

GERT8000-AC Rule Book



AC electrified lines




Issue 7



Module AC

December 2021
Comes into force 04 June 2022

Conventions used in the Rule Book

	Example
A black line in the margin indicates a change to that rule when published for the first time, and will then appear until the module is reissued.	
Green text in the margin indicates who is responsible for carrying out the rule.	
A white i in a blue box indicates that there is information provided at the bottom of the page.	
A rule printed inside a red box is considered to be critical and is therefore emphasised in this way.	

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You will need this module if you carry out the duties of a:

- train driver
- guard
- shunter
- designated person (DP)
- signaller
- crossing keeper
- person in charge of sidings

in AC electrified areas.

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1

Definitions

Bi-mode train

A train that can either provide its own tractive power, or take this from the electrification system on an ac electrified line.

Dual-voltage train

A train that can operate on more than one electrification system.

Electric train

A train that takes its tractive power from the electrification system on an ac electrified line. A bi-mode train that is operating in electric mode will normally be treated as an electric train.

Emergency switch-off

An emergency switch-off is carried out by the electrical control operator (ECO) when it is essential to switch off the electrical supply immediately, when someone is in danger from live overhead line equipment (OLE).

The ECO will switch off the electrical supply to all lines:

- between neutral sections, or
- between a neutral section and the end of an electrified line.

In certain locations, equipment is provided to shorten the area of the emergency switch-off.

Overhead line permit

A permit (known as form C) that is signed and issued by the nominated person (NP) and given to a designated person (DP), who is to carry out work on or near to the OLE.

This permit states exactly what fixed infrastructure electrical equipment is isolated and earthed and on which, or near to which it is safe for the specified work to begin.

If an overhead line permit has been issued, it does not mean train movements have been stopped.

Self-powered train

A train that provides its own tractive power.

Sequential tripping

Sequential tripping is when consecutive electrical sections along a route trip. This is normally caused by a fault on a moving train.

2

Competence

The people responsible: all concerned

all concerned

You must not go on or near the line in an area with OLE unless your regular competence assessment also contains the track-safety rules that relate to lines electrified by the AC overhead system as shown in this module.

Table A of the *Sectional Appendix* shows which lines are electrified by the AC overhead system.

If new OLE is being installed, or an electrified area is being extended, the instructions in this module will not apply until the equipment has been declared live.

You will be told about this in an energisation warning notice.

If you are not sure whether the OLE is live, you must treat it as live and dangerous to life.

3

Dangers of the system

The people responsible: all concerned, driver

3.1 Treating the OLE, pantographs and associated roof-mounted electrical equipment as being live

OLE, pantographs and associated roof-mounted electrical equipment on trains are extremely dangerous. It may be fatal if you touch or go near any of them, or if you allow anything to do so.

You must treat all parts shown in diagram AC.1 (except for the mast or structures) as being live at all times unless they have been made safe as shown in the instructions in this section.

If you have been told that the ECO has given an assurance that the electricity has been switched off, you must still treat any OLE, pantographs and associated roof-mounted electrical equipment as dangerous.

You do not have to treat the OLE, pantographs and associated roof-mounted electrical equipment as being live and dangerous to life if at least one of the following applies.

- If work is to take place on or near to the OLE, an overhead line permit has been issued to state that the OLE has been isolated and earthed.
- If it is necessary for anyone to access a train roof or to work near roof-mounted electrical equipment, the overhead line permit also includes a declaration from the person responsible for doing so that all train and locomotive pantographs and roof-mounted equipment have been isolated and earthed.
- The OLE has been isolated and earthed and an assurance has been received as shown in local isolation instructions.

all
concerned

3.2 Objects on or near to the OLE

all concerned

You must treat broken or displaced wires and anything attached to, or near to, the OLE as live and dangerous to life.

You must not remove or approach anything attached to, or near to, the live OLE.

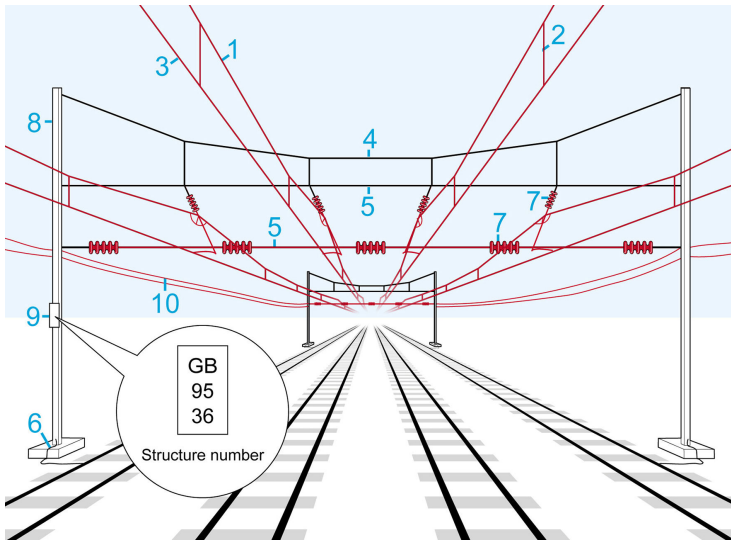
You must not try to remove or approach an object hanging from, in contact with or close to the OLE, unless you have been specially trained and authorised to do so.

driver

If you see anything in the OLE that could cause damage if it comes into contact with the pantographs on your train, you must immediately lower the pantographs.

You must stop the train as soon as possible and report the incident to the signaller.

When you have told the signaller, you will not have to tell the ECO, as the signaller will do this.



all
concerned

Diagram AC.1

Typical OLE construction

AC electrified lines

all
concerned

1	Catenary wire	6	Structure bond
2	Dropper	7	Insulators
3	Contact wire	8	Mast or structure
4	Headspan wire	9	Structure number plate
5	Cross span wires	10	Along-track conductors

3.3 Reporting objects and defects

all
concerned

You must make sure the following are reported to the ECO immediately. If you do not normally speak directly to the ECO, you should report it to the signaller.

- Objects that have been thrown onto, are hanging from, or are otherwise touching the OLE.
- Damage to the OLE.
- OLE that is smoking, excessively flashing or fusing.
- Broken or displaced along-track conductors.
- Broken or displaced wires connected to the OLE.
- Damaged or loose automatic power control (APC) track inductors.
- A broken or parted rail.
- A broken or defective bond, in which case you must state the colour of the bond.

You must not touch the rails if they are broken or parted, neither must you touch a broken or defective bond, nor any equipment connected to the bond.

If the damage or defect will affect the safe operation of trains, you must first report this to the signaller.

3.4 Reporting defects to the signaller

You must make sure that a damaged, loose or malfunctioning APCO balise, or a missing sign associated with power changeover locations, is reported to the signaller.

If the damage or defect will affect the safe operation of bi-mode trains, you must make sure that all drivers of bi-mode trains are told about this before they pass over the balise.

all
concerned

signaller

4

Personal safety

The people responsible: all concerned

4.1 When not working on traction units or other vehicles

You must make sure, you and anything you are carrying are no nearer than 2.75 metres (9 feet) from live OLE, pantographs and associated roof-mounted electrical equipment on trains unless both the following conditions apply.

- The specific conditions in your company instructions have been met and the precautions to manage danger from live OLE, pantographs and associated roof-mounted electrical equipment on trains are in place.
- You are carrying out the precautions shown in your company instructions.

all
concerned

4.2 When working on traction units or other vehicles

You and anything you are holding must never go above the cant rail level and you must not climb above the floor level of the driving cab, or climb on the roof or open upper deck of a vehicle, or on the steps giving access to the roof of any vehicle unless one of the following applies.

- You are on a line where there is no OLE above or adjacent to the vehicle.
- The OLE has been isolated and earthed as shown in Network Rail instructions. An overhead line permit has been issued that states this, and also that all train and locomotive pantographs and roof-mounted equipment have been isolated and earthed.
- The specific conditions in your company instructions have been met and you carry out the specified precautions required to manage danger from the OLE, pantographs and associated roof-mounted electrical equipment.
- Local isolation is allowed, and you are sure that the OLE is isolated and earthed and an electrical safety document has been issued where required in the applicable local isolation and earthing instructions.

You must carry out the following activities only at authorised locations where company instructions are in place and you carry out the specified precautions to manage danger from live OLE, pantographs and associated roof-mounted electrical equipment.

- Cleaning the outside of carriages by hand.
- Cleaning vehicle ends, traction cab windows and destination indicators.
- Loading or unloading open rail wagons by hand.
- Loading or unloading single-deck car-carrying vehicles.

Hosepipes must not be used for cleaning purposes. Each brush or other appliance used for cleaning must have an electrification warning sign.

all
concerned

all
concerned

4.3 Using long items

You must carry out the precautions specified in your company instructions to manage danger from live OLE, pantographs and associated roof-mounted electrical equipment, including taking extreme care when:

- holding and moving long items
- using brake sticks and shunting poles
- selecting and using the correct type of electrically-insulated ladders.

You must carry long items horizontally and, if necessary, get other people to help you.

5

Communicating with the ECO

The people responsible: all concerned

5.1 Directly or by another person

You can contact the ECO, or you can ask another person, such as the signaller, to contact the ECO on your behalf.

all
concerned

If another person asks you to contact the ECO, you must make sure that you get the necessary information from that person before speaking to the ECO. You must also get any other information that the ECO asks for.

5.2 Identifying yourself and the location

When contacting the ECO, you must state:

- your name, job title and employer
- the line or lines concerned
- the location (for example, the nearest bridge, station, signal, block marker or other structure)
- the number on the nearest OLE structure or identifying plate (this will tell the ECO exactly where you are)
- the telephone number or radio call number (whichever you are using) so that the ECO can contact you, if necessary.

all
concerned

If the ECO gives you a message identification number, you must state it each time you speak to the ECO.

6

Emergency switch-off

The people responsible: all concerned, driver, guard, PICEE, signaller,

Note: An emergency switch-off of the OLE does not mean that train running has been stopped.

6.1 Immediate actions

6.1.1 Types of incident

all
concerned

You must immediately contact the ECO (or arrange for this to be done) if you become aware of:

- a derailment
- a lineside fire
- a fire on a vehicle or train
- a person in contact with or in danger of coming into contact with the OLE
- an incident or other emergency requiring, or likely to require, the electricity supply to be switched off.

If you receive a message from another person about an emergency, you must pass on all this information to the ECO.

6.1.2 Reporting the emergency

When you contact the ECO, you must first say, 'This is an emergency call'.

all
concerned

You must tell the ECO:

- the reason why you want the electricity to be switched off
- whether any person is in danger from live OLE
- whether the emergency services are waiting to give assistance.

If you are not at the site, you must relay information from the ECO to the site and from the site to the ECO.

6.1.3 Additional instructions for train crew

If it is necessary to protect an obstruction on a line other than the one your train is travelling on as shown in section 43 of module TW1 *Preparation and movement of trains*, you must do this before asking for the electricity to be switched off.

driver,
guard

6.1.4 Additional instructions for signallers

If you become aware of an emergency, you must carry out the appropriate train signalling regulations before asking for the electricity to be switched off.

signaller

AC electrified lines

6.2 Further actions

**all
concerned**

You must stay in contact with the ECO or, if you have reported the incident through another person, stay in contact with that person until you have been assured that:

- the electricity has been switched off and the OLE has been made safe to be approached but not touched, or
- other arrangements have been made.

If the ECO agrees to the emergency switch-off, the ECO will decide who will be regarded as the person in charge of electrical emergency (PICEE).

If you are a person passing on this information on behalf of someone else, you must stay in contact with the ECO until an assurance has been given that one of these arrangements has been put in place.

6.3 Managing the emergency switch-off

PICEE

If you are appointed by the ECO as the PICEE, the ECO will tell you the limits of the emergency switch-off.

You must identify yourself to anyone arriving on site.

If the emergency services arrive on site, you must tell the officer in charge from each emergency service about the presence of the OLE and which parts have been switched off.

The ECO will tell you before shortening the area of the emergency switch-off. You must tell everyone at the site about the new limits.

If passengers are to get out of a train which is not at a platform, you must make sure that all passengers are kept clear of the OLE.

If you hand over the responsibility of the emergency switch-off to someone else, you must tell the ECO immediately. You must give the name, job title and employer of the person taking over from you.

PICEE

When you take over the responsibility of the emergency switch-off, you must immediately confirm the arrangements with the ECO.

As soon as the emergency is over and the affected section can be switched on, you must warn everyone involved that the electricity is about to be switched on and make sure they are clear of the OLE.

You must then tell the ECO that the emergency is over and wait for further instructions.

If the emergency will go on for a long time or it will be necessary to issue an overhead line permit, the nominated person (NP) will contact you when arriving on site.

You and the NP must both contact the ECO so that responsibility for the emergency switch-off can be transferred from you to the NP.

7 | Rescuing a person

The people responsible: all concerned

**all
concerned**

The OLE must be isolated and earthed before you attempt to rescue a person that is within 2.75 metres (9 feet) from the OLE, pantograph or associated roof-mounted electrical equipment unless you are sure about all of the following.

- The person is alive and can be reached from ground level.
- An emergency switch-off is in place.
- The person is more than 600 mm (2 feet) away from the OLE, pantograph or associated roof-mounted electrical equipment and anything touching it.
- You or anything you are holding will not come within 600 mm (2 feet) of the OLE, pantograph or associated roof-mounted electrical equipment and anything touching it.

8 Isolation of the OLE

The people responsible: all concerned

Note: An isolation of the OLE does not mean that train running has been stopped.

When a section or sub-section of OLE has been isolated, you must continue to treat it as being live until:

- an overhead line permit has been issued, or
- where local isolation instructions allow this, the OLE has been isolated and earthed and an assurance received as shown in the local instructions.

**all
concerned**

9

Overhead line permits

The person responsible: DP

9.1 Issuing an overhead line permit

DP

When the NP has made sure that the OLE has been isolated and earthed, the NP will hand you an overhead line permit.

You must understand:

- the working limits on the overhead line permit
- where live equipment is adjacent to, or crosses over, earthed equipment, which equipment is live and which is earthed
- the issue of the overhead line permit does not mean that train movements are stopped on the lines concerned.

You must sign the overhead line permit to show that you understand the conditions. You must then make sure that each person you are responsible for fully understands the conditions shown above before you allow work to start.

9.2 During the work

DP

You must keep the overhead line permit until:

- work is completed and you and those you are responsible for are clear of the line, or
- you are relieved by another DP, in which case you must hand the overhead line permit to that person and both sign it.

You must tell the new DP about the conditions shown in section 9.1 of this module.

If you are the new DP, you must tell the NP (either directly or through the ECO) that you have taken over the duties of the DP.

You must immediately tell the NP if you have lost your overhead line permit. The NP will arrange to issue you with another overhead line permit, endorsed 'Duplicate'.

DP

9.3 Changes of personnel within the work group

If other personnel for whom you are responsible come on duty, you must make sure that each person coming onto the site of work after the overhead line permit has been issued, fully understands the conditions shown below before allowing them to start work.

DP

- The working limits on the overhead line permit.
- Where live equipment is adjacent to, or crosses over, earthed equipment, which equipment is live and which is earthed.
- Whether trains are continuing to run on the lines concerned and, if so, the arrangements that have been made for the protection of staff.

9.4 When the work is suspended or completed

When the work is suspended or completed, you must make sure all personnel and materials are removed from, and are no closer than 2.75 metres (9 feet) from, the OLE.

DP

You must then:

- instruct each person for whom you are responsible to treat the OLE as live and dangerous to life
- complete the overhead line permit
- give the overhead line permit to the NP who will countersign it.

If you have lost your OLE permit, you must tell the NP. You must carry out a visual inspection with the NP to make sure that all personnel and materials are clear of the OLE.

10

Blocking sidings to electric trains if local isolation is not allowed

The person responsible: person in charge of sidings

10.1 Blocking sidings to electric trains

person in
charge of
sidings

When an isolation is needed in the sidings, you must consult Operations Control or the signal box supervisor or signaller as shown in the local instructions.

You must then arrange with the ECO for the isolation to take place.

Operations Control, the signal box supervisor or the signaller will contact you and tell you:

- the numbered message received from the ECO
- the electrical sections or sub-sections to be blocked as shown in the isolation instructions
- the agreed time of the isolation.

You must record the message in Part 1 of Form AS.

You must make sure all personnel working in the sidings are told about the limits of electric train movements.

You must make sure that either:

- reminder appliances are placed on or adjacent to levers of hand points that control access to the sidings to be isolated
- hand points controlling access to the sidings to be isolated are clipped and padlocked for other routes that are not affected by the isolation
- the protection arrangements shown in isolation instructions are applied.

If the points are controlled from a shunting frame or panel, you must place reminder appliances on the appropriate levers and make a suitable entry in the authorised document.

person in
charge of
sidings

You must complete Part 2 of Form AS and attach it to the authorised document.

You must then tell Operations Control or the signal box supervisor or signaller as shown in the local instructions, when you have done this.

10.2 When the isolation is no longer needed

When the isolation is no longer needed and all personnel working in the sidings have been told that normal working will be resumed, you must arrange with the ECO to cancel the isolation.

person in
charge of
sidings

Operations Control, the signal box supervisor or signaller as shown in the local instructions will contact you to complete Part 3 of Form AS.

You may then remove the protection applied to the sidings.

If the points are worked from a shunting frame or panel, you must remove any reminder appliances and make a suitable entry in the authorised document.

11

Electric trains moving to or from non-electrified lines or lines blocked to electric trains

The people responsible: driver, signaller

11.1 Towards an isolated section

signaller

You may authorise the movement of an electric train or a bi-mode train operating in electric mode if it becomes necessary to:

- go beyond the signal or block marker protecting an isolated section or sub-section towards the limiting point as shown in isolation instructions
- make an unsignalled movement towards the limiting point as shown in isolation instructions.

However, you must be sure that the approach to the isolated section is protected by a possession limit board (PLB) and three detonators, 20 metres (approximately 20 yards) apart at the limiting point.

11.2 To and from non-electrified lines

driver

You must make sure that all pantographs are lowered before moving an electric train or a bi-mode train operating in electric mode to or from a non-electrified line or through a non-electrified crossover.

11.3 A line blocked to electric trains

If a portion of line is blocked to electric trains, and it is necessary for an electric train or a bi-mode train operating in electric mode to be assisted to, through or from that section of line, or a bi-mode train is to operate using its own tractive power, you must:

driver

- lower all pantographs
- tell the driver of the assisting train when this has been done
- keep all pantographs in the lowered position throughout the movement
- keep the APCO equipment on a bi-mode train isolated throughout the movement
- disregard all lineside signs associated with a traction changeover
- not resume ac electric traction mode until you have arrived at or passed either the location the signaller has told you about or the locations indicated by signage.

Lineside signs will be provided if the location is designated as a permanent changeover location, or if a temporary changeover location is not at an easily identifiable location.

11.4 Wrong-direction movements by a bi-mode train

driver

If it is necessary for a bi-mode train to make a wrong direction movement past a location where traction changeover is necessary, you must keep the APCO equipment isolated throughout the movement.

If the train begins the movement in electric mode, you must lower all pantographs before reaching the end of the OLE.

If the train begins the movement using its own tractive power, you must not raise any pantographs until you are sure that all pantographs are beyond the start of the OLE.

You must carry out the same instructions if the train reaches another traction changeover point before the wrong-direction movement is completed.

12

Driver's instructions following a loss of line light, ADD operation, tripping or damage to the OLE

The person responsible: driver

12.1 When a train must be stopped as soon as possible

If any of the circumstances shown in 12.1 a), b) or c) of this module apply, you must:

driver

- operate the pantograph down button, if you are driving a train with a pantograph in the raised position
- stop the train immediately
- report the incident to the signaller.

a) Damage to the OLE

If you become aware of:

- something on the OLE that could cause damage if it came into contact with a pantograph or any other part of a train
- any damage to, or anything that appears unusual with, the OLE
- any unusual noises from, or movement of, the OLE.

b) ADD operation

If the automatic dropping device (ADD) on your train has operated, except if there is more than one pantograph raised on the train, the ADD operates but the line light does not go out.

driver

c) The line light goes out

If the line light goes out and you have made one attempt to reset, which was not successful, and either of the following applies.

- The only pantograph in use is not on one of the first three vehicles.
- There is more than one pantograph in use on the train.

12.2 When the train can continue to a suitable location

driver

If the line light goes out, you can continue to a suitable location, if possible, and then report the incident to the signaller in the following situations.

- There is only one pantograph in use and it is on one of the first three vehicles.
- The ADD is not isolated and has not operated.
- There is no unusual movement of, or noises from, the OLE.
- You have made one attempt to reset, which was not successful.

You can also do this if, when there is more than one pantograph raised on the train, the ADD operates but the line light does not go out.

12.3 When the train can continue normally

driver

If the line light goes out, you can continue normally if:

- the ADD is available but has not operated
- there is no unusual movement of, or noises from, the OLE
- you can reset at the first attempt, or the line light is restored
- you can regain power.

12.4 Sequential tripping or tripping

driver

If the signaller tells you that your train may have caused sequential tripping or tripping, you will be told whether you need to visually examine the OLE and all the pantographs on your train for signs of damage.

If you can check without leaving the train, including by using a pantograph camera or any other closed-circuit television equipment on the train, and you do not see any damage, you must tell the signaller.

The signaller will tell you if you need to leave the train to check for any damage to the OLE, a pantograph or the train. You must tell the signaller whether you consider the conditions at your location to be darkness or that you may have difficulty in getting a clear view of the pantograph or OLE owing to conditions such as fog or bright sunlight.

The signaller will tell you when you can leave the train.

Before you leave the train, you must make sure that there is no damaged OLE in the vicinity of the door through which you would leave the train. If there is, you must tell the signaller and stay in the train.

If it becomes dark or visibility becomes worse while you are carrying out the examination, you must:

- stop the examination
- tell the signaller
- wait until the signaller tells you that the OLE has been switched off before you continue with the examination.

You must continue to treat the OLE, pantographs and associated roof-mounted equipment as being live and dangerous.

driver

If there is evidence that something other than a pantograph has been in contact with the OLE, or that a pantograph is damaged, you must tell the signaller.

| 12.5 Telling the signaller

driver

In all cases when you have stopped the train, you must tell the signaller:

- what has happened
- the location of the incident
- the location where the train has stopped
- the nearest OLE structure number, if you can see this from the train.

If you can already do so, you must also tell the signaller:

- the extent of any damage to the OLE
- if there is any damage to a pantograph.

If you can check for damage without leaving the train, including by using a pantograph camera or any other closed-circuit television equipment on the train, and you do not see any damage, you must tell the signaller.

The signaller will tell you if you need to leave the train to check for any damage to the OLE, a pantograph or the train. You must tell the signaller whether you consider the conditions at your location to be darkness or that you may have difficulty in getting a clear view of the pantograph or OLE owing to conditions such as fog or bright sunlight.

The signaller will tell you when you can leave the train.

Before you leave the train, you must make sure that there is no damaged OLE in the vicinity of the door through which you would leave the train. If there is, you must tell the signaller and stay in the train.

If it becomes dark or visibility becomes worse while you are carrying out the examination, you must:

driver

- stop the examination
- tell the signaller
- wait until the signaller tells you that the OLE has been switched off before you continue with the examination.

You must continue to treat the OLE, pantographs and associated roof-mounted equipment as being live and dangerous.

12.6 Examining the train or OLE

If you have stopped your train because the line light has gone out, the ADD has operated or you have become aware of damage to the OLE, and you have been asked to examine the OLE and all the pantographs, you must tell the signaller whether you can see any damage.

driver

If you have stopped your train as a result of the line light going out or the ADD operating, but you find a fault on the train other than damage to a pantograph, you must tell the signaller so that normal working can be resumed.

If your train is a bi-mode train and, after the train and OLE have been examined, you can continue using the train's own tractive power, you must tell the signaller. If the signaller authorises you to proceed, you can change to self-powered mode if this is necessary, and continue the journey if it is safe to do so.

12.7 Providing electric train supply when the train cannot proceed

driver

If the train cannot proceed because of damage to the pantograph but the damage is not severe, the pantograph may be raised to supply electrical power. This is so that equipment such as train heating and lighting will be available while waiting for an assisting train.

Immediately after raising the pantograph, you must check that it is correctly in contact with the OLE and that there is no arcing.

No movement of the train is allowed with the pantograph raised. You must make sure the pantograph is lowered before the assisting train is attached.

12.8 Isolating the ADD

driver

If it becomes necessary to isolate the ADD, you must:

- isolate the ADD as shown in the instructions for the type of traction concerned and your company instructions
- tell the signaller
- carry out the instructions you are given.

When the train is to proceed with the affected pantograph raised, you must not exceed 100 mph (160 km/h) until the pantograph has been examined and the ADD reset. You may be instructed not to exceed a speed lower than 100 mph (160 km/h) for some or all of the journey.

Where possible, you may be told to use another serviceable pantograph, or if the train is a bi-mode train, to continue using the train's own tractive power.

13

Signaller's instructions following a report of a defect or tripping of the OLE

The person responsible: signaller

13.1 If tripping, a loss of line light, ADD operation or suspected damage to the OLE is reported

If the ECO tells you that sequential tripping or tripping has taken place, you must stop the train involved (or arrange for this to be done if the train is no longer in your area of control).

signaller

If you receive a report of a line light going out, the ADD operating or possible damage to the OLE, you must protect any line that may be affected, as shown in the train signalling regulations.

13.2 Examining the train or OLE

You must find out whether the driver can provide information about the cause of the incident without leaving the train.

signaller

You must agree with the ECO whether the driver needs to examine the train for evidence of contact with the OLE or damage to a pantograph, or whether someone else will do this.

You must tell the driver whether they will need to leave the train to examine it for evidence of contact with the OLE or damage to a pantograph.

You must find out from the driver, or anyone else who is going to carry out an examination whether they consider the conditions at the location of the train to be darkness or whether it would be difficult to get a clear view of the pantograph or OLE owing to conditions such as fog or bright sunlight.

AC electrified lines

signaller

You must ask the driver of a train passing on an adjacent line to tell you if they can see any damage to the OLE at the location where the train is standing.

You must not tell the driver to leave the train, or allow anyone else to carry out the examination until the OLE has been switched off, unless at least one of the following applies.

- It is daylight and the person who is to carry out the examination considers that it will not be difficult to get a clear view of the pantograph or OLE.
- It has been confirmed that there is no damage to the OLE at the location where the train is standing.

You must tell the driver when they can leave the train to examine the train for damage to the OLE, a pantograph or the train. If the examination is to be carried out by anyone else, then you must tell that person when the examination can start.

You must tell anyone carrying out an examination of the OLE, pantograph or the train to tell you when the examination is complete and whether any damage was seen.

If the driver tells you before leaving the train that there is damaged OLE in the vicinity of the door through which they would leave the train, the driver will stay in the train, and you must tell the ECO.

If you are told by the person carrying out the examination that they have stopped the examination because it has become dark, or difficult to get a clear view of the OLE, pantograph or the train, you must tell the ECO that it will be necessary to switch off the OLE.

When the ECO tells you that the OLE has been switched off, you must tell the person undertaking the examination of the OLE pantograph or train that they can continue the examination.

13.3 Arranging a switch-off

If it is necessary to switch off the OLE, you must:

signaller

- reach a clear understanding with the ECO about the area that would be affected by an emergency switch-off
- agree with Operations Control when the switch-off can take place, taking into account whether electric trains that would be affected can be cleared from the affected area or held in stations.

13.4 After the train and pantographs have been examined

If the examination shows evidence that something other than a pantograph has been in contact with the OLE or a pantograph is damaged, you must tell the person who carried out the examination to:

signaller

- visually examine the OLE immediately behind the train
- tell you if there appears to be any damage.

You must tell the ECO the outcome of the examination and carry out the instructions you are given.

If you are told that there is damage to a pantograph or the OLE, you must:

- come to a clear understanding with the ECO about the lines which the OLE will be examined on and the type of examination that will be carried out (see section 14 of this module)
- report the incident to Operations Control.

If the driver tells you that the ADD has operated and has been isolated, you must pass on this information to Operations Control.

13.5 If a driver reports a fault on the train

signaller

If tripping has taken place or a driver reports a loss of line light or ADD operation, but at any stage confirms there is a fault on the train, you may resume normal working.

This does not apply if the driver reports there is damage to a pantograph.

13.6 Resuming normal working

signaller

If tripping has taken place or a driver stops to report a loss of line light, you can resume normal working if the ECO tells you that no further action is needed.

However, if the ECO tells you that examination of the OLE is needed, you must:

- protect the affected lines as shown in the train signalling regulations
- come to a clear understanding with the ECO about the lines on which the OLE is to be examined and whether examination will be carried out by train or on foot
- arrange for the OLE to be examined as shown in section 14 of this module.

13.7 Bi-mode trains

signaller

If the train is a bi-mode train and the driver tells you there appears to be no damage to the train, and it is possible to regain traction using the train's own tractive power, you may authorise the movement if it is safe to do so. You must tell the ECO before the movement begins.

You must authorise the driver to proceed forward using the train's own tractive power and signal the train normally.

You must tell Operations Control.

If the train is to return to electric mode, you must agree with the driver a suitable and recognisable location to do so.

signaller

14

Instructions for examining the OLE

The people responsible: driver, responsible person, signaller

14.1 When the OLE must be examined

signaller

The OLE must be examined following:

- a tripping of the OLE when the ECO asks you to arrange examination of the OLE - the OLE must be examined between the locations the ECO gives you
- a sequential tripping of the OLE - each affected electrical section must be examined up to the location where the train came to a stand
- a driver reporting an ADD operation - the OLE must be examined from the location where the ADD operated to the location where the train came to a stand
- a report of damage to the OLE involving a train - the OLE must be examined from the location of the reported damage to the location where the train came to a stand
- a report of damage to the OLE with no train involved – the OLE must be examined at the location of the reported damage.

14.2 Examining the OLE using a train

14.2.1 How the OLE is to be examined

signaller

The OLE can be examined from a train on the affected line or an adjacent line.

If it is examined from an adjacent line and no defect is found, you must tell the driver of the next electric train over the affected line to proceed at caution and not to exceed 20 mph (30 km/h).

If the main type of support is not headspan, only the affected line needs to be examined.

Where the main type of support is by headspan, the OLE must be examined on all lines following:

- a sequential tripping of the OLE
- tripping of electrical sections on more than one line
- a driver reporting an ADD operation
- damage to the OLE being reported.

signaller

If a train on an adjacent line is used for this, you must also ask the driver to establish whether it is safe for trains over the affected line to pass, if the trains are able to operate using the train's own tractive power, or to coast under the OLE with pantographs lowered.

If you are asked to examine the OLE, you must:

- be accompanied by a competent person during darkness, poor visibility or where there is a tunnel in the affected section
- proceed at caution and not exceed 20 mph (30 km/h) and look out for any damage or other problem with the OLE.

driver

The signaller may also ask you to establish whether it is safe for trains over the affected line to proceed using the train's own tractive power or coast under the OLE with pantographs lowered.

In this case, you must check that:

- any obstruction is not more than 150 mm (6 inches) below the contact wire
- not more than two consecutive droppers have come off
- the object or defect is more than three OLE structures away from a tunnel or overbridge
- no other defect is obvious.

14.2.2 If a train can operate using its own tractive power or coast with pantographs lowered

If you are sure that all of these apply, you must tell the signaller that you believe it is safe for a train over the affected line to proceed using its own tractive power or coast under the OLE.

AC electrified lines

signaller

If the driver considers that a train can coast or proceed using its own tractive power through the affected area, you must get an assurance from the driver that:

- any obstruction is not more than 150 mm (6 inches) below the contact wire
- not more than two consecutive droppers have come off
- the object or defect is more than three OLE structures away from a tunnel or overbridge
- no other defect is obvious.

You must get a clear description from the driver of the exact location name or description that can be used so a driver, who is to coast under the defective OLE, can recognise it.

You must then deal with following trains, that are to pass over the affected line, as shown in section 15.4 of this module.

14.2.3 If after the examination trains cannot pass

If after the examination it is found that trains cannot pass through the affected area, you must arrange for the OLE to be examined by OLE personnel.

14.2.4 If no object or defect is found

If after the examination it is reported there is no obvious damage to the OLE, you may allow normal working to resume on all lines with the exception of the following.

- If the examination was carried out from a train on an adjacent line, you must tell the driver of the next electric train on the affected line to proceed at caution and not exceed 20 mph (30 km/h).
- If the examination was as a result of an ADD operation or reported damage to the OLE, you must stop each train on the affected line and instruct the driver to proceed at caution and not to exceed 20 mph (30 km/h).

You must continue to do this until the OLE has been examined by OLE personnel, as shown in section 14.4 of this module.

14.3 Responsible person arriving on site

When you arrive on site, you must establish whether the object or defect to the OLE is such that trains, including trains with pantographs lowered, can run or continue to run safely through the affected area.

responsible
person

If trains can run or continue to run but electric trains must coast with the pantographs lowered, you must decide whether the driver can easily identify the location. You must take account of the weather conditions and any other factor that may make this difficult.

If you believe it will be difficult for the driver of each train to easily identify the exact location, you must make sure that the following boards are erected.

20 mph (30 km/h) pantograph signs



Lower
pantograph



Raise
pantograph

14.4 OLE personnel examining the OLE

When the OLE is to be examined by OLE personnel, you must not resume normal working until the examination has been completed and this person tells you it is safe to do so.

signaller

15

Moving trains after an OLE incident

The people responsible: driver, signaller

15.1 When a pantograph has been damaged and there is no other pantograph available

driver

If, after you have lowered the pantograph, it cannot be used because of damage, the train may be assisted forward at reduced speed to the first location where the pantograph can be dealt with.

You must give the signaller an assurance that the damaged pantograph is clear of any possible contact with the OLE.

However, you must not move the train until a competent person has carried out the necessary repairs if:

- the clearance between the damaged pantograph and the OLE cannot be assured, or
- the damaged pantograph is foul of the loading gauge.

15.2 When a pantograph has been damaged but another is available or the train is a bi-mode train

driver

If the train has an undamaged pantograph, or is a bi-mode train that is able to move forward using its own tractive power, you may allow the train to proceed after any damaged pantograph has been dealt with as shown in section 15.1 of this module.

15.3 When a damaged pantograph cannot be dealt with or there is evidence that the train has contacted the OLE

If the damaged pantograph cannot be dealt with as shown in section 15.1 or any part of the train or its load has been in contact with the OLE, you must only allow the train to move if one of the following applies.

- The OLE has been switched off and you have received authority from a member of OLE personnel for the train to be moved to a location away from the OLE for the defect or damage to be repaired.
- You have been told that the defect has been repaired or made safe for the train to move.
- The train must be moved in an emergency.

driver,
signaller

15.4 Allowing trains to coast at 20 mph (30 km/h) with pantographs lowered

Following an examination of the OLE, if you receive an assurance that it is safe to do so, you may allow all trains, including electric trains with pantographs lowered, to pass under objects or defect to the OLE as shown in section 14.2.2.

signaller

You must identify a signal that can be maintained at danger or a block marker at which the route can be closed, which is a sufficient distance from the affected area that will allow a train to reach 20 mph (30 km/h) before arriving at the affected area.

Trains already beyond this signal or block marker must be dealt with individually. You must ask the driver of any electric train if they can reach enough speed to coast with pantographs lowered through the affected area.

signaller

You must stop each train at this signal or block marker and explain to the driver:

- there is a problem with the OLE
- the location name and description of the affected area
- if the affected area will be identified by 20 mph (30 km/h) coasting signs.

You must then instruct the driver:

- to lower pantographs if fitted, in enough time to make sure that the train coasts through the affected area at not more than 20 mph (30 km/h) with the pantographs lowered
- that the pantographs, if fitted, must not be raised until the driver is sure all pantographs on the train are clear of the affected area
- to obey all signals or indications on the driver machine interface (DMI).

When the driver has confirmed that all instructions have been understood, you may clear the signal or issue a Movement Authority (MA).

You must make sure that the route is clear through the affected area so that the driver will not encounter any signal at danger or an end of authority.

driver

Following an examination of the OLE, the signaller may allow all trains, including electric trains with pantographs lowered, to pass under objects or defect to the OLE.

The signaller will tell you:

- there is a problem with the OLE
- the location name and description of the affected area
- if the affected area will be identified by 20 mph (30 km/h) coasting signs.

driver

The signaller will then instruct you:

- to lower pantographs, if fitted, in enough time to make sure that the train coasts through the affected area at no more than 20 mph (30 km/h) with the pantographs lowered
- that the pantographs, if fitted, must not be raised until you are sure all pantographs on the train are clear of the affected area
- to obey all signals or indications on the DMI.

When the signaller is sure that you have understood all the instructions, the signaller will clear the signal or issue an MA for you to proceed.

You must make sure that all pantographs, if fitted, are lowered before coasting through the affected area.

You can raise the pantographs when you are sure all the pantographs have passed the affected area.

You may then proceed normally.

15.5 Allowing trains to coast at up to permissible speed with pantographs lowered

High-speed coasting signs



Advance lower
pantograph



Lower
pantograph



Raise
pantograph



Do not raise
pantograph

Conditions for using high-speed coasting

signaller

When there is planned engineering work, damage to the OLE or a failure of the power supply preventing the normal passage of electric trains, but the line is otherwise suitable for trains to pass, you may allow electric trains to coast through the affected area, as long as the following conditions are met.

- You have been given authority to use high-speed coasting by the competent person appointed by Operations Control to oversee this procedure.
- You will be able to make sure the line is clear throughout the affected area before allowing each coasting movement to start.
- The electric train is not planned to stop within the affected area.
- There are no high wind conditions.
- There is no poor visibility.

Allowing trains to coast

When you have been told that all the high-speed coasting signs are in position and you know the locations of the 'lower pantograph' and 'raise pantograph' signs, you may allow trains to proceed towards the affected section as long as you have told the driver of each electric train:

- high-speed coasting of electric trains is taking place between the two locations concerned
- the location of the 'lower pantograph' sign
- the location of the 'raise pantograph' sign.

You may continue to do this until the damaged or isolated section is again in order and you have been told the high-speed coasting signs have been removed.

Driver's actions

When the signaller has told you that electric trains are to coast and you are aware of the location of the 'lower pantograph' sign and the 'raise pantograph' sign, you may proceed normally towards the 'lower pantograph' sign.

driver

An 'advance lower pantograph' sign will be positioned approximately 400 metres (440 yards) on the approach to the 'lower pantograph' sign. You must lower all pantographs before reaching the 'lower pantograph' sign.

You may lower pantographs at any speed.

You must not then raise the pantograph until you are sure all pantographs on the train have passed beyond the raise pantograph sign.

You may raise pantographs at any speed up to 80 mph (130 km/h) or at a higher speed if authorised by your company instructions.

A 'do not raise pantograph' sign will be placed at the end of the safe pantograph raising area. If, for whatever reason, you have not raised the pantograph by the time you pass the 'do not raise pantograph' sign, you must reduce the speed of your train to 20 mph (30 km/h) before attempting to raise the pantograph.

High-speed pantograph lowering and raising signs missing or defective

You must tell the signaller immediately after passing through the affected area, if necessary stopping the train specially, if you see any of the high-speed pantograph lowering and raising signs are missing or any light is out on the 'advance lower pantograph' sign.

You must report the defect to Operations Control.

signaller

Until the defect has been put right, you must warn drivers of all electric trains that are to approach the affected section.

15.6 Bi-mode trains

driver,
signaller

You can carry out the instructions in sections 15.4 and 15.5 for a bi-mode train operating in electric mode.

You can agree that the bi-mode train will operate in a self-powered mode instead of coasting.

driver

In either case you must:

- lower all the pantographs on the train
- keep the APCO equipment on the train isolated throughout the affected area until you reach the location where you are allowed to raise the pantograph.

16

Preventing damage or danger from on-train equipment overheating

The person responsible: driver

If you become aware of any serious defect or the electrical equipment overheating, you must immediately lower all pantographs and stop the train.

driver

If lowering the pantograph cures the fault, you must:

- isolate the defective equipment, or
- if this is not possible and the train has more than one traction unit, isolate the pantograph on the defective unit and raise any servicable pantograph on the rest of the train
- isolate the APCO equipment on the train if provided.

If you cannot lower the defective pantograph and there is still a fault, you must tell the ECO or arrange for this to be done so that the electricity can be switched off on the appropriate section of OLE.

17

Electric trains driven off the contact wire

The person responsible: driver

driver

If an electric train has been driven off the contact wire with any pantograph raised, you must arrange for the incident to be reported to the ECO.

You must not move the train back under the OLE until a competent person has examined all the pantographs and, if necessary, all affected ones have been secured in a safe position.

18

Defective automatic power control (APC) track inductor or APCO balise

The people responsible: driver, signaller

18.1 APC inductor: Signaller's actions

If you see, or are told about, a loose, defective or broken APC track inductor, you must immediately report it to the fault control.

signaller

If the defective APC track inductor is on the approach side of a neutral section, you must stop each affected train and tell the driver to shut off power when passing through the neutral section.

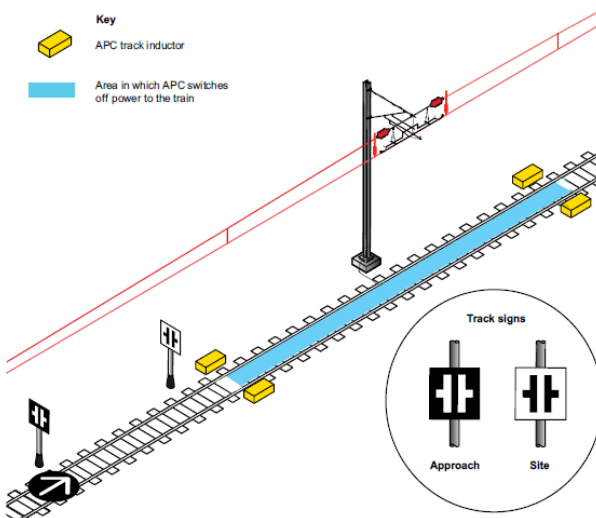


Diagram AC.2 Arrangement of signs and APC track inductors for a typical neutral section

18.2 APC inductor: Driver's actions

driver

When you have been told about a defective APC track inductor, you must shut off power immediately before entering the neutral section.

18.3 Defective APCO balise

signaller

If you see, or are told about, a loose, defective or broken APCO balise, you must immediately report it to the fault control.

If the defective APCO balise is on the approach to an electric to self-powered changeover location, you must stop each affected train and tell the driver to manually change to self-powered mode at the pantograph lower sign.

driver

When you have been told about a defective APCO balise, you must make sure that you change to self-powered mode at the pantograph lower sign.



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