sockets must not be used. Power must not be taken from circuits that are essentially for general lighting where an adaptor is being used to allow use for other purposes.  
Adaptor leads to convert from 16A to 13A and vice versa are permitted provided that they do not place a physical load on installed sockets that is greater than a single plug and its lead.
- d. Discuss with the location owners or occupiers and agree which sockets will be appropriate for use and the tests that will be carried out;

**[guidance...]** The owners or occupiers of any premises may have specific reasons why they wish only certain sockets outlets to be used, they may have equipment in operation which they do not wish to be interrupted if the temporary system should cause the supply to trip for any reason, eg an overload.

Many circuits installed since about 1990 already have RCDs installed that may be tripped by equipment used as part of the temporary system. Some domestic premises have a single overall RCD that will trip all the power to the premises leaving everyone without any light or power. This is distressing and could be dangerous to all, including those involved with the activity; re-instating the power can also be time consuming. If this possibility exists ensure that a working battery operated torch or similar is to hand to help in finding and resetting the installed RCD.

**Note** The total power of 6kW (5kW in domestic premises) is close to the maximum power that can be taken from 13A sockets on a 32A ring main or a 16A socket protected by a 16A miniature circuit breaker (mcb) or fuse. In order that such circuits are not tripped needlessly it is important that the following points are noted and considered when taking power from any installed system particularly in domestic premises or where no local electrician is present:

- i. Provided the electrical equipment available for these activities is used as intended and is in good serviceable order then the installed electrical system should not be caused to trip. See also section 6.1.b
- ii. Where a location (particularly a domestic premises) has a 30mA RCD as part of its installed electrical system and a 30mA RCD (as required by section 5.3.1) is used for the temporary electrical system it is generally not possible to judge which will trip first. It is quite possible that it will be the installed RCD that will trip first.
- iii. Care must be taken to schedule the use of electricity so that the total power used is kept well within the limits set by this EGN.
- iv. It is possible that an installed electrical system (particularly in domestic premises) may be tripped or otherwise cease to operate as intended due to the use of power for an activity as described in the EGN. In such a case it is also possible that the EIP may be unable to

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satisfactorily resolve the problem; therefore when necessary the EIP must be able to call upon competent assistance to give advice on restoring the installed system to its normal state. Those with overall responsibility for the activity should be informed of this situation and if attempts to restore the power fail they should call in the services of a local competent electrician.

Hospitals, premises coming under the jurisdiction of local authorities, exhibition halls and similar premises may have their own codes of practice for the use of temporary electrical systems that may have to be complied with. It is possible that evidence of valid PAT testing will be required and that work may only proceed in the presence of a local electrician.

- e. Ask about the general steadiness of the supply, has lighting showed signs of fluctuations in level in recent times;
- [guidance...]** The rare but possible fault in the public distribution described in section 4.2.e can show itself by causing any lights that are 'on' to fluctuate in light output, this will be most noticeable with normal filament light bulbs. If such fluctuations are reported and the test outlined in g. gives suspicious results, the supply at these premises must not be used.
- In the unlikely event that the situation described in section 4.2.e does occur while a supply is in use, then the situation becomes dangerous when power is used outdoors as an RCD does not offer protection. In this circumstance everyone must stand clear of the electrical equipment and the plugs taking power from the installed system should be withdrawn immediately; merely switching off is not sufficient.
- If such circumstances should be present the owners or occupiers of the premises should be advised to report the matter to their electricity supplier for investigation.
- f. Carry out a visual check of the sockets to be used;
- [guidance...]** Any sockets that are cracked, insecurely fitted, appear browned or charred on the surface, and particularly around any opening that will receive a pin of a plug when inserted, must not be used. Sockets that are damp or mounted on or in damp material or wall must not be used.
- g. Carry out a polarity and earth loop impedance test with a Martindale E-Ze check Xtra (EZ150) and correctly interpret the results;
- [guidance...]** This test device is plugged into a 13A socket and automatically performs a polarity test on the supply and an earth loop impedance test and shows the results of this test within certain ranges. Each socket outlet that it is planned to use should be tested in this way. The test device can be used for testing circuits with 16A Ceeform sockets but requires an adaptor having a 16A plug to a 13A socket to achieve this. Information is given in the document 'User Guide for the Martindale E-Ze Check Xtra Socket Tester' on the use of this device and interpretation of the results. This is available at <http://resources.gateway.bbc.co.uk/obtechinfo/Power/BBC-published/Socket-testers.html#user>
- This tester should be used to test the installed socket where power will be obtained and the sockets on any extension lead that is plugged up to distribute the power. If the result is not satisfactory for the installed socket then another socket and/or circuit must be found, if the results show that a fault is within the extension lead then a good lead must be obtained. If the result is satisfactory move to the decision outlined in h..
- h. Decide from the considerations in a. to g. if the supply can be safely used;
- [guidance...]** If the test shows that all is well then the socket(s) may be used. If not it will mean rejecting the socket(s) and circuit tested and seeking others in the premises, or it may mean that the supply at the premises is not useable. If in doubt, do not use.
- i. Prepare any risk assessment that may be necessary or required for the present activity;
- [guidance...]** Given that the conditions and risks identified in a. can be satisfactorily removed, reduced or otherwise safely controlled and that the supply is satisfactory for use, then a risk assessment should be produced to cover the circumstances that exist.

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- j. If the supply is to be used, advise all those involved about any special arrangements that must be implemented for the safety of any people or animals that may be involved or affected, the safety of the premises or the equipment used;
- k. Check the electrical equipment used for the validity of its most recent PAT test information, and visually check for damage;
- [guidance...]** All the equipment whether owned by the BBC, or by a crewmember as part of the service offered or hired from an equipment supplier must show that it has had a formal inspection and test satisfying the requirements of EWR. See section 6.1.c for details.
- The equipment should be visually inspected before use, for any damage that may compromise its safety; if damage is found do not use the equipment.
- l. Plug up the electrical distribution and equipment to be used taking into account the electrical loads involved. A 30mA RCD must be used at each installed socket outlet from which power is taken. (see 'Note' in guidance in section 5.3.d; see EGN 3 for details on RCDs).
- [guidance...]** In some cases the space immediately around the installed socket outlet prevents an RCD being plugged in, provided the socket is in good order, the RCD may be inserted at the end of an extension lead. In this case an RCD should be used on each outlet of the extension lead. The routine use of the test button on RCDs should be followed each time any RCD is used.
- i. Extension leads must not be used to provide more than their rated power (see EGN 20 extension leads); within the scope of this EGN the maximum power for 13A or 16A extension leads is 3kW but many leads fitted with 13A plugs will have a lower rating which must be adhered too. Extension leads are often stored coiled on drums or reels or within storage enclosures; if used in the coiled or stored form they can easily overheat to the point of melting insulation and even fire. Extension leads must only be used when fully extended. Extension leads and equipment must not impede walkways or access and exit routes; they must not create a hazard at any doorways and must not obstruct the correct action of fire doors.
- If plug top or portable power supplies or chargers for lap-tops, mobile phones and similar items are used they must not be covered as they are likely to overheat.
- ii. Any tungsten filament, fluorescent or discharge luminaires that are used must not be placed in any position where heat from the luminaire body or beam may be liable to cause furnishings or other combustible materials to singe or burn. The areas where the greatest danger occurs from rise in temperature are the highest point of the luminaire and above and within the beam from the luminaire. As a guide, information about the minimum clearance between luminaires and other materials is provided on many luminaires. This applies to walls, ceilings and furnishings of all types and includes any materials that may be combustible or damaged by heat. The presence of smoke detectors and sprinkler heat sensors must be taken into account.
- iii. Where tungsten filament, fluorescent or discharge luminaires are used totalling more than 2kW every attempt should be made to switch them on one at a time to limit the high current taken from the installed system on switch-on.
- m. Monitor the electrical system while in use,
- [guidance...]** Where temporary electrical systems are in use changes can occur that need to be monitored. The following are typical of some of the many changes that may occur, all must be monitored:
- i. Check that the electrical equipment is not overheating and that lighting is not causing any damage;
- ii. The progress of the work may mean rearranging or moving the electrical distribution or equipment; first switch off and, if necessary, allow to cool down, re-arrange, check and then re-energise;

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- iii. If outdoors the weather may change, electrical systems may require protection from rain or dampness. Keep electrical equipment and connectors dry in all circumstances;
- iv. It may become dark, consider the distraction caused to road users, railways or others caused by lighting; it may become difficult to see cables or equipment, increasing the risk of tripping;
- v. The work carried out may attract passers-by to watch, or worse to interfere with the activity; Such developments will require reassessment of the risks and possibly changes to working arrangements.
- n. Do not leave any part of a temporary electrical system unattended while it is powered, if unattended switch off and make secure. Whenever a temporary electrical system is powered it must be attended by a competent person able to deal with any problems that may arise.
- o. Advise on and control any risks that may develop as the work proceeds;  
[guidance...] If any changes occur during the progress of the work that may increase the risks associated with the use of electricity, then the crew and all those directly or indirectly involved must be appropriately informed and any changes to control the risks put into place;
- p. Remove from use any electrical equipment that may become faulty and mark it as faulty;  
[guidance...] Any equipment that is found to be, or becomes, faulty during use should be removed from service and labelled as faulty. If possible an indication of the fault should be written on the label to help with repair. Repairs should only be done by the owners or suppliers of the equipment.
- q. Dismantle the temporary electrical system and stow for transport to the next activity or for return to the supplier at the end of use.  
[guidance...] Allow luminaires to cool before de-rigging. While dismantling the temporary electrical system each item of equipment should be visually checked for any damage that may have occurred during use, if anything is found it should be labelled as faulty. Once dismantled, equipment should be tidily repacked or stowed so that it will not suffer damage when transported.

#### 5.4 Other crewmembers

All crewmembers must support and take due regard of the views and advice on safe working arrangements associated with the use of electricity provided by the EIP for the temporary electrical system.

#### 5.5 Organisations or people providing or maintaining electrical equipment for use

Those owning or responsible for the supply and/or maintenance of electrical equipment that will be used for the activities covered in this EGN must ensure that such equipment meets the requirements of EWR and of section 6 and 6.1. This must include due consideration of its safety and suitability for the crews using the equipment bearing in mind that no electrician or electrically competent person will be present.

### 6 Considerations effecting the selection, provision and use of temporary electrical power systems and related equipment

The electrical equipment used may be owned by the BBC, by a crewmember(s) or be provided on hire from a supplier. The equipment selected and used for any activity will become the responsibility of the EIP for the temporary electrical system no matter who the owner is. The EIP must have ready access to the owners/suppliers so that they may be contacted easily in case of emergency or if there is a need to query the safety, suitability, or operation of the equipment.

For general information on equipment see EGN 7 section 6.

#### 6.1 Safety and suitability of the equipment required for the activity.

Whoever owns or supplies the electrical equipment must take due account of the requirements of section 5.5 and ensure that:

- a. Each item of equipment is safe and suitable for the purpose;

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[*guidance...*] The equipment should bear a CE mark and have been competently designed to be safe and suitable for the purpose for which it will be used. See also EGN 12.

- b. Each item of equipment is maintained to be safe and suitable for use;

[*guidance...*] Those responsible for maintaining the equipment must understand its use and be adequately competent to ensure that it is kept in good repair. Equipment should be obtained from one of the organisations, companies or people on an appropriate list of BBC pre-vetted suppliers. See EGN 7 section 6.3.b. and c. EGN 12 gives further information on obtaining equipment; EGN 9 gives information on inspection and testing equipment.

It is important that equipment provided for these activities does not introduce protective conductor currents (aka residual currents, leakage currents) that may tend to trip 30mA RCDs that are part of the installed system in premises used to provide power; (see section 5.3.d). Class I or class II handheld or portable equipment is normally used; the design will typically result in protective conductor current as follows for each item: 0.75mA for handheld or 3.5mA for portable class I, and 0.25mA for class II. Given the relatively few items of electrical equipment\* used at one time it is reasonable that the total protective conductor current introduced into an installed electrical system must not exceed 5mA. This is small enough so that an installed system with a 30mA RCD should not be tripped.

\* - (3 or 4 luminaires, possibly a battery charger, lap-top and a mobile phone charger, sometimes additional electrical equipment for others involved with the production)

As a part of routine maintenance it will be beneficial to check that the protective conductor current of each item of equipment is within its specification and in the order of the figures given above.

- c. Each item of equipment has evidence of passing a formal inspection and test and that the result of this is still valid at the date of use;

[*guidance...*]

- i. This is normally a PAT test and equipment usually has a 'tested label' giving the next retest date; this shows that the supplier believes the last test is still valid. In some cases the 'tested label' only bears the date of the last test. Provided this date is less than 6 months old this can be accepted, if it is more than 6 months old the suppliers should be asked what the period of validity is; if it is 12 months old it is recommended that the equipment should not be used. Some suppliers send a printout of equipment supplied that includes the PAT results, this is acceptable; however such printouts often don't successfully reach the appropriate EIP.
- ii. Martindale E-Ze Check Xtra testing devices have a built in self check routine that is performed before the test results are displayed. These devices are not PAT tested but it is beneficial if they can be periodically tested to check that the results they will give are correct.
- iii. RCDs should have a valid tested label indicating they are performing correctly. See EGN 3 for details of performance testing.
- iv. All equipment selected for use should be visually checked for damage before use.

- d. Wherever possible mains powered equipment should be of class II insulation. This equipment includes such items as battery chargers, luminaires, cameras, monitors, sound equipment etc.

[*guidance...*] The use of class II insulated mains equipment helps to reduce the risk described in section 4.2.e. The benefit of using class II equipment occurs when mains powered equipment is used outdoors. The greatest benefit will be when all mains powered equipment used out of doors is class II; the use of class II equipment indoors presents no problems.

- e. Battery powered equipment satisfies the requirements of 6.1a and b. Reference should also be made to EGN 18 Batteries.

[*guidance...*] The use of battery operated equipment helps to reduce the risks related to mains electric shock because mains electricity is not involved with the equipment when in active use. The occasions where the risk remains are when the batteries are being recharged or the

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equipment running on batteries is used whilst the batteries are still connected to the mains powered battery charger, or in the case of laptop computers and similar, to the plug top or similar portable power supply. Batteries, chargers and related supplies are dealt with in EGN 18.

Normal PAT tests are inappropriate for battery powered equipment and therefore some suppliers do not carry out any formal inspection or test; thus the equipment may not have 'tested labels'. The argument often used for the absence of a formal inspection and test of such equipment is that the risk of electric shock is very small. Some suppliers sadly believe that EWR only applies to mains powered electrical equipment. EWR regulation 4 requires that systems are arranged and maintained so that danger is not caused; battery operated equipment constitutes a system in this context and therefore come under the requirements of EWR. The batteries used by some equipment can deliver sufficient power to overheat the batteries, their internal wiring and anything else that may be involved with a fault in such a system. In this context lighting batteries often at 30V may represent the worst case. Battery packs and belts should be inspected before use to check for damage that could result in overheating or at worst fire or explosion. Battery belts can be dangerous if they overheat for any reason while being worn. Although not a common fault it is possible for a battery pack or belt to overheat from an internal fault without being connected to any equipment. Such a fault may occur by dropping a battery, or by starting to use or recharge it when it is already hot. Most hire organisations when asked about the safety of their battery packs or belts state that they do check these on a regular basis.

#### **6.2 Equipment provided free of charge – its safety and suitability.**

This matter is dealt with more fully in EGN 7 section 8. The occasions where this may occur include demonstrations of electrical equipment that may belong to hospitals, research establishments, manufacturers, museums, and similar organisations; where the equipment will feature as part of the programme. In these circumstances the owners of the equipment should provide someone to be present who is competent to set up and operate the equipment and deal with any other related matters; in this case the owners representative will be responsible for the equipment and their requirements and advice should be followed.

On some occasions electrical equipment may be offered free of charge by someone present at the location believing they are helping those working on the activity whatever it may be. This must not be used unless the person responsible and in control at the location is able to call in their own independent competent person to verify the safety and suitability of the offered equipment. Such an assessment is normally beyond the training and hence the skills of people working on the activities covered in this document.

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## Appendix 1

### Check List

This is a Check List for the electrically instructed person (EIP) on a single camera shoot or other activity using less than 6kW with no electrician present. It may be useful to print a copy for use whenever required.

- A1.1 Check the location, what special electrical hazards or risks exist, can they be removed or adequately controlled for work to proceed? If not, find somewhere else.
- A1.2 What electrical equipment will be needed, use battery powered, or class II insulated mains powered equipment wherever it is possible and available.
- A1.3 Work out the amount of electrical power needed for each aspect of the work.
- A1.4 Discuss with the location owners or occupiers and agree which sockets will be appropriate for use and the tests that will be carried out. Find out about RCDs that may already be installed at the premises, tripping an installed RCD may land everyone in complete darkness. A working battery torch may be useful. (Refer to 'Note' in guidance of section 5.3.d of EGN 7B)
- A1.5 Ask about the general steadiness of the supply; has lighting showed signs of fluctuations in levels in recent times? If no fluctuations reported, then proceed. If fluctuations reported, switch on an installed light (filament type preferably) and see what happens, if it fluctuates be suspicious and be prepared not to use these premises at this time. Consult section 5.3.e in EGN 7B.
- A1.6 Carry out a visual check of the socket(s) to be used. Sockets that are cracked, insecurely fitted or appear browned or charred, or are damp or fixed to a damp surface must not be used.
- A1.7 Carry out a polarity and earth loop impedance test with a Martindale E-Ze check Xtra (EZ150) and correctly interpret the results. If these results and those from A1.5 and A1.6 are acceptable, the socket may be used. If not find another socket on a different circuit and test it.
- A1.8 Decide from the outcome of A1.1 to A1.7 if the supply and premises can be safely used; if all is well proceed; if in doubt do not proceed and seek competent assistance.
- A1.9 Prepare any risk assessment that may be necessary or required.
- A1.10 Advise all involved of any special arrangements required for the safety of any people or animals that may be involved, present or affected, the safety of the premises or the equipment used.
- A1.11 Check the electrical equipment to be used for the validity of its most recent PAT test information, and visually check for damage.
- A1.12 Use a 30mA RCD at each installed socket that is used, plug up the equipment to be used taking into account the electrical loads involved (See reference in section A1.4);  
Use extension leads fully extended, do not cover mobile phone, lap-top or similar power supplies.  
Do not place luminaires close to furnishings or other materials, see luminaire for minimum clear distances. See section 5.3.l in EGN 7B particularly if luminaires over 2kW are used.
- A1.13 Monitor the electrical system while in use, things change as work progresses, check for overheating materials or equipment. If the temporary system is to be altered, switch off at the source before making the changes. Do not leave temporary systems unattended when powered.  
If outdoors, protect equipment from rain or dampness. Consult section 5.3.m in EGN 7B.
- A1.14 Advise others about, and control any risks that may develop as work proceeds.
- A1.15 Remove from use any electrical equipment that may be faulty or damaged and mark it as faulty.
- A1.16 Before de-rigging allow luminaires to cool. When de-rigging the temporary electrical system, check each part for damage, and stow for transport to the next activity or for return to the supplier at the end of use.

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## Appendix A2

This appendix is present in the draft version to include the glossary applicable to the EGN 7 series. It is planned that the final version will have a glossary in EGN 7 only or in a separate referenced 'Glossary' document.

### A2.1 Temporary

In the EGN 7 series of documents the word 'temporary' when used in association with the distribution or use of electrical power has a specific meaning. In its simplest form it means the distribution or use of electrical power for activities that will often only last for a few hours but will require items of electrical equipment to be powered from one or two socket outlets of an installed system. In its more complex forms the time may be as short as a day, but typically will be longer and could extend through days to several weeks with the quantity of electrical equipment increasing significantly. In all cases the electrical distribution and equipment required will be brought to the venue or location, set up, used and removed at the end of the activity.

This arrangement is typical of programme related or broadcasting activities, but can equally apply to other activities outlined in section A2.2.

**A2.1a. Temporary Systems** Where these words are used implying or referring to electrical systems this means the complete temporary electrical system, including the connection to a source of power, the electrical distribution, and the equipment that is powered from the distribution.

### A2.2 Activities

Activities that are typical of those covered by the EGN 7 series and include:

- A2.2a. any programme related or broadcasting activities including news gathering;
- A2.2b. any trials or proving tests for equipment conducted in an environment simulating operational circumstances;
- A2.2c. any demonstrations of technical equipment;
- A2.2d. any exhibitions, promotions, presentations or public facilities provided as part of the BBC's business in premises or at locations that are not occupied by the BBC. Included in these activities are Vox Pop and internet bus (learning zone) facilities.

An activity is seen as the entire production, event, or demonstration. It is not just one job or piece of work associated with setting up an activity.

### A2.3 Locations and venues, or Locations

Locations and venues are those places away from studios that are visited by television and radio productions in the process of making programmes, news gathering, or other similar related broadcasting activities. The use of the words 'location(s)' or 'venue(s)' have the following meanings:

**Location** - as a generality when used on its own covers anywhere that is not a studio or the adjacent rooms associated with a studio. In this context the word location also covers any place that may be a venue.

**Venue** - this is any place set up for specific purposes that may be visited in the course of radio or television productions. It includes sports stadiums, arenas and grounds, exhibition halls, theatres, etc. When used on its own the word 'venue' specifically means these types of places.

Where it is important to recognise specifically that something applies to locations and venues then both these words will be used. In the context of the EGN 7 series of documents a location or venue will also include those places where any of the activities set out in section A2.2 are carried out such as:

- A2.3a. any place that is not a BBC occupied premises;

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A2.3b. a BBC occupied premises where the power is supplied for temporary use in any area that is not a studio or directly related technical area normally used for programme making activities. This includes working outdoors away from a studio; and indoors in corridors, offices or other areas away from a studio or technical area.

#### A2.4 Single or multiple sources of power

In setting up for the temporary distribution and use of electrical power, circumstances may require the power to be taken from a single source or from more than one source. Obtaining power from a single source and using it within the area served by that source makes for simpler arrangements that are easier to manage. The use of two or more sources of power and the use of any source of power outside the area or environment (or equipotential zone (EPZ)) served by that source can introduce additional risks and makes the management of such power more complex. The issues related to the use of single or multiple sources of electrical power are dealt with in BS 7909 Annex C. The term electrical environment is used in BS 7909 and in this EGN and is defined in BS 7909 Annex C paragraph C.1 General in the final note. For the purpose of EGN 7A and EGN 7B only a single installed source of power is considered, the following should be noted.

A2.4a Single source of power. A single source of power is where all power used for an activity is derived from the same source of power. This may be from one or more sockets of an installed electrical system in a house, office, conference room, warehouse, factory, theatre, venue or location so that the line, neutral and earth conductors (cpc) of the supply from two or more sockets on that system have the same electrical characteristics.

[*guidance...*] The electrical supply in one residence may not be the same electrically as that in an adjacent or nearby residence; similarly sockets in two adjacent areas in a warehouse, factory, theatre, venue or location etc may not be electrically the same.

- i. The simplest arrangement to use and control is a single source of power obtained and used within its own electrical environment (or EPZ).
- ii. The next degree of complexity is when a single source of power is taken out of its electrical environment (or EPZ) for use. This occurs when an extension lead is used to take power from premises for use outdoors.
- iii There is an increase in complexity if power from an installed source in one premises is taken for use into adjacent premises. This can introduce additional electrical risks that are outside the scope of EGN 7A and EGN 7B.

#### A2.5 Electrically Instructed Person (EIP)

An electrically instructed person (EIP) will have had adequate training in the setting up and use of the electrical equipment required for the duties they are to perform. This training will include the recognition of the hazards, risks and safety measures associated with the provision of temporary supplies and use of this equipment. A person appointed and accepting the duty of EIP will be responsible for the safe setting up, operation and removal of the temporary electrical systems used in any work within the scope of EGN 7A and EGN 7B. The actual competence of an EIP must be appropriate to the complexity of the work for which they will be taking this duty. The subject of competencies is dealt with in EGN 7 section 7. Where temporary electrical distribution and systems are used it is a requirement of BS 7909 (see section A2.7) that someone will always be present who has sufficient competence to take responsibility for the system. The level of competence needs to match the level of complexity involved with the temporary electrical system. Hence for EGN 7A and 7B where the system is essentially simple; a suitably instructed person will have sufficient competence to take responsibility for the simple systems involved.

#### A2.6 Electrically Competent Person (ECP)

An electrically competent person (ECP) will, as a minimum, be a qualified electrician with experience of electrical systems as covered in the EGN 7 series of documents. A person appointed and accepting the duty of ECP will be responsible for the safe setting up, operation and removal of

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the temporary electrical systems used in any work within the scope of the EGN 7 series of documents. The actual competence of an ECP must be appropriate to the complexity of the work for which they will be taking this duty. The subject of competencies is dealt with in EGN 7 section 7. Where temporary electrical distribution and systems are used it is a requirement of BS 7909 (see section A2.7) that someone will always be present who has sufficient competence to take responsibility for the system. The level of competence needs to match the level of complexity involved with the temporary electrical system. In general the temporary electrical systems covered in the EGN 7 series of documents requires that the ECP is at least a qualified electrician with experience in the use of power in the entertainment industry. But for EGN 7A and 7B where the system is essentially simple; a suitably instructed person will have sufficient competence to take responsibility for the simple systems involved.

#### A2.7 BS 7909

The full title of BS 7909 is 'BS 7909 Code of Practice for Design and installation of temporary distribution systems delivering ac electrical supplies for lighting technical services and other entertainment related purposes'. It is based very closely on BS 7671 the Wiring Regulations but it sets out procedures that allows the entertainment industry to safely set up and use temporary electrical systems in the way the industry requires that are not part of BS 7671.

BS 7909 covers temporary distributions at locations of the size and type normally encountered in film, TV and touring shows etc. The most important requirements of BS 7909 that must be recognised and embraced are that:

- i. a competent person is appointed to take responsibility for the distribution and use of electrical power at the level of complexity that is envisaged;
- ii. the equipment provided to produce the temporary distribution is designed to be adequate for the purpose and is delivered to the venue or location in a fully usable and tested form so that the constituent parts required can be plugged together and checked;
- iii. there is always at least one person present with adequate knowledge and competence to manage the complexity of the system and amount of power that is currently in use.

Fundamental to the requirements set out in BS 7909 is that:

there will always be a person present with adequate competence to manage all aspects of the distribution and use of the electrical power that may be required at the particular time.

#### A2.8 BS 7671

The standard BS 7671 Requirements for electrical installations, often known as the IEE wiring Regulations 16<sup>th</sup> edition deals with the installed wiring of premises.

#### A10 Document Control

Version:	Date:	Amended by:	What was done:	In response to:	Filename:
~02	20/04/2005		Original version. Prepared by D B Roberts and D B Humphries		EGN7B-02.doc EGN7B-02.pdf
~03	11/07/2005	D B Roberts and D B Humphries	Corrections of grammar. Positive statement of Radio activities in sections 1 & 2 Corrected reference to EGN 12 in section section 6.1.b	General comments received, comments from Duncan Smith and Andrew Leslie	EGN7B-03.doc EGN7B-03.pdf

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