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No-3/1984

To all Chief Fire Officers

4 April 1984

Dear Chief Officer

A. HOME OFFICE FIRE SERVICE INSPECTORATE - VACANCY
B. MANUAL OF FIREMANSHIP AND SLIDES FROM BOOK 12
C. EXPOSURE OF FIREMEN TO SMOKE DURING TRAINING
D. TRAINING IN THE USE OF HIGH EXPANSION FOAM
E. PROCEDURES FOR INCIDENTS ON RAILWAY PROPERTY
F. REVERSING FIRE APPLIANCES
G. MINIATURE DETONATING CORD

For the sake of economy I am incorporating in this letter a number of topics which I wish to draw to your attention. To facilitate handling I have set each out on separate sheets.

There are no significant cost or manpower implications arising from any part of this letter.

Yours sincerely

pp P H DARBY

FIR/83 548/2/1 - A
FIR/80 7/6/19 - B
FIR/82 620/13/4 - C & D
FIR/83 620/33/5 - E
FIR/83 620/33/1 - F & G

D. Training in the use of high expansion foam

15. Guidance in the operational use of high expansion foam was given in Dear Chief Officer letter No.31/1970. The letter suggested that firemen should, from time to time, carry out exercises totally immersed in high expansion foam under suitable training conditions (although it was not specified what these should be).

16. Dear Chief Officer letter No.31/1970 has now been cancelled and replaced by Section D of Dear Chief Officer letter No.6/1983 which concerns measures to be considered when high expansion foam is used. The Joint Training Committee have now recommended that this letter should be supplemented by the following advice on training.

17. Training involving immersion in foam must be closely supervised. Immersion should be for a few minutes only and take place not more frequently than twice a year. Those involved must be fully briefed beforehand on the likely effects of immersion. They should wear breathing apparatus and enter the training area in pairs. The training should be carried out at ground level in an area of about 9 square metres (eg the ground floor of a drill tower or a sectioned off area of a smoke chamber), and the foam should be not more than 2 metres deep.

18. The following precautions should also be taken:

a. A hosereel with a spray should be charged and readily to hand to break down the foam if necessary. Dry powder extinguishers may also be used to produce a rapid breakdown.

b. A small diameter line for signalling purposes may be used (this could also provide an opportunity for exercising signals by line).

c. Trainees should be encouraged to perform minor tasks, such as searching for a piece of equipment.

d. When communications equipment is available, the opportunity should be taken to exercise its use.

e. The value of occasionally adopting a squatting position to experience the effect of deep immersion should be borne in mind.

f. Following immersion, all residual foam on uniforms should be hosed or brushed off.

g. Trainees should wash any exposed parts of their body (usually only the hands and neck will be in contact with the foam).

ANNEX B TO DEAR CHIEF OFFICER
LETTER NO 3/1984

CENTRAL FIRE BRIGADES ADVISORY COUNCILS
FOR ENGLAND AND WALES, AND FOR SCOTLAND

JOINT COMMITTEE ON FIRE BRIGADE OPERATIONS

FIRE SERVICE PROCEDURES FOR INCIDENTS ON RAILWAY PROPERTY

HOME OFFICE
FIRE DEPARTMENT

MARCH 1984

CONTENTS

FIRE SERVICE PROCEDURES FOR INCIDENTS ON RAILWAY PROPERTY

I INTRODUCTION

1. This guidance is in two main parts. The first (paragraphs 5-26) describes the terminology, equipment, and organisation of railway systems. The second (paragraphs 27-63) sets out considerations to be taken into account to ensure safe working at railway incidents. The main recommendations are aimed at establishing the conditions in which an incident should be tackled with least risk to fire service personnel, railway staff and members of the public, and to indicate the relevant safety precautions. The guidance also indicates where responsibility lies for implementing the various procedures.

2. Particular importance must be placed on pre-planning and the development of working relationships at local level between brigades and railway management. This is essential in order to achieve familiarity with local topography, local variations in equipment and details of local organisations. On this basis brigades can develop greater confidence in the application of procedures for trains to be stopped, or to have operations restricted in accordance with the procedures recommended. The guidance is intended for general use country-wide. It does not therefore include details of underground railway systems unique to particular localities.

3. Only brief reference is made to the special features of the Advanced Passenger Train. Further changes in design are likely before it is introduced into regular service. Brigades in the areas where prototypes are running have already received information about its characteristics which is available (see Appendix to Dear Chief Officer Letter No 3/1981).

4. There is continuing concern about the adequacy of warning devices for use at railway incidents. The guidance takes account of the fact that while an attempt is being made to find adequate replacements for the railway warning horn there will be incidents where that device can reliably be used although its limitations need to be kept in mind.

II RAILWAY SYSTEMS

General background

5. Working on or near railway lines is hazardous, and although the Fire Service has always emphasised the safety aspects of operational procedures in such circumstances accidents have still occurred. To ensure safe working all firemen must:

i. fully recognise the dangers involved:

ii. have a working knowledge of railway systems construction and equipment;

iii. familiarise themselves with the safety procedures adopted by railway authorities and brigades; and

iv. engage in regular local reconnaissance and pre-planning.

6. This section gives a basic description of railway systems and procedures. It sets out the essential factors to bear in mind for the safe and efficient conduct of operations. Above all firemen must appreciate that in the vicinity

f the incident there will be many potential hazards or difficulties varying ccording to the location; these could arise from electrification, from track ystems or rolling stock, viaducts, bridges, steep cuttings, tunnels and nderground railways. Everyone must be ready to take these factors into account uring operations. For optimum efficiency, however, it is essential to build on his general and theoretical knowledge by local reconnaissance and discussions. here is no substitute for familiarity with local circumstances; systems and rocedures vary from area to area, and areas vary in their physical characteristics. rigades must respond to local conditions. Close and regular liaison with the ocal railway authorities, pre-planning and exercises to take account of local ircumstances are essential.

erminology

. There are many special terms used by railway staff. Fire service personnel re not expected to use these terms, since it might be undesirable to do so in ire brigade messages. But, they must understand them, and they should familiarise hemselves with the following which are among those most commonly used:

brake compartment	part of a passenger train usually occupied by the guard – emergency tools and a ladder are usually kept here;
cautioning	oral warning to a train driver of operations on or near the line ahead. He should then proceed with caution, but his actual speed will depend on circumstances and will not necessarily be very slow;
cess	the narrow area immediately bordering the outside edge of the tracks;
conductor rail	rail carrying live traction current;
four foot	the space between the running rails of one line;
isolation	the disconnection of electrical supply from a section of line. (NB the line is not blocked: diesel trains can still run and electric trains can coast for considerable distances);
line blocked	trains are stopped, with no traffic passing over that section of line;
look-out/look-out man	a man whose sole duty it is to watch for approaching trains and warn those working on or near the line;
OLE	electrical overhead line equipment;
on or near the line	a position on or near enough to the line for a person, appliance or equipment to be at risk of being hit or sucked under by a passing train;
overbridge	a bridge over the railway;
sighting distance	the distance at which a look-out can first sight a train or a train driver can sight a signal;
six foot	the space between rails of adjacent lines – not a safe area;

Track or line	the rails and sleepers over which trains run;
Underbridge	a bridge carrying the railway over, for example, a road or river;
Up/down	terms used to distinguish the direction of traffic on a line. (NB there is no hard and fast rule on their use by railway staff and the traffic flow on a particular line must be established locally).

Construction and equipment

8. The following notes describe the principal features of the railway system:

a. The permanent way

i. Track

The greatest proportion of BR track is double line but most branch lines and some minor through lines are single. Some sections of route are multi-track. On all lines trains can travel in both directions and signals cannot be relied on to indicate the direction of traffic. Figure 1 shows a typical section of track.

ii. Signalling

Signals are of two major types: the mechanically operated semaphore and the electrically operated colour light. The latter usually, but not always, have telephones and identifying letters and numbers (see Figure 2). The signal box controlling a signal may be many miles away.

iii. Points

Points may be fitted with point heaters to prevent them freezing and there may be a supporting propane gas system located nearby (see Figure 3). Points may also have electrical motors which may remain live even when traction power is isolated. Firemen should not stand on point rodding, on wires or between blades.

b. Electrification

i. Increasingly, trains are powered by electricity. There are two systems of supply - overhead, or at rail level. In both cases the voltage is sufficient to kill anyone touching a conductor.

ii. Overhead line equipment systems

Overhead line equipment (OLE) consists of a contact wire suspended by a catenary wire which is in its turn supported by a complex system of suspension cables, arms and tensioning devices (see Figure 4). The equipment is fed from railway feeder stations and in virtually all cases operates at 25kv AC. The greater part of the OLE is electrically live and carried on insulators. Structures supporting the OLE bear an identifying letter and number.

The height of the contact wire varies normally between 4.72m (15ft 6ins) and 5.13m (16ft 10ins). At low bridges the minimum height is 4.16m (13ft 8ins). At public road level crossings the height is 5.64m (18ft 6ins). A retractable pantograph on the roof of the locomotive or motor car collects the current from the contact wire (see Figure 8).

OLE is divided into sections by means of switchgear in feeder stations, and track sectioning cabins. All these are usually closed, locked and unattended. Firemen should not normally enter them without first contacting the Divisional Control Office because the control room staff may be trying to re-connect a supply not knowing they are there. Locked switches on OLE further divide each section; railway staff operate these manually from ground level, or occasionally by remote control.

iii. Conductor rail systems

Conductor rail (third rail) systems operate at a maximum of 1200v DC; many lines use 750v DC. Brigades should find out what voltage is used in their area. Shoes on the train pick up the current from a conductor rail to one side of, and 50-76mm above, either running rail. It is not normally possible to retract the shoes from the conductor rail. The return circuit is provided by the axles, wheels, and running rails. In a few local systems, a fourth rail between the running rails is also part of the return circuit and may carry current up to 250v DC.

The control system is similar to that for OLE. Sub-stations convert alternating current to the direct current supplied to the conductor rails and the overall control of circuits is supervised from a control room. Railway staff can also isolate local sections by the manual operation of trackside switches.

c. Rolling stock

i. Passenger trains

There are five basic types of passenger train. The first is used mainly for local and suburban services, plus some Inter-City routes on Southern Region, the others for longer journeys. Their outward appearance does not generally indicate the direction in which they will move.

Multiple units can travel at speeds up to 90 mph. There are four kinds - diesel mechanical, diesel electric, AC electric and DC electric. AC electric units use overhead supply; DC electric, on Southern Region and London Midland Region, use third rail supply. All units have their motors below the floor; diesel electric units on Southern Region also have generators in compartments at floor level. Multiple units may not be easily separable because power lines connect passenger and motor units. Some units have sliding doors; most have hinged doors.

Locomotive hauled trains have locomotives at either end of the train which are diesel electric or electric powered and travel at speeds up to 100 mph. Coaches are mostly saloon type but there is still compartmented stock in use. Sleeping cars run on some trunk routes and have one or two-berth compartments.

High speed trains (HST) can travel at speeds up to 125 mph. They have a self-contained driving cab and engine at either end and their coaches are of a modern saloon type.

Motor rail trains consist of sleeping cars, compartment coaches and flat trucks to carry cars.

Advanced passenger trains (APT) have integral power cars, overhead supply, and can travel at up to 125 mph. These trains are being developed and brigades which have APTs running in their areas should consult locally to obtain up to date details of their construction and performance.

Of particular concern to the fire service are the fuel tanks, batteries and accesses. Their locations on typical locomotives, a representative diesel multiple unit, an HST power car, and coaches and sleeping cars in common use are shown in Figures 5-13.

ii. Non-passenger trains

Trains of suitably marked special purpose vehicles have largely replaced freight trains of mixed stock - for example, containers for various goods, including explosives; tanks for petrol, oil, and flammable or otherwise dangerous chemicals; hoppers for minerals; car carriers; and closed bogie vans for parcels.

iii. Fire-fighting equipment on locomotives and trains

Diesel multpile units, diesel electric multiple units, HSTs, the APT and all main-line diesel locomotives have automatic or manually operated CO_2 or BCF fire extinguishing installations. Some of these systems can be operated by an external pull handle or button, located as shown in Figures 8-13. All locomotives and multiple units have hand-held BCF extinguishers in the cabs. Brake vans, passenger coaches, catering vehicles and sleeping cars have BCF, water or CO_2 extinguishers.

iv. Alighting from a passenger train in an emergency

The crew will usually help passengers to alight by using a ladder from the guard's compartment to assist them onto the ballast or cess. Otherwise, passengers must jump down.

d. Tunnels and other confined working spaces

Tunnels, bridges and viaducts present special difficulties. They nearly always have refuges for use when a train approaches. Provision should be made in pre-planning for the crews to reconnoitre such features in their own areas. When a feature is covered by two Brigades, close liaison is essential. Paragraphs 48-54 give details of the safety provisions and procedures which firemen should bear in mind.

e. Underground railways

Underground railways operate in London, Glasgow, Tyne and Wear, and Merseyside. The Merseyside underground and certain lines in London form part of the wider suburban electric network operated by BR, generally in accordance with standard practice. London Transport and the other systems are self-contained and their equipment, procedures, etc may not be the same as for BR. Where necessary brigades should get information from the relevant railway authorities.

Dangerous substances

9. Much of the traffic on British Rail is freight and often this consists of dangerous substances. To control the freight they handle, including these substances, BR employ a system known as TOPS (Total Operations Processing System). This consists of a central computer connected to control offices, marshalling yards and depots throughout the country. These feed into the computer details of wagons loaded and unloaded, of freight train movements, and of traffic conveyed. Any control office can obtain from the system, on demand, information on any wagon or freight train and its cargo. Guards on freight trains may also have details of dangerous goods on their train.

10. BR's List of Dangerous Goods (LDG) and Conditions of Acceptance sets out the terms on which they accept dangerous goods for conveyance. The section of BR's Working Manual for Rail Staff commonly known as'the pink pages' sets out specific instructions to staff on handling such materials. Copies are circulated to all brigades. They contain guidance on the action necessary in emergencies and the obtaining of specialist assistance, and require staff to call the emergency services when an incident occurs. Both of these publications illustrate the labels required for packages of dangerous substances and the pink pages also show the necessary wagon labels. BR comply with the UK Transport Hazard Information System. The Manual of Firemanship, Book 12, Part 2, gives further information and advice on dangerous substances, their identification, decontamination, etc.

Asbestos

11. Some BR passenger rolling stock still has blue asbestos as an insulating material between the inner and outer skins of vehicles. It is no longer used in the construction of new passenger cars and is being gradually removed from existing stock. Brigade control can at any time check with the railway control office whether it is present by quoting the carriage identification number, painted at the waist on each side of one end, and asking the railway control office to check this number against their list. Small amounts of white and brown asbestos have been used for pipe and water tank lagging and in asbestos cement boards behind heaters. Unless it has been confirmed that asbestos is not present, the officer-in-charge should assume that it is, and take appropriate precautions.

Liaison

12. Good liaison between brigades and local railway authorities is essential. BR divide England and Wales into four regions, each composed of a number of divisions, which are, in turn, divided into areas; Scotland forms a fifth region, which is divided only into areas. In England and Wales, apart from the Southern Region in Greater London, brigades should have contact with area managers and divisional managers. For the GLC area of Southern Region the contact is the Chief Operating Manager (Waterloo). For the Scottish Region, area managers and the regional chief operating manager should be contacted. Brigades should record:

i. the appropriate BR telephone numbers; and

ii. the details of BR 'on call' arrangements (the divisional managers' control offices are usually continuously open, but each division also has a duty officer on call).

13. Brigades should also ensure they have details of large stations and depots, fuelling points, tunnels, bridges, viaducts, cuttings, water supplies, points of access etc. Especially in non-urban areas these can best be located by use of the National Grid reference. Brigades should ensure regular, close liaison to keep details up-to-date, arrange S.1(1)(d) inspections, and organise periodic exercises. These are very important in checking that contigency plans work efficiently and in familiarising personnel with the procedures and problems they might face.

14. For railways other than those operated by BR, brigades should contact the railway's General Manager.

Communications

15. Brigades and local railway authorities must be in complete agreement about the arrangements for cautioning, stopping, and restarting trains and for isolating and restoring power, and all personnel must be totally familiar with these.

16. Trackside telephones are common on BR but they normally give access only to the nearest signal box or to electrical control rooms. These electrical controls cannot stop trains or confirm that they have stopped running; they can only disconnect the traction current on request. Electrification telephones are just under half a mile apart on OLE and further apart on third rail systems. They are being phased out of use. Brigades must therefore direct requests amd messages through BR regional headquarters or divisional traffic control. The only proper channel of communications and control is via an appliance radio, through Brigade Control.

17. Direct contact with an electrical control room could possibly be beneficial where an immediate rescue was necessary and it was imperative to have immediate isolation of power. But this practice will cause considerable difficulty, and the action must be confirmed immediately through the Brigade Control to the British Rail control. Isolation will not stop all trains.

18. Brigade Control must always identify itself when contacting BR for the isolation or the restoration of power. Other brigades could be working on the same section of track, and BR would need to ensure that it was all clear.

19. BR have a comprehensive domestic telephone network giving communication between control offices, stations, depots, most level crossings, signal bxes etc. Lineside telephones fall into three groups:

i.	signal post to signal box	identified by black and white hatching on the cabinet lid (see Figure 2). They can be in groups of up to 12 on one circuit, only one being usable at a time. Nearly all colour light signals but few semaphore signals have these telephones;
ii.	electrification telephones	identified by a red telephone symbol on white. They provide communication with the electrical control room only;
iii.	other telephones	identified by a black cross on white. Usually they give communication between two specific points, but they may be dialling telephones giving access to the whole BR network. The telephone cabinet will contain instructions on use.

BR attendance at incidents

20. Whether railway operating staff will attend an incident depends on its size. It is important therefore that the Fire Brigade officer in charge at the scene passes full information to his Brigade Control for onward transmission to British Rail. Under normal circumstances the following attendance is usual:

i.	minor fires on trains	crew only;
ii.	larger fires on trains	a railway official, who will attend as quickly as possible;

iii.	major collisions and derailments	a railway officer in charge, who will attend as quickly as possible. Usually this person will be identified by a marked helmet, high conspicuity jacket with the legend "Incident Officer", or by an armband, and will be accompanied by Engineering Officers. The railway officer in charge will set up a command post on arrival.

21. The information in this section relates only to BR. Other railways may use similar systems, but, again, for the full and accurate information necessary the brigade should contact the appropriate General Manager.

Identifying the location of incidents

22. Whatever the source of information about an incident, Brigade Control should establish contact with the appropriate railway traffic control. Identifying the location of an incident may be a considerable problem. Members of the public supplying information are likely to be very imprecise about this, particularly in areas unfamiliar to them. Even a train driver reporting a fire may not be precise, particularly when he has had to proceed beyond the incident to the next trackside telephone point, or he may use a railway location rather than a local name. It is important therefore that the fire brigade officer in charge confirms the location of an incident on arrival. This benefits both railway traffic control and any further fire brigade crews whose attendance might be necessary. It is also vital in ensuring that disruption to railway traffic is kept to a minimum.

23. The possible difficulties of locating incidents again emphasise the vital importance to brigades of familiarising themselves with the local situation and liaising with the local rail authorities. Many BR area managers produce for their staff a handbook on emergency procedures which contains a schematic diagram of the area rail network and identifies the location of key structures and, most importantly, access points to the track.

24. Brigades should seek to obtain copies of such manuals and may find it helpful to carry them on appliances. A further way of locating an incident is by the numbers marked on bridges and tunnels in some regions, on most signal posts, and on all OLE supports. There are also mile marker posts alongside all lines, numbered consecutively from London or other big cities (Figure 14). These posts are sometimes supplemented by quarter mile posts, though these do not show total distances. BR also make frequent use of National Grid references to identify locations, and brigades are recommended to do the same where it is possible and appropriate.

Access points

25. Access points may be at gateways, level crossings, stations, or bridges. They are all numbered or named. In listing them, BR specify their position by the number or name, the nearest mile post, the National Grid reference, and description. Firemen should familiarise themselves with a particular route to each access point. It may not always be most convenient to gain access to the track at these points. This is particularly so in the case of fires on the embankment or on land adjoining the track. If a crew has to breach the perimeter fencing, it is especially important to notify BR of the location, because BR may be unaware that firemen are attending an incident on their property.

Major disasters

26 In their liaison with BR and pre-planning for incidents, brigades should bear in mind the special requirements of major disasters (see Manual, Book 12, Chapter 4). In particular, it should be appreciated that the incident may be in a location that is remote and difficult of access.

III SAFETY AND OPERATIONAL PROCEDURES

General

27. For the purpose of this Guidance, incidents on railways are classified in three categories. First, those in which it is possible to deal with the incident without firemen going on or within a hazardous distance of the track. Secondly, those in which it is essential for firemen to go on or near the track and in which the full safety procedures can be established beforehand. Thirdly where in the most exceptional circumstances there is such an immediate risk to life that the officer in charge has no alternative to attempting rescue before all the normal safety procedures have been established.

28. The first rule of safety is that no fireman should go on or near the track unless this is essential. If it is possible to deal satisfactorily with a fire or other incident without firemen going on or near the track, then that should be done. It will still be necessary to have regard to potential hazards from being close to the track, eg from escalation of the incident, and specific safety measures may be necessary. Every fireman has a personal responsibility to comply with all the safety measures put in hand and to avoid any action likely to detract from the safety of the operation.

29. The officer in charge at a railway incident will place priority on the safety of crew(s) and others present; will at once initiate and then adapt the safety procedures appropriate to the circumstances; and will control them throughout the incident to achieve the high degree of protection required in such a potentially hazardous environment. He will ensure that Brigade Control is kept fully informed so that it can in turn liaise with the railway traffic control to ensure appropriate action is taken to safeguard the crews at work. It is particularly important that a message should be sent with the minimum of delay on arrival at an incident to confirm where the incident has occurred and the action being taken, and that Brigade Control inform the railway traffic control of the brigade's presence on or near the track.

30. Where an officer in charge considers that an immediate rescue must be attempted, then certain minimum safety measures must be put in hand. It is not possible, because of the variations in circumstances, to specify details. But the minimum measures should normally include an assessment of the possible risks against the likelihood of success of the action, use of the minimum number of personnel with as little equipment as possible on or near the track, the positioning of look-outs, and clear instructions to the firemen about their task, risks to their safety and the action to be taken when a train is approaching.

Protection of working areas

31. The officer in charge should begin immediately to seek as much information as possible for his crew, requesting the stopping of trains and isolation of current as necessary and ensuring that look-out duties are performed. The measures to be taken, in particular stopping and cautioning trains and posting look-outs, require time to become effective. They cannot be relied upon for protection until the officer in charge has obtained confirmation that they are in force. There will be very rare occasions when there is an urgent need to begin work before this

confirmation can be obtained. This is likely to happen only when there is a threat to human life. In those circumstances alone the officer in charge may authorise work to proceed, or track crossed, to render assistance.

32. Even in the most pressing circumstances, crossing the line at track level should be avoided if at all possible. If necessary, appliances and equipment should be repositioned to achieve this. The dangers of tripping over signal wires or points mechanisms, or of slipping on track, are considerable, especially if equipment is being carried. No one should step on any rail - there is a danger of slipping, and with conductor rails the added danger of electrocution. Crossing tracks under live overhead line equipment may expose crews to the risk of electrocution, if long items such as ladders are being carried or if the clearance has been reduced because of damage to the equipment. In the guidance that follows, it is assumed that access to the work in hand will be made without crossing the track other than by bridges or authorised crossing places unless the traffic has stopped and appropriate action has been taken to safeguard firemen from the hazards of electrical systems. (see also paragraphs 36-41)

Safe distances for working

33. To achieve reasonably safe working conditions, it is essential for officers in charge to identify the extent of the area where it will be safe to work. If trains continue to run, safe working will be possible only at least three metres from the outside rail of a line in use. The actual distance may have to be much greater than the 3 metres because officers in charge will need to take account of such factors as:

i. weather and other conditions affecting visibility;

ii. sighting distances;

iii. local topography (because embankments and cuttings cause difficulties in moving and using equipment);

iv. availability of refuges or other safe areas;

v. the nature of the incident, including whether human life is at risk;

vi. hazards arising during operations (eg the dangers of using hose near electrified track or carrying ladders under OLE); and

vii. the risk of firemen unintentionally straying closer to the line.

Stopping trains

34. If a safe working distance from moving trains or exposed electrically live equipment is not possible, the officer in charge should consider whether to ask for trains to be stopped and for the power supply to be cut off. If, in his judgement, the incident can be dealt with only by firemen entering a hazardous area, and it is imperative that the incident should be brought under control, then he should ask the railway authority to stop trains. He should consider stopping trains both on the track directly affected and on adjoining tracks. Brigade Control must be told in clear terms when it is essential to have trains stopped. Following the correct channel of communications between brigade and railway authority (see paragraphs 15-19) is therefore very important. The officer in charge should keep Brigade Control informed of any messages that do not go through it. All firemen should assume that trains are running normally and that power is still being supplied until traffic control confirms that the action requested has been taken.

35. There is a need for mutual understanding of the problems faced by both the fire services and by British Rail from incidents on the railways. Railway traffic controllers will act without delay on requests for the stopping or cautioning of trains (see paragraphs 36-41), or for the isolation of current. British Rail would find it of great assistance for such requests to be precise, and made with a brief explanation. It might also be helpful if a senior brigade officer, not necessarily at the scene, could confirm the request when widespread disruption is likely to result, as in a large conurbation during the rush hour, or if a hazard could exist through stopping trains in a tunnel or away from stations.

Special requirements on electrified systems

36. There are two main considerations to keep in mind when the officer in charge makes a request for trains to be stopped on an electrified railway:

i. Trains should be stopped by signal. Cutting the power may slow and eventually stop electric trains, but diesel units using the track can be stopped only by signal. They can run for up to a mile before receiving a warning, and until the driver of a diesel unit asks via a trackside telephone why a signal is unexpectedly at red, traffic control cannot confirm to the Brigade that all trains are stopped. This may take some time.

ii. Electrified systems should be treated as live and in use until traffic control has confirmed that the current is off and all trains have stopped. Circuits often become tripped out for minor faults. When these show up on indicator panels, electrical control room staff will try to re-energise the circuits at least twice. Firemen should not attempt to isolate circuits themselves.

37. On conductor rail systems the normal minimum section which can be isolated is 1½ miles. Because all shoes on a train will be live as long as one is in contact with a live conductor rail, the train itself may bridge the gap between two sections and re-energise an isolated section of conductor rail. To reduce the likelihood of this happening, it will be necessary to isolate adjoining sections in addition to the section(s) immediately concerned. Railway staff may use short-circuiting bars to protect those working on a line after the current has been cut off.

38. On overhead line equipment systems, the equipment must be regarded as live and dangerous at all times unless an assurance has been given by the Railway Control that the Electrical Control Operator has had the power switched off. No part of the body, tools or water jets must be allowed to come within 2.75m (9 ft) of the live equipment, broken or displaced wires, or foreign matter such as rope in contact with overhead line equipment.

39. No one should climb above the interior floor level of locomotives or carriages or into wagons and freight vehicles, unless the overhead line equipment has been isolated.

40. The normal section that can be switched off in an emergency is about 15 miles, and isolation of overhead line equipment therefore causes considerable disruption of train services. Isolation of such long sections of track is necessary to ensure that the overhead line equipment will not be made live by a train bridging the isolation point. However, when the equipment is isolated, voltage may be induced into the overhead line equipment by power lines running parallel to the railway, and consequently care should be taken to avoid touching isolated overhead line equipment until the equipment has been earthed by trained railway staff.

41. After stopping trains on electrified track, officers must also consider having trains on adjoining tracks cautioned (see paragraph 42).

Cautioning

42. When a safe working area is being established and trains are running nearby but there is no need for trains on a particular track to be stopped, then officers in charge can ask for drivers to be cautioned. This might be appropriate, for example, when firemen are working on an embankment or where there are a number of tracks not all of which need to be blocked. Cautioning means that drivers have been warned of the presence of fire service personnel. But it is left to the judgement of each driver to decide at what speed to travel so as to be able to stop short of any hazard. This can vary from as low as 10 or 15 mph up to 50 or 60 mph, according to local conditions, the type of train and the exact nature of the cautioning message. When trains are proceeding under caution, firemen should keep clear of the track or tracks in use.

Look-outs

43. The provision of look-outs is very important, particularly with the increasing speed of trains and limited audibility range of the railway warning horn. For all operations on or near any track in use, and whenever trains are being stopped or are under caution, look-outs should be posted directly by the officer in overall control of the incident or via an appointed safety officer. They may be posted in other circumstances at the discretion of the officer in charge. They should be so stationed that they can see an oncoming train and give a warning in time to allow those affected 30 seconds in which to reach a place of safety.

44. To prescribe where look-outs should be posted is difficult. Local knowledge, weather, light, curvature of the track and uncertainty about the speed of traffic are all relevant. The distance a train will travel in 30 seconds, having regard to the likely speed of trains on the line, must be taken into account by the look-out who will need to be confident that he can give a warning signal when he knows an approaching train is not less than that distance away from the incident. The following table shows the distance covered in 30 seconds at different speeds:

Speed of train	Distance covered in 30 seconds
30 mph	0.25 mls/402 metres
50 mph	0.4 mls/670 metres
60 mph	0.5 mls/804 metres
75 mph	0.65 mls/1006 metres
90 mph	0.75 mls/1206 metres
100 mph	0.85 mls/1340 metres
125 mph	1.05 mls/1676 metres.

All trains which attain speeds of 100 mph or more have headlights permanently in operation.

45. To ensure that look-outs are as effective as possible, the following points should be borne in mind by the officer in charge and by the look-outs:

i. Look-outs should stand in a safe position from which they have the best view possible of oncoming traffic and can give a warning time of at least 30 seconds. They should consider the use of vantage points for this. They must be sure that those working at the incident can hear the warning horn and should check this before operations start. They must be able themselves to see the acknowledgements of their warnings. Where necessary on bends there should be intermediate look-outs to relay warnings and signals.

ii. Where crews from more than one station are working together on a site they can share a look-out. The officers in charge of each group should confer with the overall officer-in-charge or appointed safety officer and instruct any look-outs as to which additional crew members he is responsible for. Each officer in charge should point out to his own crew the look-out responsible for them. Officers must take note of the extent to which personnel may safely disperse and the boundaries beyond which protection is not likely to be effective.

iii. If changing circumstances persuade the look-out that he cannot offer adequate protection, he should sound his horn. When everyone has stood clear he should explain the situation to the officer-in-charge. The officer-in-charge should relocate look-outs if he considers that changing circumstances have made their warnings ineffective.

iv. Fireground communications equipment may be of considerable assistance in maintaining contact with look-outs and there may be circumstances where it can be used to supplement the audible warning signal. Radio should not, however, be used instead of a warning signal directly audible to men at work.

46. Safety can be assured only if those being protected fully understand procedures and how to respond to warnings. At the first sign of approaching traffic the look-out will give a series of short blasts on his horn. He will repeat these until he receives an acknowledgement. Those warned should all immediately raise an arm over their head in acknowledgement and move to safety. The officer-in-charge should ensure that they stay there until the train has passed and can see that no other is coming. It is imperative that every individual should know where his place of safety is. Officers-in-charge can best ensure this by designating a place of safety for each fireman before work starts. Where an arm signal as response to a warning would not be seen, acknowledgement should be by the clearly defined circular movement of a torch in the direction of the look-outs. The first person to hear the warning who can in turn warn others should make this acknowledgement. He should then pass on the warning orally to the others present. Where noise renders a warning inaudible there should always be a further look-out with the men working on the track to ensure the warning is passed on, by touch if necessary. A further look-out may also be useful in other circumstances.

47. All look-outs should wear high conspicuity jackets and be equipped with a warning horn. In poor visibility each should also have a hand lamp for his own safety.

Moving about on or near track

48. When they are on or near the track, firemen should always wear their saturn yellow reflective garments. These serve the same warning purpose as orange surcoats worn by BR personnel. The difference in design and colour do not affect their safety value. In addition to the hazards described in paragraph 32, firemen should be aware of danger from passing trains and take precautions to protect themselves. They should preferably walk along the cess on the side of approaching traffic and must acknowledge warning signals from train drivers by raising an arm.

Places of safety

49. On beoming aware of an approaching train, all firemen must move immediately to a place of safety. This is generally held to be such that there is a space

of at least three metres between any person or equipment and the nearest rail of any line on which a train is approaching. A place of safety may also be found in a refuge on an embankment or in a cutting. Firemen should stay in this position until the train has passed and they can see no other is coming. No one should remain between trains passing on adjacent lines unless they have at least three metres clearance on either side. If they must stay, or if they think they cannot reach a place of safety in time, they should lie down in a clear space.

50. Trains travelling at high speeds set up wind turbulence which can be an added danger and may also lift objects at the side of the track which could strike those nearby. Vibration can also cause objects to move and cause a hazard. On lines where trains travel at over 100 mph the space between lines is not safe. Firemen should be at least three metres from the nearest rail on which a train is approaching. They should make full use of refuges and hand holds where these are provided. On these high speed lines blue and white chequered boards at the side of the track indicate that there is no place of safety on that side (Figure 15). Red and white chequered boards at the side of the track, whatever the speed, indicate that the clearance between a structure and the nearest rail is less than 1.5 metres (Figure 16). If as a last resort firemen cannot reach a place of safety before a train arrives, they must lie down as far from the line as possible.

51. Extreme care must be taken anywhere the amount of safe space is limited either for working or for gaining access to the incident. This may apply not only to tunnels and bridges but also to narrow embankments and steep-sided cuttings.

52. Officers in charge should not send firemen into tunnels or onto bridges or viaducts until trains have definitely been stopped, unless they are completely satisfied they would be able to take up a position of safety if a train did approach. Refuges which will at most accommodate four men are normally provided at intervals in tunnels and on viaducts. Sometimes there is a safe area between the line and the side or between sets of lines in these confined areas, but this is not always so. Firemen wearing breathing apparatus may not be able to use some refuges in safety or lie down safely between or beside tracks. Pre-planning is therefore particularly important, and access to designated safe places must be checked before work begins.

53. If firemen are in a tunnel when trains are approaching they will be particularly at risk. If they cannot leave the tunnel safely, they should either stand in one of the refuges in the tunnel wall or, if they cannot do that, lie face down on the ground between the two sets of lines or between the lines and the side of the tunnel, until the trains have passed. The width of these spaces varies. Each fireman when he enters a tunnel must acquaint himself with the space allocated to him for emergencies by the officer in charge. If there is a red and white chequered plate at the tunnel entrance there will not be enough room to stand beside the lines while a train passes. This hazard should be avoided if safety procedures are properly followed and trains are stopped before entry.

54. Firemen should not enter tunnels or underground railways unless accompanied or authorised by responsible railway staff, or unless the officer in charge is satisfied that his men can take up a position of safety if necessary.

Lights

55. During an incident at night, firemen may floodlight the scene and they may use the blue flashing light of an appliance at the side of the line. Other coloured lights near the line or any coloured lights on it would cause confusion to train drivers and must not be used.

Safety lines

56. Since safety lines restrict freedom of movement, they should be considered for use only as scrambling lines or when a fall could cause injury. They should not be used solely to keep firemen clear of track which is in use.

Firefighting - use of hose

57. It should not normally be necessary to take hose across track. Firemen should consider so doing only when it is quite certain that trains have been stopped and any electrified track has been isolated. Modern methods of track construction make it impractical to feed hose under sleepers, as the ballast now often rises to the underside of the rails. The necessary digging out would only be worthwhile at a lengthy incident when it was desirable to release other lines for normal use. However, if a train does approach unexpectedly, hose across the top of the track would not by itself cause a derailment and crews should therefore make no effort to recover it.

Engine and rolling stock fires

58. When firemen arrive, the fixed firefighting installations will usually have operated and the crew will have used their portable appliances. The procedure for dealing with the fires will vary according to circumstances. Firemen should always check the following points, however:

i. On diesel locomotives, have the engines stopped? Is the battery isolation switch open?

ii. on diesel multiple units, have the engines stopped? Are the heaters off?

iii. on electric locomotives and multiple units operating under OLE, have the pantographs been lowered? Is the battery isolation switch open? On conductor rail lines, has there been an isolation?

iv. on passenger rolling stock, is the 1000v electric heating supply off?

59. Firemen should be aware of gases discharged in engine compartments and bear in mind that sleeping cars and catering vehicles may carry LPG cylinders. There will always be a main shut-off valve for the LPG supply. If it is possible to separate and isolate a burning vehicle from the rest of the train, the officer in charge should ask the train crew to do this.

Rescues

60. Where necessary the train crew will arrange as far as they can for the evacuation of passengers. Trains carry some equipment such as an extending ladder, crowbar, 7lb hammer and panel cutting tool to assist in rescue work, but the short-circuiting bars which are carried on some trains must only be used by train crews. Where lifting and cutting equipment is needed, the railway authorities can send lightweight items by road and these can arrive in reasonable time. Heavy gear, including cranes, is however only kept at a limited number of strategic points and is likely to take two or three hours to arrive. Pending the arrival of a railways officer in charge firemen at an incident must maintain liaison with railway control via their Brigade Control.

61. On electrified systems, where urgent life saving action necessitates immediate action prior to the current being switched off, this must only be carried out

provided that no part of the casualty or the rescuer is nearer than 1 metre to live overhead line equipment or above the level of the OLE. On conductor rail systems not exceeding 750v DC, the supply should if possible be cut off before firemen attempt to rescue anyone touching a conductor rail. If the supply cannot be cut off without delay, a dry rope or wooden pole may be used to pull or push the person clear of the conductor rail.

Winding down operations

62. At the end of operations, as soon as it is safe to restore current or resume normal services, the officer in charge must consider in consultation with the railway authorities lifting the measures he has had applied and advising them of his withdrawal. Messages being relayed to railway control must clearly identify the incident in question, particularly because other crews might be working on the same line.

The role of the officer in charge

63. Not all of the matters mentioned in the section on Safety and Operational Procedures will need to be taken into account at every incident. There are some points which should always be considered, and an officer in charge may find it necessary, especially in making an initial assessment of an incident, to remember to take the following actions:

i. Assess the situation with regard to both the possible necessity for immediate action and the need to introduce safety procedures.

ii. Identify the location of the incident to brigade control so that the railway authorities can quickly be informed.

iii. Direct crews in the use of safe working areas and places of safety.

iv. Request brigade control to contact the railway authorities immediately if it is necessary to isolate power or control railway traffic by cautioning drivers or stopping trains, and ensure that confirmation of the action being taken is obtained.

v. Request brigade control to inform the railway authorities when normal power and traffic conditions can be restored.

March 1984

Home Office
Queen Anne's Gate
LONDON SW1

Fig. 1 Railway terminology ; two track layout

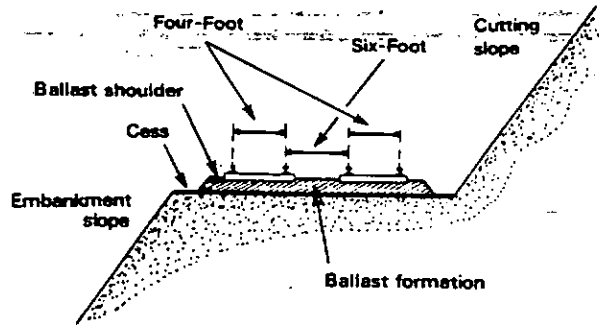


Fig. 2 Typical signals

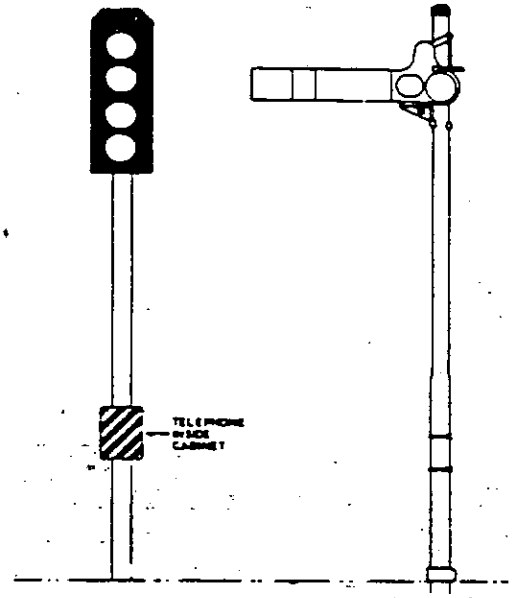


Fig. 3 Points

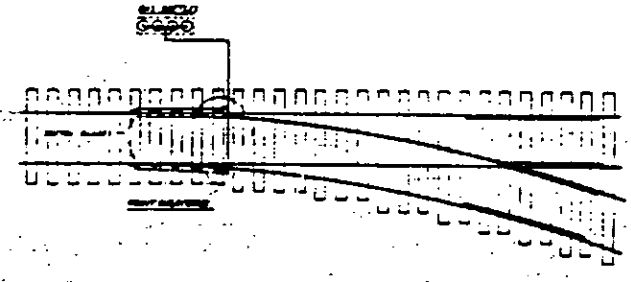


Fig. 4 Typical electrical overhead line equipment (OLE)

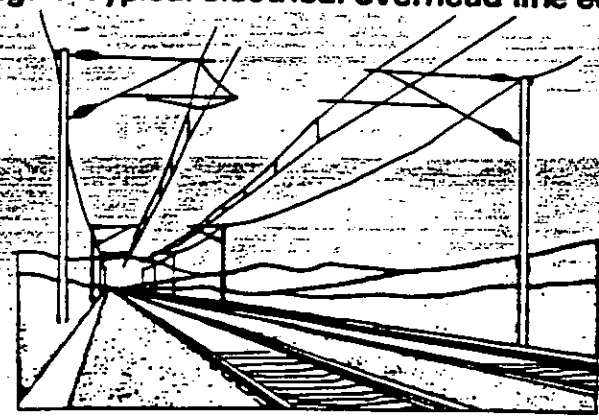


Fig. 5

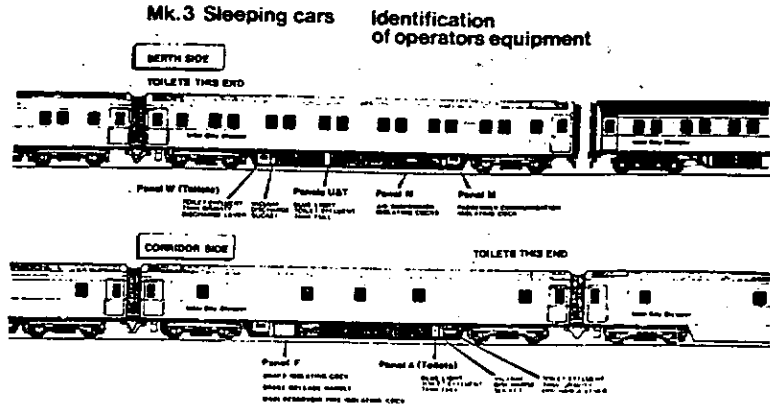


Fig. 6 Mk. 1 Day coach

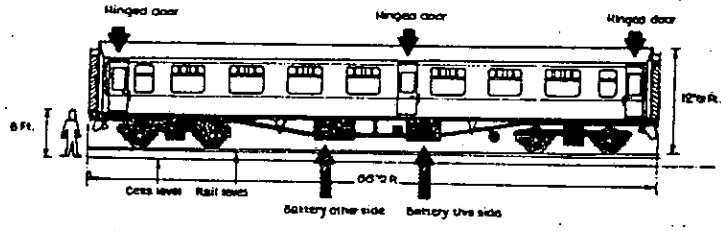
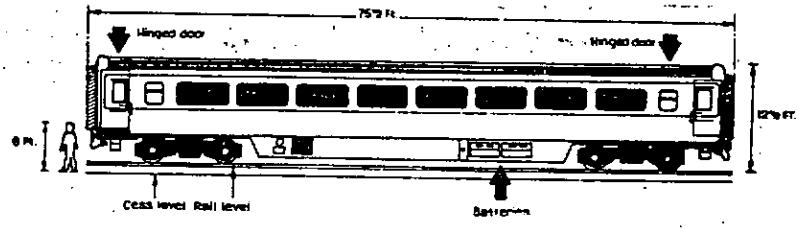


Fig. 7 Mk. 3 Day coach



External access to equipment

Key : Figures 8 to 13

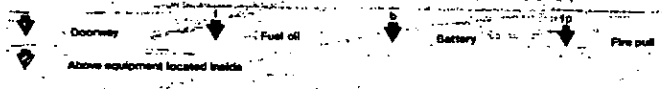


Fig. 8 Electric locomotive

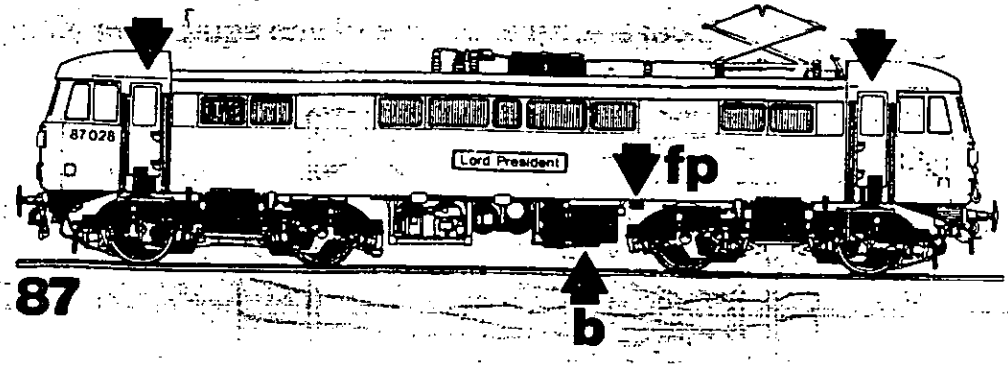


Fig. 9 Class 56 Diesel locomotive

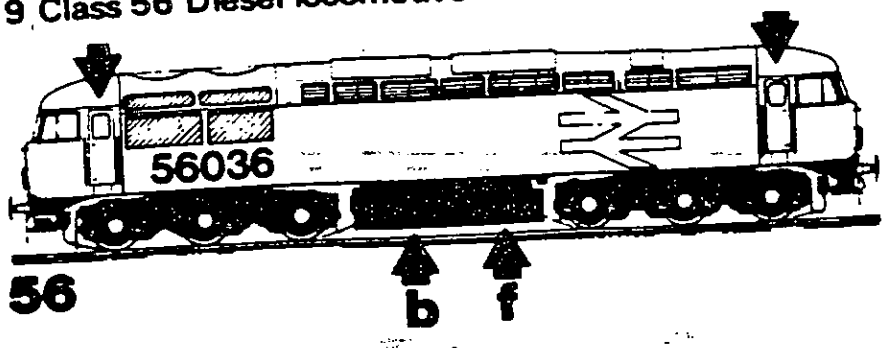


Fig. 10 Class 47 Diesel locomotive

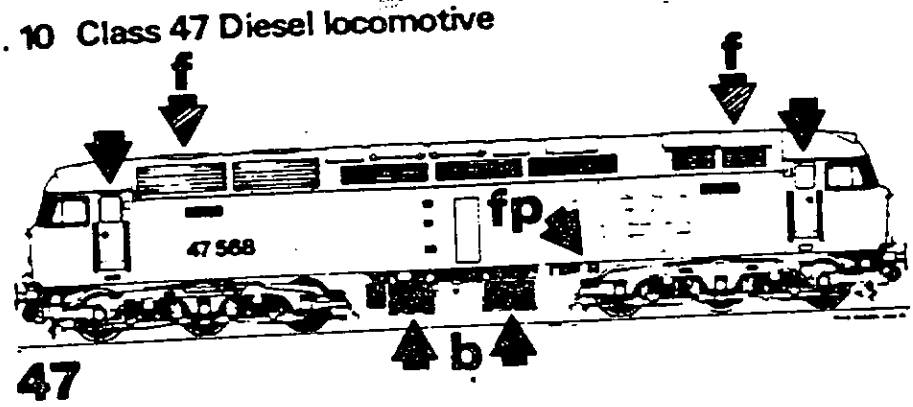


Fig. 11 Class 27 Diesel locomotive

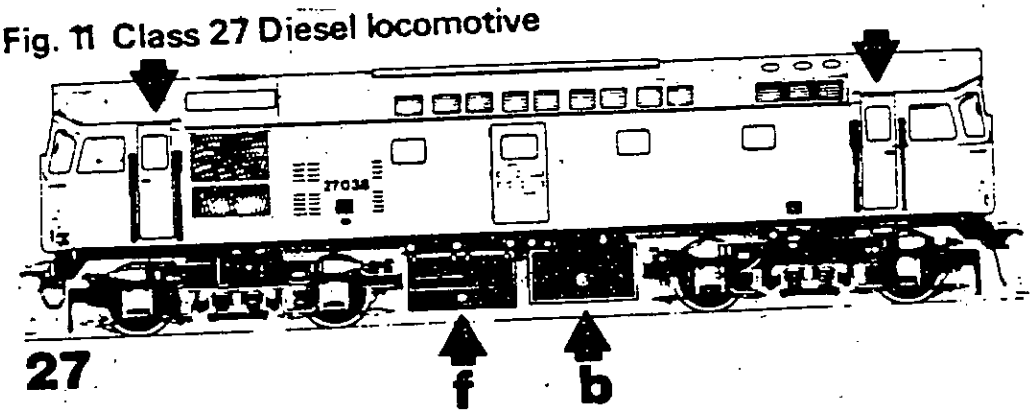


Fig. 12 Inter-city 125

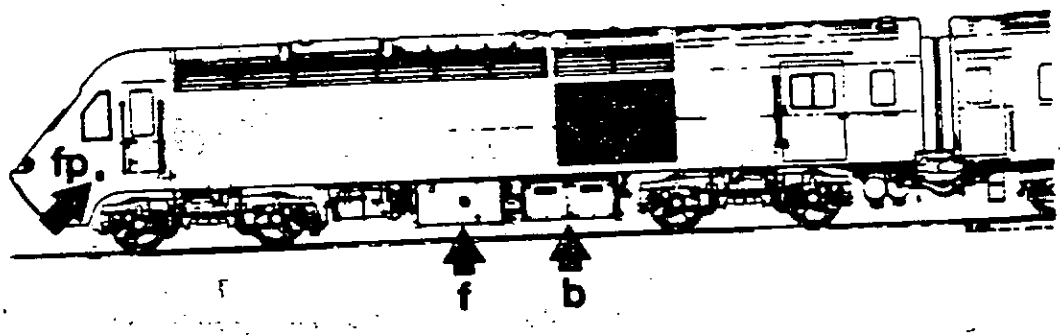


Fig. 13 Diesel multiple-unit

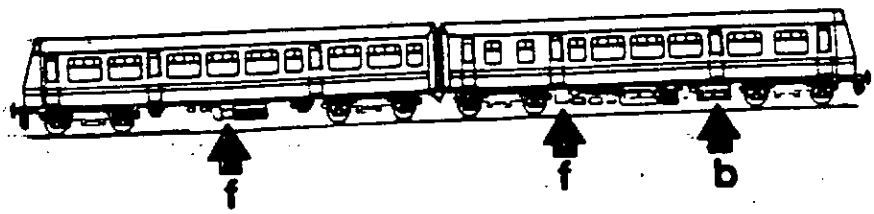


Fig. 14 Typical mile posts

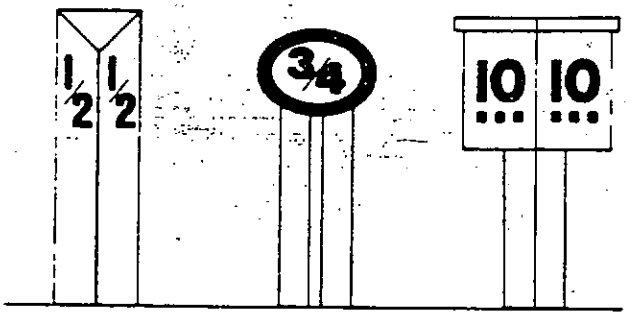


Fig. 15

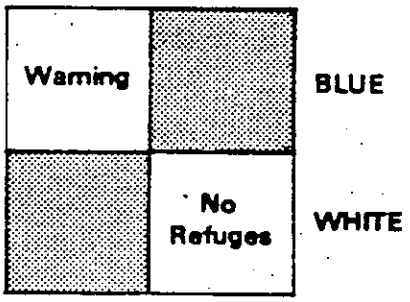


Fig. 16