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Iarnród Éireann
Irish Rail

22nd June 2022

[redacted]

Email [redacted]

Re: FOI request IE_FOI_583

Dear [redacted],

I refer to your request dated 18th May 2022 made under the Freedom of Information Act 2014, which was received on by my office on the 14th of February, for records held by Iarnród Éireann.

Request:

1. Any technical drawings of class 201(JT42HCW), class 121 and class 071 locomotives
2. Also, the drivers/operator's manual for class 201 (JT42HCW) and its variations for specific locomotives within the class
3. The driver's manual for class 071 locomotive and its variations.
4. Also, manuals and technical drawings for any maintenance vehicle including Ballast regulators, tampers, relaying gantries, MPV, and track recording vehic
5. Any information to Tralee station and its storage sheds, and previous freight terminal. (are these sheds still in use and what do they store.
6. Information on Cork Kent station are its sheds in use and what do they store.
7. Finally, A list of all trains and locomotives in storage at Inchicore and at any other depots, this would include decommissioned trains and maintenance trains also.

Response:

I, Ms. Emma Cuddy, Decision Maker have now made a final decision to Grant your request on 14th June 2022.As discussed, you have made the decision to withdraw Q1, Q4 and Q5 as they are too vague or likely to incur a fee if not redefined.

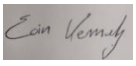
Please find response document and schedule of records attached

Rights of appeal

In the event that you are not happy with this decision you can make an appeal in relation to this matter, you can do so by writing to the FOI Unit, Corporate Communications, Iarnród Éireann Irish Rail, Connolly Station, Amiens St, Dublin 1 or by e-mail to foi@irishrail.ie. You should make your appeal within 4 weeks (20 working days) from the date of this notification, where a day is defined as a working day excluding, the weekend and public holidays, however, the making of a late appeal may be permitted in appropriate circumstances.
The appeal will involve a complete reconsideration of the matter by a more senior member of the staff of this body.

Should you have any questions or concerns regarding the above, please contact the FOI Officer on [redacted] or by email at foi@irishrail.ie

Yours sincerely,

PP 

Ms. Emma Cuddy, FOI Decision Maker, Iarnród Éireann

Freedom of Information Request:
Schedule of Records for IE_FOI_583: Summary for Decision Making

Record No.	Date of Record	Brief Description	No. of Pages	Decision: Grant/Part Grant/Refuse	Section of Act if applicable	Record Edited/Identify Deletions
1	14.06.2022	IE_FOI_583 Response Doc	537	Grant	~	~

Signed:
Eoin Kennedy
Freedom of Information / Data Protection Office

FOR INFORMATION OF COMPANY'S EMPLOYEES ONLY

IARNRÓD ÉIREANN

Iarnród Éireann

DRIVERS' MANUAL

VOLUME 2

201 Class Locomotive

To operate on and from 31/05/2005

NOTES

CONTENTS

CONTENTS (Contd.)

List of illustrations in this Volume

NOTES

201 CLASS LOCOMOTIVE (JT42HCW)

Fig. 1 - 201 class locomotive 206 at Inchicore

Section 1

LOCOMOTIVE DATA

Locomotive horsepower :	2975

Diesel engine details

Model :	710G3B
Type :	Turbocharged 2 stroke
No. of cylinders :	12
Full speed :	904 rpm
Standby speed :	600 rpm
Idle speed (normal) :	300 rpm

Main alternator

Traction alternator :	AR8PHEH
Nominal voltage :	600 volts

Traction motors

Model :	D43
Number :	6
Type :	Axle mounted DC series wound

Wheel arrangement :	CoCo
Wheel diameter :	40" (1.016m)
Weight on rails (fully loaded) :	107 tons (108,864 kg)
Distance over buffers :	68' 9" (20.95 m)
Width :	8' 8" (2.64 m)
Height :	13' 1 " (3.986m)
Fuel tank capacity :	1000 Imp gals (4500 litres)
Water system :	212 Imp gals (962 litres)
Max. service speed :	100 mph (160 km/h)
Entered service :	1994/1995

CAUTION

The maximum amount of fuel permitted in the tank of a 201 class locomotive is 850 gallons.

Section 2

IMPORTANT FEATURES ABOUT THIS LOCOMOTIVE

The illustrations referred to in this section are all to be found in Section 3. A list of these illustrations follows the Contents page of this manual.

Two of these locomotives, 208 and 209, are owned by Translink (or NIR). The remaining 32 belong to Iarnród Éireann (I.É.). (Locomotives 208 and 209 have been re-numbered 8208 and 8209 by Translink. Where reference is made to these locomotives in this manual, they will continue to be referred to as 208 and 209).

These locomotives have many special features. Listed below are the most important of these.

LOCOMOTIVE BODY

The locomotive body is fully enclosed, providing protected walkways for easy access to the engine room, and a flat bodyside which is easy to clean.

HEAD END POWER (HEP) - the control panel is shown in fig 6.

The 201 class locomotive is equipped with a generator which supplies electrical power to the train. The generator is driven by the locomotive engine through a gearbox. This means that there is no need to have a generator van with its separate diesel generator sets powering the train. The only engine now needed is the locomotive engine. However, when the HEP is in use (normal operation), to supply AC current at 50 cycles per second to the train, the engine speed will be 904 rpm regardless of the throttle position. If the train is stopped at a station for an extended period the HEP should be switched to the standby mode. In this mode the engine will run at 600 rpm instead of 904 rpm. Again this is to ensure AC current at 50 cycles per second is provided for the train. When the HEP is isolated, no electrical power is supplied to the train and the engine responds to the throttle as on a conventional locomotive.

N.B. It is not possible to take power (drive) while the HEP is in the standby mode.

ENGINE PURGE CONTROL

The engine on this locomotive is equipped with a purge cycle on start up. When the engine is being turned over to start it will revolve slowly at first to expel fluids from the combustion chambers. Having done this, the engine cranking speed will increase to allow the engine to start. This prevents a hydraulic lock developing which could damage the engine.

WHEEL CONTROL SYSTEM

Wheel control on the 201 class consists of the Super Series system and the wheel slip protection system. The EM2000 computer automatically switches on the system that suits the prevailing operating conditions.

The Super Series system works by enabling the fastest turning wheelset to rotate at a speed faster than the speed of the locomotive i.e. it allows the wheels to creep. Under certain conditions, allowing the wheels to creep, or slip in a controlled way, increases the adhesion above that available when the wheels are not slipping. During controlled wheel creep, wheel speed usually remains relatively steady or changes slowly. When this is happening the wheels will be heard to squeal under the locomotive.

The wheel slip protection system operates in three modes :

(i) starting - where locomotive speed is less than 2.4 km/h (1.5mph)

(ii) back up - where there is a Super Series failure, or all wheels are slipping

(iii) dynamic braking - to prevent wheel slide.

The system detects several stages of wheel slip and can react according to how severe it is. This enables smoother overall operation and quicker recovery from wheelslip.

BRAKING SYSTEM

There are several differences between the braking system used on this locomotive and the systems we have on other General Motors (GM) locomotives.

Firstly the locomotive is equipped with dynamic braking. This is a system whereby the traction motors are used to generate electricity, and the energy needed to generate this electricity is used to brake the locomotive. This power is dissipated in the dynamic brake grid, located below the radiators.

When the blended brake mode switch is cut in, the braking effort is provided by a controlled combination of dynamic and normal braking. This is known as a blended brake. The locomotive brakes still apply, but to a lesser extent when dynamic braking is active. The overall effect is that for a given brake handle movement (application) the braking effect is the same whether in or out of the dynamic braking mode, but when in the dynamic braking mode there is less wear on the wheels and brake blocks.

When the blended brake mode switch is cut out, the brakes are normal straight air brakes similar to the other GM locomotives.

Secondly there are unit brakes attached to the bogies for each wheel. This is far more efficient than the more usual arrangement of one cylinder applying several brake blocks through a system of rods and levers.

Thirdly the parking brakes work on four wheels and are applied and released by operating a push button in either cab (see Fig.11). They will also apply automatically as the air pressure on the locomotive drops below 90 psi. These brakes will release automatically when the air pressure builds up unless you operate the parking brake button. If they had been applied in this way they will have to be released by operating the parking brake release push button. See section 5.3 for manual release of the parking brake.

COMPUTER - the display panel is shown in figs 4 and 5.

This locomotive is equipped with a computer, the EM 2000. It controls and monitors critical functions in the power management system, and displays messages and gives audible alarms if faults occur. Some faults may require action by use of the touch pad to clear them.

BUFFERS and DRAWGEAR

Some of these locomotives are fitted with buckeye couplers and retractable buffers, namely 206 - 209, and 215 - 234. This is to enable them to be used for push/pull work. Some of the above numbered locomotives have screw shackles fitted to allow them to operate trains equipped with shackles. In all cases it is

necessary to ensure that the buffers are set up correctly. Locomotives 201 - 205 and 210 - 214 have drawbars, shackles, and standard buffers. They are not used on push/pull trains.

AWS and Translink (NIR) RADIO

Locomotives 206 to 209 inclusive are fitted with an automatic warning system (AWS) and a Translink (NIR) radio for use on the Translink (NIR) rail system. Details of the function and operation of this equipment may be found in the General Appendix.

HEATED WINDSCREEN

The windscreens on these locomotives are heated to prevent misting and give good visibility.

BRAKE GAUGES - see Fig. 9.

The main reservoir gauge is different from the ones fitted to other locomotives in so far as it only has one pointer or needle, to indicate the main reservoir air pressure. The deadman's application pressure is not shown on this or any other pressure gauge on the locomotive.

DEADMAN'S EQUIPMENT and VIGILANCE TIMING

The timing of the vigilance cycle varies on this locomotive with speed. The faster you are travelling the shorter the time for the vigilance to cycle.

At 30 mph the vigilance needs to be reset every 100 seconds, and at 100 mph it must be reset every 30 seconds.

The vigilance cycle can be reset by operating the hooter, the notch control handle and the locomotive brake as well as the deadman's pedal.

THE OVERHEAD SWITCH PANEL - see Fig 11.

This panel contains an alarm and lights to show when the central fire alarm and suppression system has detected a fire in the engine room, inertial filter compartment or the electrical cabinet. This locomotive is fitted with an automatic

fire extinguisher system which can also be operated manually. The panel also contains the controls for the parking brake and the heated windscreens.

NORMAL/REMOTE CUT-OUT VALVE - see Fig 15.

This valve, situated in cab no. 1, has two positions - when operating as a lead locomotive the valve is in the normal position, and when operating at the rear of a push/pull train or being hauled the valve must be in the remote position. Fig. 15 shows this valve in the normal position.

DOOR INTERLOCK OVERRIDE SWITCH - see Fig.4

This switch allows the locomotive to take power when you have no blue light on push/pull trains.

N.B. - This switch must be sealed in the down position before the locomotive is taken into service. See Section 5.1 for further information about the door interlock switch.

AIR DRYERS - see Fig 24.

The air system on these locomotives is equipped with an air dryer which operates automatically. There is a facility to drain the water manually if the automatic dryers are not working.

CRANKCASE DETECTOR - see Figs 19 and 20.

These locomotives are fitted with crankcase detectors some of which have two buttons and the others three. On the two button type the top button is the protection against low water pressure, and the lower button detects abnormal crankcase pressure. In the case of locomotives fitted with the three button type the top two buttons are for protection against low water pressure and the third (bottom) button is to detect abnormal crankcase pressure. This unit, which provides protection for each of the cylinder head banks on the engine, is the same in operation as that fitted to the other locomotives, except that an additional water button has to be checked.

FIRE ALARM ON 201 CLASS LOCOMOTIVES

These locomotives are fitted with an automatic fire extinguishing system that will automatically operate in the event of a fire occurring. The system also has the option of manual operation if required. See Section 5.2 for activation of fire alarm.

Section 3

LOCOMOTIVE CONTROLS

A list of illustrations follows the contents page of this volume

The switch and fuse panel located at the back of no. 1 cab below the computer display panel.

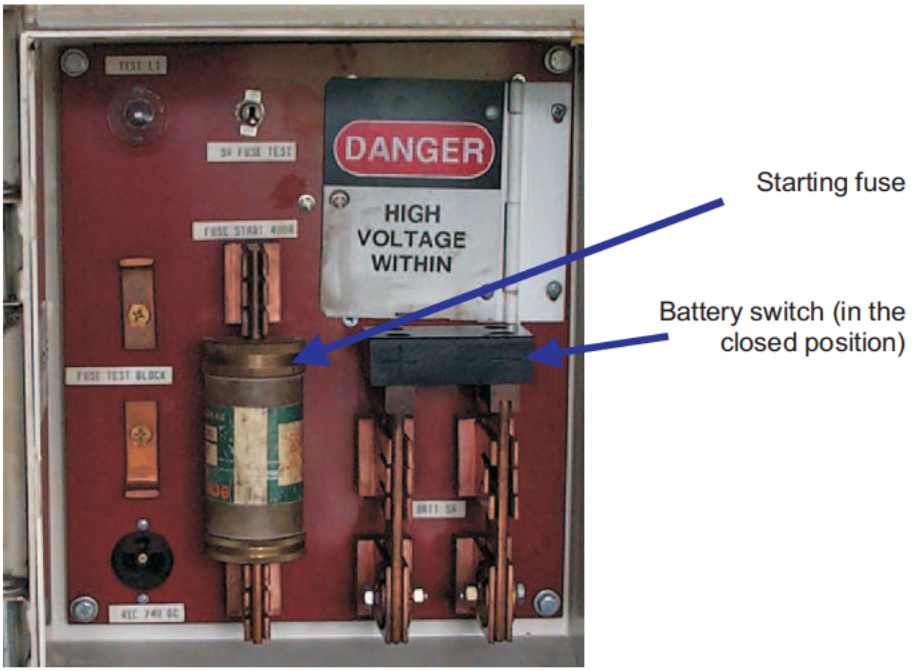


Fig 2 - The switch and fuse panel

The miniature circuit breaker (MCB) panel is located directly above the switch and fuse panel behind the computer display panel.

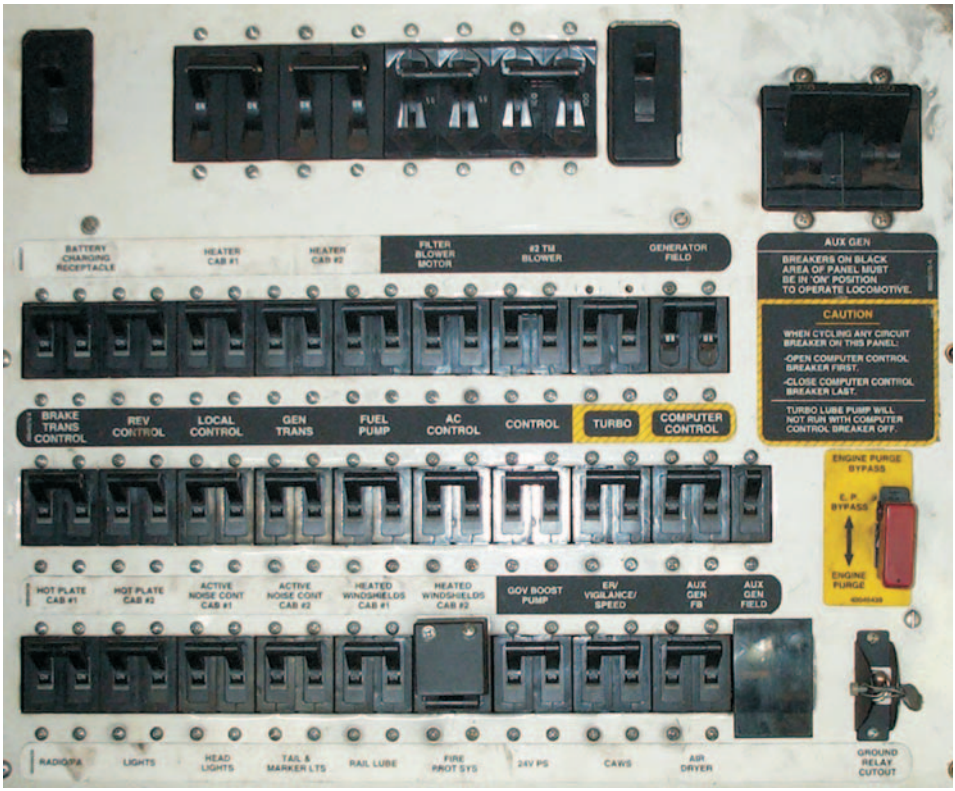


Fig 3 - The miniature circuit breaker (MCB) panel

The MCBs that must be on for locomotive operation have their nametags on a black background.

Other circuit breakers for lights and miscellaneous items have their names on a white background.

These MCBs are switched on by putting the switches in the up position, and turned off by putting the switches in the down position.

Event recorder download panel

EM2000 display

Door interlock override switch (sealed in the normal position)

Fig 4 - The computer display panel

Fig 5 - A typical crew message

(Above messages reads : #1 of 1. message code 273. No blended brake - blended brake cut out).

Fig 6 - The coach/locomotive and HEP control panels

The blended brake, CAWS override and vigilance override switches must be sealed.

Fig 7 - Driver's station, left hand side of cab 1

Fig 8 - Switch panel to right of driver's station

Fig 9 - Brake gauge panel with speedometer

Fig 10 - Switch panel on central console

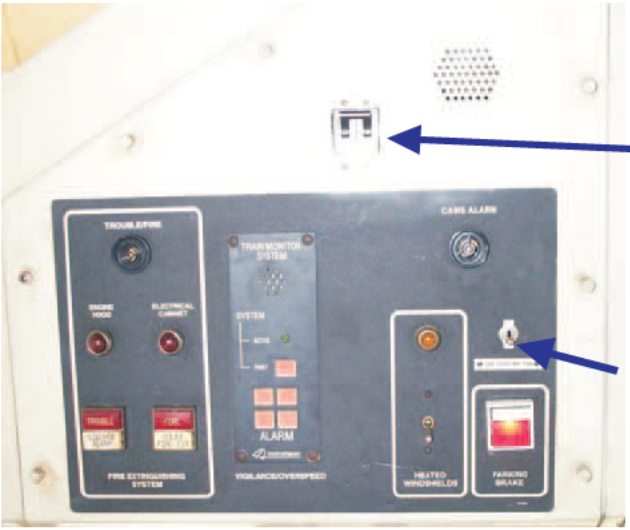


Fig 11 - Overhead switch panel with trouble/fire alarm and parking brake

This digital fuel gauge is only fitted to some of the 201 class locomotives.

Fig 12 - In-cab fuel gauge located between the two windscreens.

Fig 13 - The location of the parking brake release lever in the driver's cab.

Fig 14 - The parking brake release lever in use.

Fig 15 - The MU2 valve to the left of the normal/remote cut-out valve. The cut-out valve is in the normal position.

Fig 16 - The emergency brake valve at the right hand side of the cab

Fig 17 - The water level gauge on the cooling system

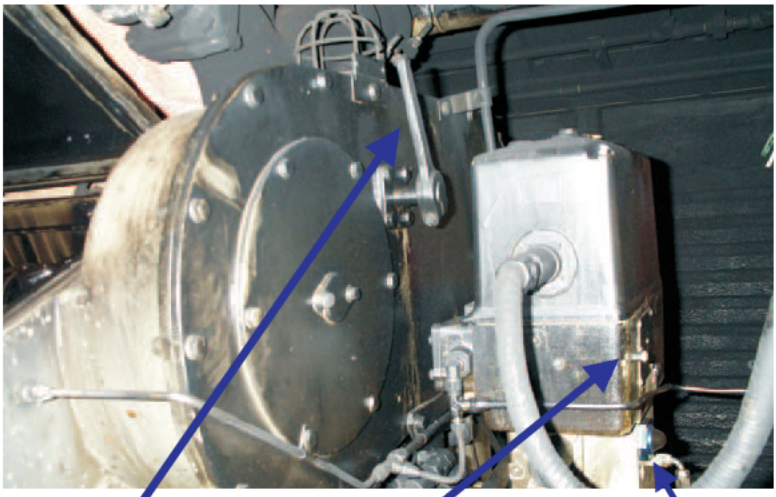


Fig 18 - The governor

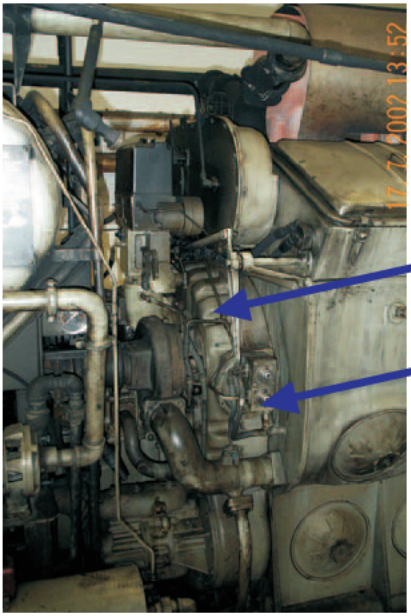


Fig 19 - The fuel rack lever and the crankcase detector

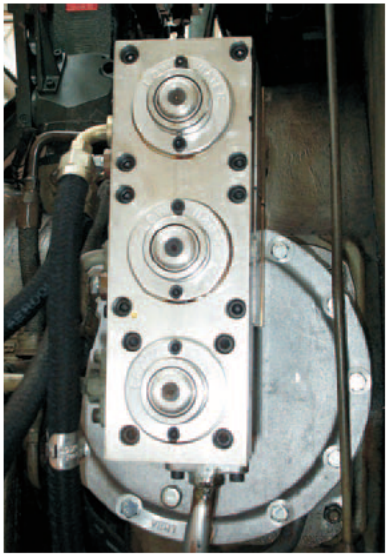


Fig 20 - The crankcase detector with two low water buttons and one crankcase button

The sight glass nearer the engine should be full under normal operation, while the other one should remain empty

Fig 21 - The two fuel filter sight glasses.

Close up of the oil level gauge - the needle must be in the green area

Fig 22 - The compressor/exhauster

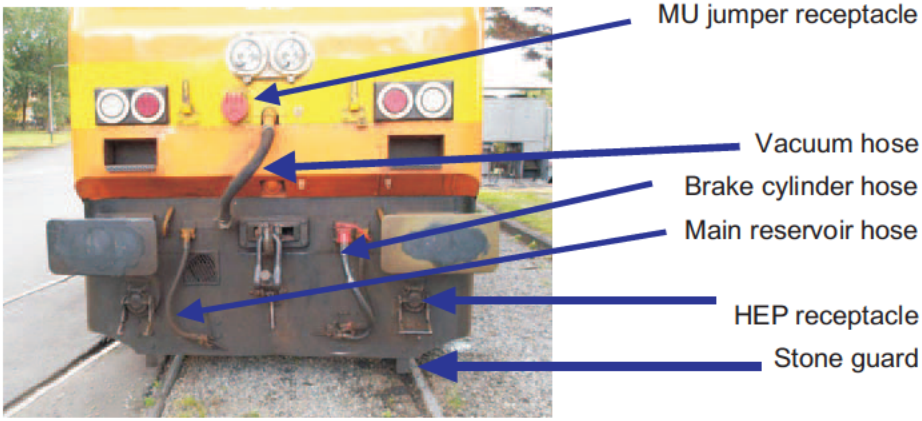
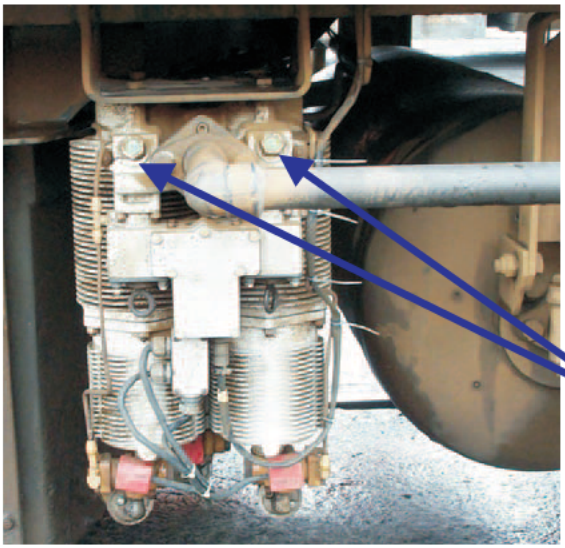
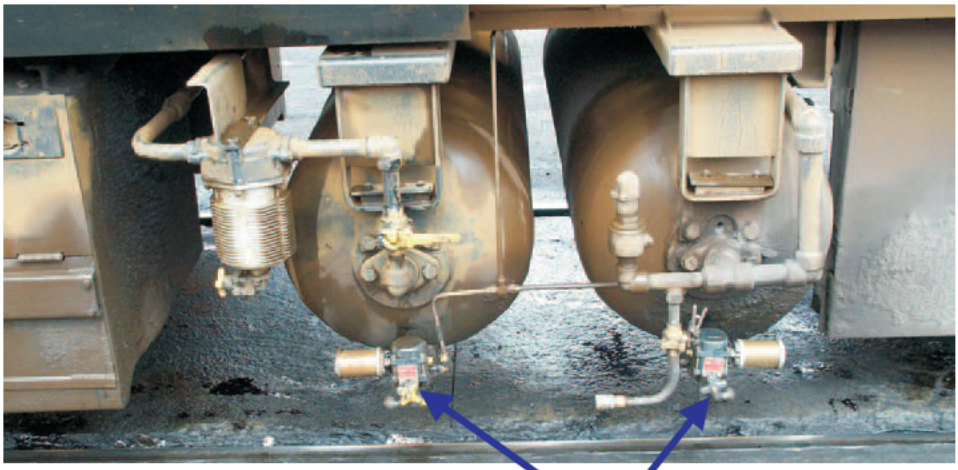


Fig 23 - Locomotive front



At least one of the air dryer discs must be blue. If both discs are white, pink or red the dryers have not been working and the reservoirs should be blown down manually.

Fig 24 - The air-drying equipment



The air reservoir blow down cocks

Fig. 25 - The main air reservoirs

Section 4

OPERATING INSTRUCTIONS

INDEX TO SECTION 4

Section 4.4 Changing cabs

- 4.4.A Cab being vacated
- 4.4.B Cab being occupied

Section 4.5 Disposal of a locomotive

- 4.5.A Shutting down the engine
- 4.5.B Leaving the engine running

Section 4.6 Change of driver

- 4.6.A Handing over to another driver on your footplate
- 4.6.B Handing over to another driver away from the footplate
- 4.6.C Taking over from another driver

REMOVAL OF KEYS

Where this text refers to removing the key, it must be understood that you take any removable key with you, and do not leave it in the locomotive cab. If you are disposing of your locomotive and the key is not a personal issue, you must hand the key to your supervisor at the end of your turn of duty.

LOCOMOTIVE PARKING BRAKE

Where this text refers to applying the parking brake, the following method must be used :

1. **Apply the locomotive and train brake handles to full service.**
2. **Apply the parking brake.**
3. **Release the locomotive and train brake handles. When the locomotive and train brakes are fully released, as indicated by the cab gauges, ensure that the parking brake is adequate to hold the locomotive or train.**
4. **Re-apply the locomotive and train brake handles to full service.**

Important : The MU2 must not be relied upon to secure an unattended locomotive or train.

4.1 PREPARATION FOR SERVICE (LOCOMOTIVE SHUT DOWN)

4.1.A EXTERNAL EXAMINATION

(1) When first going to the locomotive ensure that the following conditions apply :

- (i) it is secured by parking brake (and scotches if necessary)
- (ii) no person is working on or around it
- (iii) there are no not to be moved notices on display, such as red flags, hold off or battery on charge notices
- (iv) there are no fuel hoses, air lines or electrical cables connected to the locomotive.

(2) At each end of the locomotive examine:

- (i) buffers extended or retracted as required
- (ii) drawgear
- (iii) brake hoses, glad hands and air cocks
- (iv) vacuum hose on dummy plug and secured by pin
- (v) jumper receptacle covers (ensure they are closed or the locomotive is jumpered to a train as required)
- (vi) two portable tail lamps. There must be two lamps provided on the locomotive when it is not attached to a train. These may be on one end of the locomotive or in a cab
- (vii) stone guards
- (viii) CAWS pick-up coils.

(3) Along each side of the locomotive examine :

- (i) axle boxes and bearing caps
- (ii) brake blocks and brake gear
- (iii) springs

(iv) handrails and steps

(v) fuel filling points and gauges

(vi) two automatic extinguishers on the underframe

(vii) cab and car body doors - closed and secured

(viii) air reservoir blow down cocks - ensure that the threaded spindle protrudes from the star handle to indicate that the cocks are in the automatic position

(ix) air dryer - check that the disc colour in the air dryer is blue. If it has turned white, pink or red ensure that you blow down water from the reservoirs manually when the reservoirs are up to pressure

BLOWING DOWN THE MAIN AIR RESERVOIRS

If you notice that both discs in the air dryer are no longer blue or either or both automatic blow down cocks are isolated, blow down the air reservoirs manually. Report this defect in the logbook.

(x) the charging (booster) socket to make sure that it is fully closed

(xi) the speedometer electrical cable to ensure it is in place and shows no external signs of damage

(xii) the underfloor equipment box doors to ensure they are properly closed.

While you are carrying out the above examination remember to check that there are no loose, damaged or missing parts, also where possible, any reported defects have been attended to.

4.1.B INTERNAL EXAMINATION

(1) Examine the logbook for reported defects and check that any defects that would require attention before the locomotive is taken into service have been signed off by maintenance.

(2) Ensure that the following emergency equipment is installed :

(i) one dry powder fire extinguisher, at the entrance to each cab

(ii) one extinguisher for the high voltage cabinet

(iii) TCOD outside each cab, with the padlock in the correct position and is not resting on the floor

(iv) four scotches, which may already be in use securing the locomotive

(v) parking brake release lever in one cab (located in the press beside the hot plate).

4.1.C PREPARATION FOR STARTING

(1) In the engine room ensure that:

(i) the fuel sight glasses are intact

(ii) the overspeed lever is in the 11 o'clock position

(iii) the governor oil is visible in the sight glass and the governor button is latched (no red band showing)

(iv) the governor plug and cable are fully home and secure

(v) the water level on the sight glass is correct

(vi) the crankcase detector low water and crankcase buttons are set (no red band showing). Check that they are latched. If they are not, and will not reset, after you have started the engine ensure that you latch them within 40 seconds

(vii) the compressor/exhauster oil level gauge needle is in the green sector

(viii) There is no combustible debris in the general area.

(2) Check the following in each cab (going to no.2 cab first)

(i) the MU2 valve is cut out

(ii) the forward/reverse handle is in the neutral position

(iii) the notch control handle is in the idle position

(iv) the locomotive and train brake handles are in the full service position

(v) the engine run and gen field switches are switched off

(vi) the control and fuel pump switch is switched off

(vii) place the start/run switch in the run position in your trailing cab

(viii) the marker lights and headlamps are switched off.

(3) Additionally in no. 1 cab check :

(i) the vigilance, CAWS, blended brake and door interlock override switches are sealed in the correct position

(ii) the normal remote valve is in the normal (horizontal) position

(iii) open the circuit breakers panel and set it up as follows :

(a) switch on all the MCBs on the panel, with the exception of the CAWS MCB

(b) the ground relay switch is closed and sealed

(c) the engine purge switch is closed and sealed.

(4) Open the switch and fuse panel and firmly close the battery switch.

(5) On the HEP control panel ensure that the HEP mode switch is in the isolate position.

4.1.D STARTING UP THE DIESEL ENGINE

(1) Switch on the control and fuel pump switch in one cab only.

(2) With the start/run switch in start position, turn and hold the fuel prime/engine start switch in the fuel prime position for 20 to 30 seconds.

(3) Turn and hold the fuel prime/engine start switch in the engine start position. The engine will start turning over. Hold the switch in this position for 20 seconds or until the engine starts. If the engine does not start within the 20 seconds allow 2 minutes for the starting motors to cool off before trying another start. The computer controls the system so that the starter motors are not overloaded. If you try to restart before this time limit has expired nothing will happen. If the engine fails to start on the second attempt, refer to the fault finding section for this locomotive.

(4) When the engine starts release the fuel prime/engine start switch. The switch will return to the vertical position.

(5) When the engine revs have settled down (approx 20 seconds) turn the start/run switch to the run position.

4.1.E RUNNING ENGINE EXAMINATION

With the engine running carry out the following checks :

(1) within 40 seconds of starting the engine, ensure the crankcase detector buttons have not tripped. Do not reset these buttons more than twice

(2) the fuel sight glass next to the engine is full and free of bubbles and that the other sight glass is empty

(3) lift the engine oil dipstick and verify that the oil is between the marks on the dipstick

(4) leaks in the fuel, lubricating oil and water systems and listen for any air leaks

(5) in the rear cab ensure that the start/run switch is in the run position.

WATER LEAKS

Dripping water leaks are unfortunately common at clamp type joints (Marmon couplings) when engines are cold. Check that there are no leaks when the engine has warmed up.

ALL LEAKS

If water leaks persist, or fuel oil, lube oil and other leaks are found during the initial external and internal examinations, these leaks should be rectified before taking the locomotive into service. Seek advice from maintenance.

4.1.F PRE - SERVICE CHECKS

(1) On the overhead switch panel check that the trouble and fire indicators are off in both cabs.

(2) The following equipment must be tested as described below, these tests being carried out in both driving cabs:

(i) the operation of the wipers and the hooter

(ii) switch on the marker lights, tail lights and headlamps. Check these lights from the ground, and switch them off afterwards as required.

CAUTION

Make sure that your parking brake is applied and that the locomotive is scotched if necessary. You will be releasing brakes during the brake and deadman's/vigilance tests.

(3) Brake test.

Check that the main reservoir air pressure has built up to 100 to 130 psi before carrying out any further tests.

(i) Insert the master control key and turn it on.

(ii) Cut in the MU2 valve.

(iii) Switch on the CAWS MCB

The acknowledge button will light continuously, accompanied by an audible tone. After one minute this audible tone will stop sounding, but the lamp in the acknowledge button will stay lit until it is pressed.

(iv) When the CAWS equipment has timed out place the normal/disable switch in the normal position and press the acknowledge button.

(v) Switch on the engine run and gen field switches.

(vi) Reset the deadman's equipment.

(vii) Release the train brake handle and hold for 1 minute to ensure that there are no leaks in the main reservoir system.

(viii) Select forward direction.

(ix) Release the locomotive brake handle and confirm that all the brakes are released by observing the brake gauges, clearing any penalty brake (deadman's) that may have applied.

(x) Ensure the pneumatic control (PC) lamp goes out.

(xi) Carry out a brake test verifying gauge readings as in the table over :

BRAKE TEST

Step	Brake Handle Position	Gauge Indication	
1	Locomotive Full Service Train Released	MR BP BC Vac.	100 to 130 psi 70 psi 40 psi 21 ins
2	Locomotive Released Train Released	MR BP BC Vac.	100 to 130 psi 70 psi 0 psi 21 ins
3	Locomotive Released Train Full Service	MR BP BC Vac.	100 to 130 psi 48 psi 30 psi 0 ins
4	Locomotive Released Train Emergency	MR BP BC Vac.	100 to 130 psi 0 psi 30 psi 0 ins
5	Locomotive Full Service Train Full Service	MR BP BC Vac.	100 to 130 psi 48 psi 40 psi 0 ins
main reservoir (MR); brake cylinder (BC) ; brake pipe (BP) ; vacuum (Vac.)			

IMPORTANT

Check that all brake blocks are applied to the locomotive wheels.

Remove any scotches from the wheels and replace on the locomotive.

Before leaving the cab ensure that the forward/reverse handle is in neutral and the master control key is removed.

(4) Deadmans/vigilance tests

Insert and turn on the master control key.

Select a direction with the forward/reverse handle before continuing with these tests.

Cycle the deadman and keep the pedal depressed

(i) Release both the train brake and the locomotive brake handles and confirm the brake release on the brake gauges

(ii) Ensure that the PC lamp goes out

(iii) Release the deadman's pedal and note that the warning device sounds for 3 seconds with a low audible tone followed by 3 seconds with a high audible tone. After 7 seconds see that the:

- brake pipe falls to 0 psi
- vacuum pipe falls to 0 ins Hg
- brake cylinder pressure rises to 30psi.
- PC lamp lights
- engine revs increase

Press the parking brake off button and see that the parking brake light goes out.

Sound the hooter and test that it is not possible to take power by notching up the notch control handle. Note that the engine speed falls to idle and that the locomotive does not attempt to move.

(iv) re-apply the parking brake

(v) return the notch control handle to idle and reset the deadman, holding the pedal or button depressed until brakes are released and PC lamp goes out

(vi) hold the pedal depressed to prevent a deadman's brake application and note that the alarm sounds after a period of 105 to 135 seconds. Continue to depress the pedal and observe that the vigilance applies as follows :

- the brake pipe falls to 0 psi
- vacuum pipe falls to 0 ins Hg
- brake cylinder pressure rises to 30psi.
- PC lamp lights
- engine revs increase

(vii) reset the deadman's pedal again

(viii) test the operation of the other pedal and the override button in this cab. Engage each pedal and button in turn and note that the warning device sounds each time the button or pedal is released

(ix) Select neutral and apply the locomotive brake.

(5) Brake leakage test

Carry out a brake leakage test as follows :

(i) ensure that the parking brake is applied

(ii) apply both brake handles to their full service position

(iii) cut-out the MU2 valve

(iv) check the brake cylinder gauge reading and observe that for 1 minute there is no drop in the brake cylinder pressure

(v) cut-in the MU2 valve.

The brake leakage test need only be performed in one cab.

(6) CAWS test

Carry out the CAWS test as described in the General Appendix, Section J.

(7) Radio test

Carry out the radio tests as described in the General Appendix, Section F.

Note: With the exception of the brake leakage test, all the above tests must be carried out in both driving cabs of the locomotive. For the purpose of carrying out these tests it is necessary to change ends in accordance with the procedure described in the section Changing Cabs.

4.1.G SETTING UP THE CABS

The following two lists spell out the way that each cab has to be set up. Most of these points should already be completed.

(1) ensure that the trailing cab is set up as follows :

- (i) forward/reverse handle in neutral position
- (ii) notch control handle in idle position
- (iii) eng run and gen field switches off
- (iv) train radio switched off
- (v) CAWS in disable position
- (vi) MU2 valve switched out
- (vii) locomotive brake handle in full service
- (viii) train brake handle in full service
- (ix) start/run switch in run position
- (x) wipers, hotplates, heaters and cab lights switched off
- (xi) marker lights, tail lights and headlamps set up in accordance with the Rule Book
- (xii) close windows and lock cab doors.

(2) Go to the driving cab and :

- (i) ensure that both brake handles are in the full service position
- (ii) check that the main reservoir pressure has risen to 100 to 130 psi. and the gauges indicate that the brakes are applied
- (iii) cut in the MU2 valve

(iv) check the crew messages on the computer for the status of your locomotive e.g traction motor cut out, blended brake cut out etc.

(v) insert and turn the master control key

(vi) place the engine run and gen field switches in the on (up) position

(vii) release the parking brake by pressing the off button on the overhead console and observe that the associated light extinguishes.

Your locomotive is now ready to enter service.

Remember - before entering service, you must ensure that :

(i) the train radio identity (I.D.) and channel are correctly set up

(ii) the correct carrier is selected for the CAWS equipment (in a non CAWS area leave disabled)

(iii) the correct head/marker lights are displayed

(iv) tail lamps are displayed as required.

4.2 PREPARATION FOR SERVICE (LOCOMOTIVE ENGINE RUNNING)

This section covers the preparation for service of a locomotive with the engine running, when the locomotive has been disposed of for a period in excess of two hours or has required the attention of maintenance.

4.2.A EXTERNAL EXAMINATION

(1) When first going to the locomotive ensure that the following conditions apply :

(i) it is secured by parking brake (and scotches if necessary)

(ii) no person is working on or around it

(iii) there are no not to be moved notices on display, such as red flags, hold off or battery on charge notices

(iv) there are no fuel hoses, air lines or electrical cables connected to the locomotive.

(2) At each end of the locomotive examine :

(i) buffers extended or retracted as required

(ii) drawgear

(iii) brake hoses, glad hands and air cocks

(iv) vacuum hose on dummy plug and secured by pin

(v) jumper receptacle covers (ensure they are closed or the locomotive is jumpered to a train as required)

(vi) two portable tail lamps. There must be two lamps provided on the locomotive when it is not attached to a train. These may be on one end of the locomotive or in a cab

(vii) stone guards

(viii) CAWS pick-up coils.

(3) Along each side of the locomotive examine :

(i) axle boxes and bearing caps

(ii) brake blocks and brake gear

(iii) springs

(iv) handrails and steps

(v) fuel filling points and gauges

(vi) two automatic extinguishers on the underframe

(vii) cab and car body doors - closed and secured

(viii) air reservoir blow down cocks - ensure that the threaded spindle protrudes from the star handle to indicate that the cocks are in the automatic position

Blowing down the main air reservoirs

If you notice that both discs in the air dryer are no longer blue or either or both automatic blow down cocks are isolated, blow down the air reservoirs manually. Report this defect on the logbook.

(ix) check that the disc colour in the air dryer is blue. If it has turned white, pink or red ensure that you blow down water from the reservoirs manually when the reservoirs are up to pressure

(x) check that the charging (booster) socket is fully closed

(xi) check that the speedometer electrical cable is in place and shows no external signs of damage

(xii) check that the underfloor equipment box doors are properly closed.

While you are carrying out the above examination remember to check that there are no loose, damaged or missing parts, also check where possible that any reported defects have been attended to.

4.2.B INTERNAL EXAMINATION

(1) Examine the logbook for reported defects and check that any defects that would require attention before the locomotive is taken into service have been signed off by maintenance.

(2) Ensure that the following emergency equipment is installed :

(i) one dry powder fire extinguisher at the entrance to each cab

(ii) one extinguisher for the HV cabinet

(iii) TCOD outside each cab, with the padlock in the correct position and is not resting on the floor

(iv) four scotches, which may already be in use securing the locomotive

(v) parking brake release lever in one cab (located in the press beside the hot plate).

4.2.C RUNNING ENGINE EXAMINATION

(1) With the engine running carry out the following :

(i) check that the fuel sight glass next to the engine is full and free of bubbles and that the other sight glass is empty

(ii) lift the engine oil dipstick and verify that the oil is between the marks on the dipstick

(iii) check for leaks in the fuel, lubricating oil and water systems and listen for any air leaks

(iv) the governor oil is between the marks on the sight glass

(v) the water level on the sight glass is correct

(vi) the compressor/exhauster oil level gauge needle is in the green sector

(vii) there is no combustible debris in the general area.

WATER LEAKS

Dripping water leaks are unfortunately common at clamp type joints (Marmon couplings) when engines are cold. Check that there are no leaks when the engine has warmed up.

ALL LEAKS

If water leaks persist, or fuel oil, lube oil and other leaks are found during the initial external and internal examinations, these leaks should be rectified before taking the locomotive into service. Seek advice from maintenance.

(2) Check the following in each cab (going to no.2 cab first):

(i) the MU2 valve is cut out

(ii) the forward/reverse handle is in neutral

(iii) the notch control handle is in idle

(iv) the locomotive and train brake handles are in the full service position

(v) the engine run and gen field switches are switched off

(vi) the control and fuel pump switch is switched on in one cab only

(vii) place the start/run switch in the run position

(viii) the marker lights and headlamps are switched off.

(3) In cab no. 1 check :

(i) that the vigilance, CAWS, blended brake and door interlock override switches are sealed in the correct position

(ii) that the normal/remote valve is in the normal (horizontal) (cab no. 1 only) position

(iii) that all MCBs are on

(iv) the ground relay switch is closed and sealed

(v) the engine purge switch is closed and sealed

(vi) the battery switch is fully closed

(vii) the HEP switch is in the isolate position.

4.2.D PRE - SERVICE CHECKS

(1) On the overhead switch panel check that the trouble and fire indicators are off in both cabs.

(2) The following equipment must be tested as described below, these tests being carried out in both driving cabs:

(i) the operation of the wipers and the hooter.

(ii) switch on the marker lights, tail lights and headlamps. Check these lights from the ground, and switch them off afterwards as required.

CAUTION

Make sure that your parking brake is applied and that the locomotive is scotched if necessary. You will be releasing brakes during the brake and deadman's/vigilance tests.

(3) Brake test.

Check that the main reservoir air pressure has built up to 100 to 130 psi before carrying out any further tests.

(i) Cut in the MU2 valve

(ii) Insert the master control key and turn it on.

(iii) Switch on the engine run and gen field switches.

(iv) Switch on the CAWS MCB and place the normal/disable switch in the normal position.

The acknowledge button will light continuously, accompanied by an audible tone. After one minute this audible tone will stop sounding, but the lamp in the acknowledge button will stay lit until it is pressed.

(v) When the CAWS equipment has timed out press the acknowledge button.

(vi) Reset the deadman's equipment.

(vii) Release the train brake handle and hold for 1 minute to ensure that there are no leaks in the main reservoir system.

(viii) Select forward direction.

(ix) Release the locomotive brake handle and confirm that all the brakes are released by observing the brake gauges, clearing any penalty brake (deadman's) that may have applied.

(x) Ensure the PC lamp goes out.

(xi) Carry out brake test verifying gauge readings as in the table over :

Brake Test

Step	Brake Handle Position	Gauge Indication	
1	Locomotive Full Service Train Released	MR BP BC Vac.	100 to 130 psi 70 psi 40 psi 21 ins
2	Locomotive Released Train Released	MR BP BC Vac.	100 to 130 psi 70 psi 0 psi 21 ins
3	Locomotive Released Train Full Service	MR BP BC Vac.	100 to 130 psi 48 psi 30 psi 0 ins
4	Locomotive Released Train Emergency	MR BP BC Vac.	100 to 130 psi 0 psi 30 psi 0 ins
5	Locomotive Full Service Train Full Service	MR BP BC Vac.	100 to 130 psi 48 psi 40 psi 0 ins
main reservoir (MR); brake cylinder (BC) ; brake pipe (BP) ; vacuum (Vac.)			

IMPORTANT

Check that all brake blocks are applied to the locomotive wheels.

Remove any scotches from the wheels and replace on the locomotive.

Before leaving the cab ensure that the forward/reverse handle is in neutral and the master control key is removed.

(4) Deadmans/vigilance test.

Insert the master control key and turn it on.

Select a direction with the forward/reverse handle.

Cycle the deadman, keep the pedal depressed and carry out the following tests :

(i) release both the train brake and the locomotive brake handles and confirm the brake release on the brake gauges

(ii) ensure that the PC lamp goes out

(iii) release the deadman's pedal and note that the warning device sounds for 3 seconds with a low audible tone followed by 3 seconds with a high audible tone. After 7 seconds see that :

- brake pipe falls to 0 psi.
- vacuum pipe falls to 0 ins Hg.
- brake cylinder pressure rises to 30psi.
- PC lamp lights.
- engine revs increase.

(iv) press the parking brake off button and see that the parking brake light goes out

(v) sound the hooter and test that it is not possible to take power by notching up the notch control handle. Note that the engine speed falls to idle and that the locomotive does not attempt to move

(vi) re-apply the parking brake

(vii) return the notch control handle to idle and reset the deadman, holding the pedal or button depressed until brakes are released and PC lamp goes out

(viii) hold the pedal depressed to prevent a deadman's brake application and note that the alarm sounds after a period of 105 to 135 seconds. Continue to depress the pedal and observe that the vigilance applies as follows :

- brake pipe falls to 0 psi.
- vacuum pipe falls to 0 ins Hg.
- brake cylinder pressure rises to 30psi.
- PC lamp lights.
- engine revs increase.

(ix) reset the deadman's pedal again

(x) test the operation of the other pedal and the override button in this cab. Note that the warning device sounds each time the button or pedal is released.

(xi) select neutral and apply the locomotive brake.

(5) Brake leakage test

Carry out a brake leakage test as follows :

(i) ensure that the parking brake is applied

(ii) apply both brake handles to their full service position

(iii) cut-out the MU2 valve

(iv) check the brake cylinder gauge reading and observe that for 1 minute there is no drop in the brake cylinder pressure

(v) cut-in the MU2 valve.

The brake leakage test need only be performed in one cab.

(6) CAWS test

Carry out the CAWS test as described in the General Appendix, Section J.

(7) Radio test

Carry out the radio tests as described in the General Appendix, Section F.

Note: With the exception of the brake leakage test, all the above tests must be carried out in both driving cabs of the locomotive. For the purpose of carrying out these tests it is necessary to change ends in accordance with the procedure described in the section Changing Cabs.

4.2.E SETTING UP THE CABS

(1) Ensure that the trailing cab is set up as follows :

- (i) forward/reverse handle in neutral position
- (ii) notch control handle in idle position
- (iii) eng run and gen field switches off
- (iv) train radio switched off
- (v) CAWS in disable position
- (vi) MU2 valve switched out
- (vii) locomotive brake handle in full service
- (viii) train brake handle in full service
- (ix) start/run switch in run position
- (x) wipers, hotplates, heaters and cab lights switched off
- (xi) marker lights, tail lights and headlamps set up in accordance with the Rule Book
- (xii) close windows and lock cab doors.

(2) Go to the driving cab and :

- (i) ensure that both brake handles are in the full service position
- (ii) check that the main reservoir pressure has risen to 100 to 130 psi. and the gauges indicate that the brakes are applied
- (iii) cut in the MU2 valve
- (iv) check that the normal/remote valve is in the normal (horizontal) position
- (v) check the crew messages on the computer for the status of your locomotive e.g traction motor cut out, blended brake cut out etc.

(vi) insert and turn the master control key

(vii) place the engine run and gen field switches in the on position

(viii) release the parking brake by pressing the off button on the overhead console and observe that the associated light extinguishes.

Your locomotive is now ready to enter service.

Remember - before entering service, you must ensure that :

(i) the train radio I.D. and channel are correctly set up

(ii) the correct carrier is selected for the CAWS equipment (in a non CAWS area leave disabled)

(iii) the correct head/marker lights are displayed

(iv) tail lamps are displayed as required.

4.3 PARTIAL PREPARATION FOR SERVICE (LOCOMOTIVE ENGINE RUNNING)

In this case you are taking control of a locomotive with the engine running which has been in service within the last two hours and has not required the attention of maintenance within that period.

4.3.A EXTERNAL EXAMINATION

(1) When first going to the locomotive ensure that the following conditions apply :

(i) it is secured by parking brake (and scotches if necessary)

(ii) no person is working on or around it

(iii) there are no not to be moved notices on display such as red flags, hold off or battery on charge notices

(iv) there are no fuel hoses, air lines or electrical cables connected to the locomotive.

4.3.B PRE - SERVICE CHECKS

Examine the logbook for reported defects and check that any defects that would require attention before the locomotive is taken into service have been signed off by maintenance.

4.3.C SETTING UP THE CABS

(1) Ensure that the trailing cab is set up as follows :

- (i) forward/reverse handle in neutral position
- (ii) notch control handle in idle position
- (iii) eng run and gen field switches off
- (iv) train radio switched off
- (v) CAWS in disable position
- (vi) MU2 valve switched out
- (vii) both brake handles in full service
- (viii) start/run switch in run position
- (ix) wipers, hotplates, heaters and cab lights switched off
- (x) marker lights, tail lights and headlamps set up in accordance with the Rule Book
- (xi) close windows and lock cab doors.

(2) Go to the driving cab and :

- (i) ensure that both brake handles are in the full service position
- (ii) check that the main reservoir pressure has risen to 100 to 130 psi. and the gauges indicate that the brakes are applied
- (iii) cut in the MU2 valve
- (iv) check that the normal/remote valve is in the normal (horizontal) position
- (v) check the crew messages on the computer for the status of your locomotive e.g traction motor cut out, blended brake cut out etc.
- (vi) insert and turn the master control key

(vii) place the engine run and gen field switches in the on position.

Check that the vigilance, CAWS, blended brake and door interlock override switches are sealed in the correct positions in cab no. 1.

Check that the deadman's equipment is operational in both cabs.

Release the parking brake by pressing the off button on the overhead console and observe that the associated light extinguishes. Ensure that there are no scotches under the wheels.

Your locomotive is now ready to enter service.

Remember before entering service, you must ensure that :

(i) the train radio I.D. and channel are correctly set up

(ii) the correct carrier is selected for the CAWS equipment (in a non CAWS area leave disabled).

(iii) the correct head/marker lights are displayed

(iv) tail lamps are displayed as required.

4.4 CHANGING CABS

The following is the procedure that you must use when you are changing cabs:

4.4.A CAB BEING VACATED

(i) Apply both brake handles to the full service position and check that the brake gauges read accordingly.

(ii) Apply the train brake handle to the emergency position. Observe that the brake pipe gauge falls to 0 psi.

(iii) Apply the parking brake.

(iv) Cut out the MU2 valve.

(v) Replace the train brake handle to the full service position.

(vi) Place the forward/reverse handle in the neutral position.

(vii) Remove the master control key.

(viii) Switch off the engine run and gen field switches.

(ix) Switch off the train radio.

(x) Place the CAWS unit in the disable position.

(xi) Change marker lights as required.

(xii) Switch off the headlamps and wipers as required.

(xiii) Turn off heater, cab lights and hotplate.

(xiv) Close windows and lock cab doors.

4.4.B CAB BEING OCCUPIED

(i) Ensure both brake handles are in the full service position.

(ii) Cut-in the MU2 valve.

(iii) Insert the master control key.

(iv) Release the parking brake.

(v) Switch on the eng run and gen field switches.

(vi) Set up the train radio and test its operation.

(vii) Set up the CAWS unit as required.

(viii) Switch on marker lights/headlamps as required.

4.5 DISPOSAL OF A LOCOMOTIVE

This section deals with disposal of a locomotive under two headings:

A. Disposal of your locomotive, shutting down the engine

B. Disposal of your locomotive, leaving the engine running

Disposal of your locomotive by handing over to another driver is dealt with in Section 4.6 - Change of Driver.

4.5.A DISPOSAL OF A LOCOMOTIVE, SHUTTING DOWN THE ENGINE

Before shutting down the diesel engine, examine interior for any fuel oil, lube oil, water, air or vacuum leaks, or any loose or missing parts.

(i) Place both brake handles in the full service position.

(ii) Apply the parking brake (and use scotches if required).

(iii) Place the gen field and eng run switches in the off position.

(iv) Ensure that the notch control handle is shut off.

(v) Place the forward/reverse handle in the neutral position.

(vi) Remove the master control key.

(vii) Cut out the MU2 valve.

(viii) Place the start/run switch in the start position.

(ix) Press the emergency fuel cut-off button and allow the engine to stop.

(x) Turn off the control and fuel pump switch.

(xi) Turn off the radio.

(xii) Place the CAWS equipment in the disable position.

(xiii) Turn off all wipers, heaters, cab lights and hotplate.

(xiv) Turn off marker lights/headlamps as required.

(xv) Open the battery switch.

(xvi) Turn off the CAWS MCB.

(xvii) Examine the locomotive externally for any leaks, loose or missing parts.

(xviii) Complete the logbook.

(xix) Close windows and lock cab doors.

(xx) Make a verbal report on the locomotive condition to the supervisor on arrival at the depot if there is anything likely to prevent the locomotive from re-entering service.

4.5.B DISPOSAL OF A LOCOMOTIVE, LEAVING THE ENGINE RUNNING

Examine the locomotive for any fuel oil, lube oil, water, air or vacuum leaks, or any loose or missing parts, and carry out the following procedures :

(i) Place both brake handles in the full service position.

(ii) Apply the parking brake (and use scotches if required).

(iii) Place the gen field and eng run switches in the off position.

(iv) Ensure that the notch control handle is shut off.

(v) Place the forward/reverse handle in the neutral position.

(vi) Remove the master control key.

(vii) Cut out the MU2 valve.

(viii) Place the start/run switch in the start position.

(ix) Turn off marker lights/headlamps as required.

(x) Complete the logbook.

(xi) Turn off the train radio.

(xii) Place the CAWS in the disable position.

(xiii) Turn off wipers, cab lights, hotplate and heaters.

(xiv) Close windows and lock cab doors.

(xv) Make a verbal report on the locomotive condition to the supervisor on arrival at the depot if there is anything likely to prevent the locomotive from re-entering service.

4.6 CHANGE OF DRIVER

This section covers situations where

A. You hand over to another driver before you leave the footplate.

B. You hand over to another driver but the footplate is left unattended for the changeover.

C. You take over from another driver.

4.6.A HANDING OVER TO ANOTHER DRIVER ON YOUR FOOTPLATE

You must carry out the following before handing over to another driver :

(i) apply both brake handles to the full service position and confirm brake application on brake gauges

(ii) select neutral

(iii) remove the master control key

(iv) ensure defects are recorded on the logbook

(v) inform the driver taking over of any defects or any special instructions regarding the working of the train.

4.6.B HANDING OVER TO ANOTHER DRIVER AWAY FROM THE FOOTPLATE

This section deals with the situation where you hand over to another driver, but the footplate has to be left unattended for the changeover. This situation can arise in service when two trains are being crossed.

In this situation you carry out 4.6.A above, in addition you must switch off the eng run and gen field switches, and also must ensure that the parking brake is applied.

4.6.C TAKING OVER FROM ANOTHER DRIVER

(i) Enquire from the driver being relieved if there is anything requiring special attention regarding the working of the train, or if there are any defects on the locomotive.

(ii) Check the logbook regarding recorded defects.

(iii) Check that the parking brake is released.

(iv) Insert the master control key.

(v) Switch on the eng run and gen field switches.

(vi) Select forward.

(vii) Test the operation of the deadman's equipment in the driving cab by releasing the train brake, partially releasing the locomotive brake and then releasing the pedal to see that the brakes begin to apply.

Section 5

SPECIAL INSTRUCTIONS

5.1 USE OF DOOR INTERLOCK OVERRIDE SWITCH

If the seal is broken

(i) On the locomotive entering service from a maintenance depot, the fault must be rectified. If the depot concerned does not have the facilities to carry out the repairs to rectify the problem, it is permissible to enter service subject to the conditions below.

(ii) On the locomotive about to enter service at a location where there are no maintenance facilities, it is permissible to enter service subject to the conditions below.

(iii) On the locomotive while in service it is permissible to remain in service subject to the conditions below.

Conditions

In these cases you must inform the traffic regulator, or controlling signalman in a non-CTC area, who will ensure that the locomotive is worked directly to a depot that can effect repairs. The locomotive must be taken out of service.

IMPORTANT

> **If operating a push/pull train with the seal broken, you cannot rely on the door interlock to prevent you from taking power without a blue light.**

5.2 ACTIVATION OF FIRE ALARM

The alarm will sound for 10 seconds and then the automatic extinguishers will be activated and the engine will be shut down. If during this 10 sec. period the delay fire ext. switch is pressed the shut down sequence will be delayed for twenty seconds. The 10 second delay sequence will then start again. During this second 10 second delay period the delay fire ext. switch can again be pressed, giving another 20 second postponement before the 10 second sequence again starts. This process of repeatedly pressing the delay fire ext. switch can be repeated as often as necessary to allow the train to clear a tunnel or other obstruction so that passengers can be detrained safely, etc.

Deferring the operation of the extinguishers MUST be kept to a minimum.

5.3 MANUALLY RELEASING THE PARKING BRAKE

If assisting a failed 201 class, occasions may arise where the parking brake will remain applied when the service brake is released on the 201 class. You will observe that the brake blocks release on axles 2, 3, 4, 5 and remain applied on axles 1 and 6. This can occur when releasing the service brake :

(i) with an assisting locomotive(s), correctly coupled to the 201 class and you are unable to release the parking brakes from the cab e.g. no battery power or a burst parking brake hose.

or

(ii) by blowing down the air reservoirs of the 201 class where it is not possible to build main reservoir pressure due to damage/leak. In this case the assisting locmotive is coupled to the failed 201 class which is being hauled unbraked with a brake van or a vacuum braked train in rear.

The parking brakes must be manually released as follows :

1. Release the service brake.
2. Confirm release by observing brake blocks are released on axles 2, 3, 4 and 5.
3. Using the parking brake release lever, pull out the release ring on each of the parking brake cylinders on axles 1 and 6 (total of four) until you hear it click (see fig. 14).
4. As you hear each click, observe the brake block move away from the wheel.

IMPORTANT

> **Before you manually release parking brakes, ensure that the 201 class is coupled to another vehicle on which the brakes are applied.**

> **When disposing of a 201 class with parking brakes manually released, it must be secured by scotches as the parking brakes will not operate and cannot be applied.**

FOR INFORMATION OF COMPANY'S EMPLOYEES ONLY

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DRIVERS' MANUAL

VOLUME 3

071 Class Locomotive

To operate on and from 31/05/2005

NOTES

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071 CLASS LOCOMOTIVE (JT22CW)

Fig. 1 - 071 class locomotive number 078 at Inchicore after a body overhaul in 1987

Section 1

LOCOMOTIVE DATA

Locomotive horsepower :	2250

Diesel engine details

Model :	645E3C
Type :	Turbocharged 2 stroke
No. of cylinders :	12
Full speed :	900 rpm
Idle speed :	315 rpm
Low idle speed :	255 rpm

Main alternator

Traction alternator (rectified output) :	AR10
Nominal voltage :	600 volts

Traction motors

Model :	D77
Number :	6
Type :	Axle mounted DC series wound

Wheel arrangement	CoCo
Wheel diameter :	40" (1.016m)
Weight on rails (fully loaded) :	99 tons (100,600 kg)
Distance over buffers :	57 ft. (17.374 m)
Width :	9' 5 7/8"(2.892 m)
Height :	13' 3 3/16 " (4.043m)
Fuel tank capacity:	814 imp. gals (3785 litres)
Water system :	168 imp. gals (757 litres)
Max. service speed :	90 mph (145 km/h)
Number in fleet :	18 locomotives
Entered service :	1977

The traction motors were all refielded and rebuilt to D78 specification.

Section 2

IMPORTANT FEATURES ABOUT THIS LOCOMOTIVE

TURBOCHARGER (TURBO)

The turbocharger supplies high pressure air to the engine for combustion (remember the more air you can get into a cylinder the more fuel you can burn and the more power you get out). It does this by using the spent exhaust gases to turn a turbine and compress the air delivered to the engine. At low engine speeds there is insufficient exhaust gas to do this efficiently and the turbocharger is driven by the engine through gears. As the engine speed increases the volume of exhaust gas increases, and when this reaches a sufficient volume these gases take over the turbo drive via a clutch.

A turbocharger is more efficient than a blower type compressor because the waste exhaust gasses are used to drive it and there is no power taken from the engine at high engine speeds.

Turbo-charger bearings must be properly lubricated before start up and cooled down gradually after shut down. To ensure this, an auxiliary lubricating oil pump is provided. The pump and its indicator lamp remain on for approximately 35 minutes after start. Likewise when the locomotive is shut down, the pump and its lamp will remain on for approximately 35 minutes even when the battery switch is opened. After this time, the pump will automatically shut down and the indicator lamp will go out. With the pump and lamp working, locomotive operation will not be affected.

PURGE CONTROL

The purge control is a means of turning over the diesel engine in order to flush out (or purge) any water from the cylinders so that a hydraulic lock is avoided on start up. This purging is done automatically on cranking over the engine to start. The engine cranking speed is reduced for this cycle. When this cycle is completed the cranking speed increases to the normal cranking speed for starting.

Normally if there is any water in the cylinders it would be ejected through the valves or the air box during engine purge. If a hydraulic lock occurs during the purge cycle the starter motors will stall as they do not have sufficient power to rotate the engine under these conditions. This prevents any damage being caused to the engine. If they do stall, the starter fuse will blow to give further protection from any damage being caused.

TRACTION MOTOR CUT-OUT SWITCH - see Fig. 10

The traction motor cut-out switch is located below the engine control panel in cab no.1. If a traction motor is defective and is causing ground faults, it can be isolated by the use of this switch. This switch will isolate a pair of motors rather than an individual one, and the power is automatically reduced to prevent overloading the remaining four motors still in use.

When operating this switch it is necessary to place the start/run switch on the engine control panel in the isolate position. Make sure that all the locomotive wheels rotate freely before operating with a traction motor cut out.

MAIN RESERVOIR BOOST BUTTON FOR AIR-BRAKED TRAINS - see Fig. 8

This button located beside the MU2 valve is used to build up air reservoir pressure quickly when the locomotive has coupled up to an air- braked train. To build up the air pressure more quickly you place the train brake handle in emergency and hold down the red button until the air pressure has built up to the required level (100 to 130 psi).

LOW IDLE/HIGH IDLE

This class of locomotive is equipped with a fuel saving feature that reduces the idling engine revs. from 315 to 255 rpm. This happens automatically every time you put the forward/reverse handle into neutral.

Section 3

LOCOMOTIVE CONTROLS

A list of illustrations follows the contents page of this volume

The electrical cabinet is located at the back wall of cab no.1. At the top right hand corner is the switch and fuse panel.

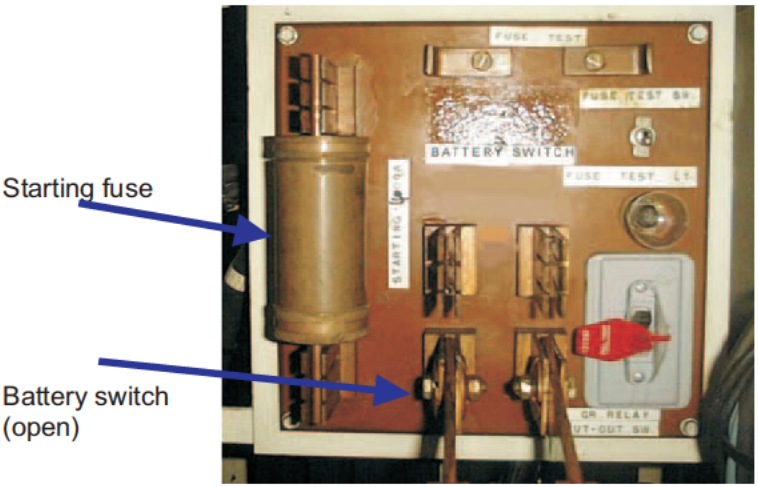


Fig. 2 - The switch and fuse panel.

The miniature circuit breaker panel is located directly below the switch and fuse panel.

Fig. 3 - The miniature circuit breaker panel

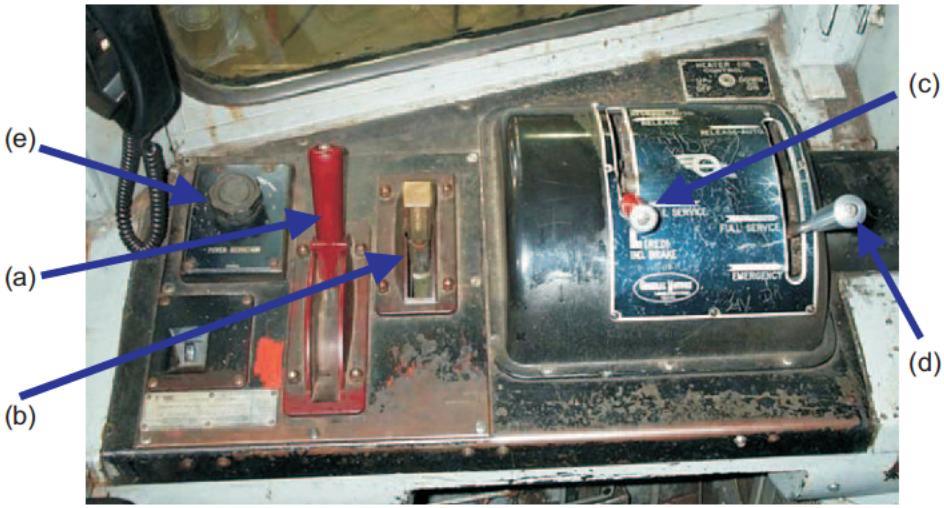
The black section on the right hand side contains the MCBs that are essential for locomotive operation.

The control console consists of four parts, namely

Two control desks (left and right) - see Fig. 4

Switch and indicating light panel - see Fig. 5

Brake gauge panel - see Fig. 6



(a) Notch control handle

(b) Forward/reverse handle

(c) Locomotive brake handle

(d) Train brake handle

(e) Hump control (disconnected)

Fig. 4 – The left hand side control desk

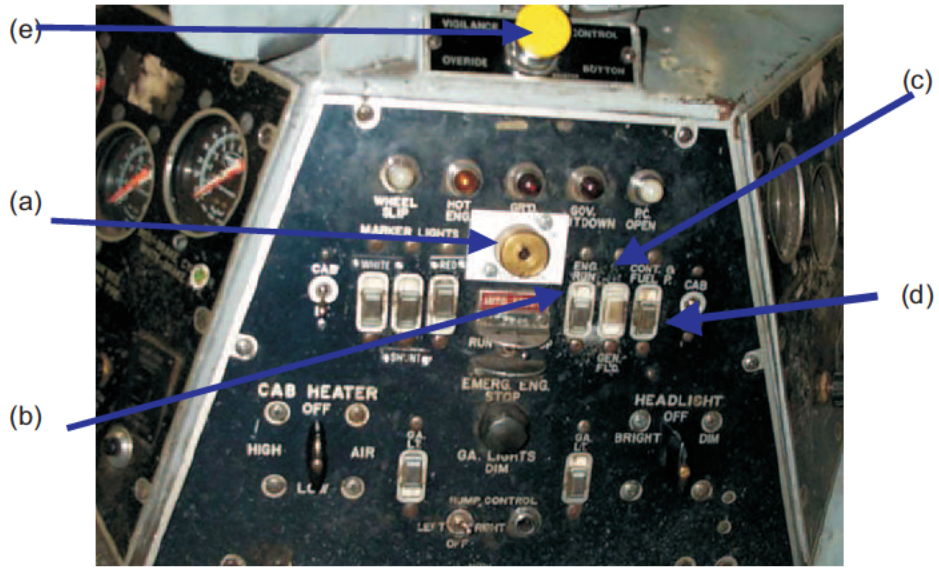


Fig. 5 - The switch and lighting indicator panel

(a) Master control key switch
(b) Engine run switch
(c) Gen field switch
(d) Control and fuel pump switch
(e) Deadman's button

Apart from the master control key switch all the above switches are off when down and on when up.

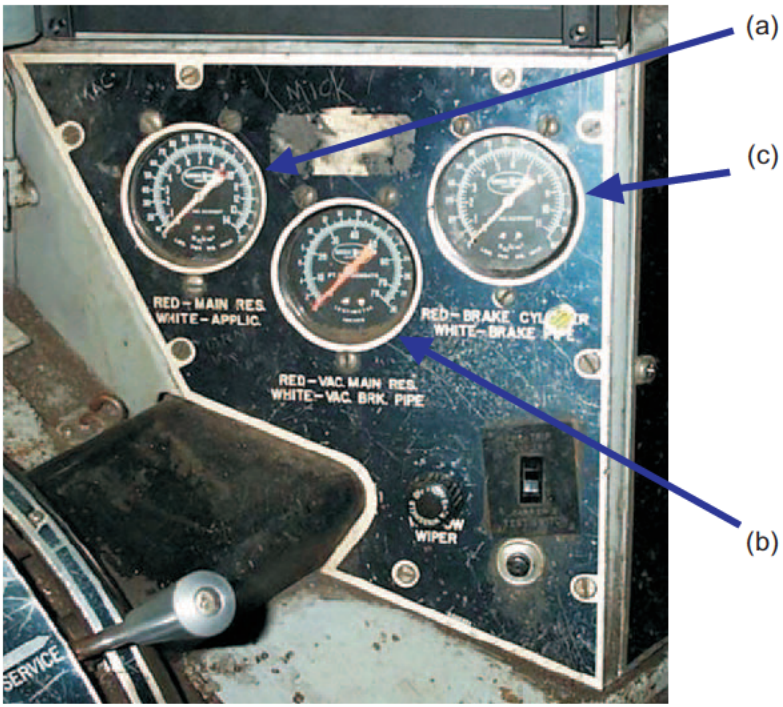


Fig. 6 - The brake gauge panel

The three brake gauges are

(a) Main reservoir and application pressures

(b) Vacuum reservoir and vacuum brake pipe

(c) Brake cylinder and brake pipe pressures

There is an engine control panel on the rear wall of each cab, located at the upper centre.

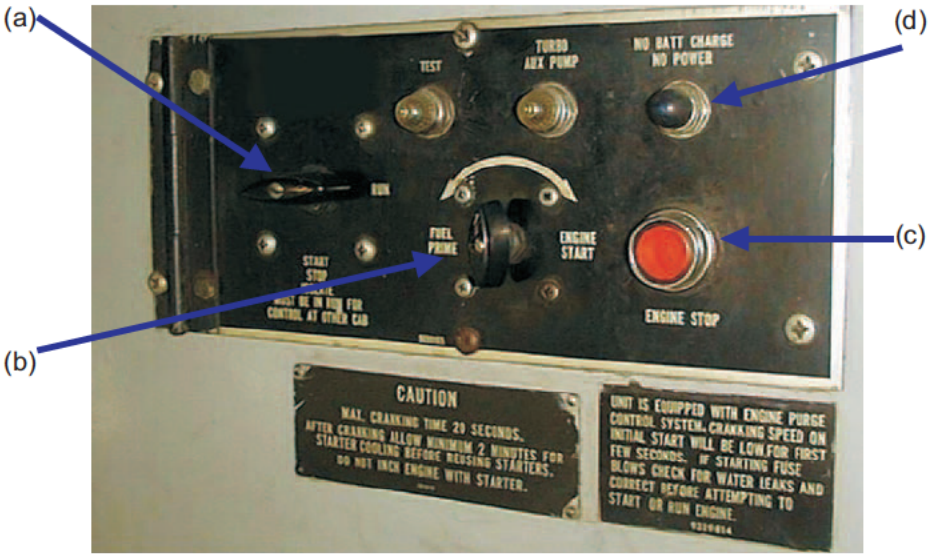


Fig. 7 - The engine control panel

(a) Start / run switch
(b) Fuel prime / engine start switch
(c) Engine stop button
(d) Warning and indicator lamps at top of panel

Under desk controls:

There is a deadman's pedal on the floor in front of each of the driver's seats. On the cab wall under the left hand desk both the MU2 valve and the main reservoir boost button are to be found.

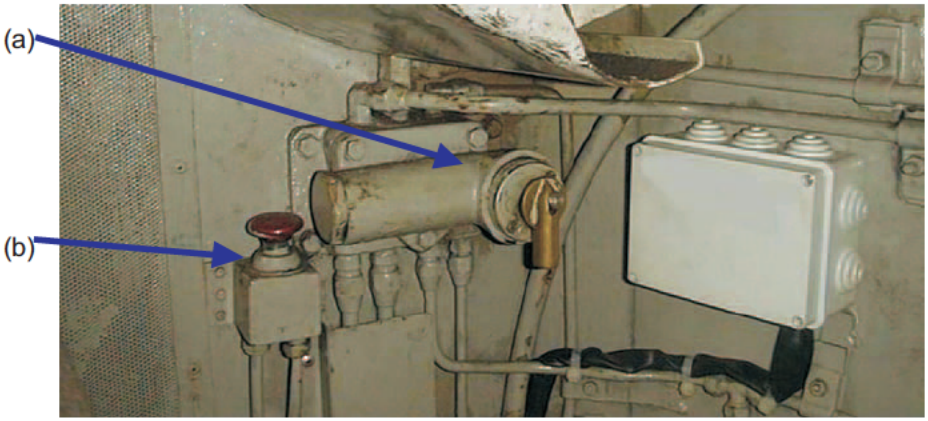


Fig. 8 - The controls under the driver's desk

(a) MU2 valve (b) Main reservoir boost button

The emergency brake valve is located behind the left hand driver's seat in each cab.

Fig. 9 - The emergency brake valve

There is a motor cut-out switch in cab no. 1 located below the engine control panel on the rear wall.

This switch is used to isolate or cut out traction motors if they fail while the locomotive is in service.

Fig. 10- The motor cut-out switch

Handbrake wheel.

Fig. 11 - The handbrake

The handbrake located on the right hand catwalk only applies the brake blocks on one wheelset.

The following features are located in the engine compartment.

The engine governor is located at the no. 2 end of the locomotive.

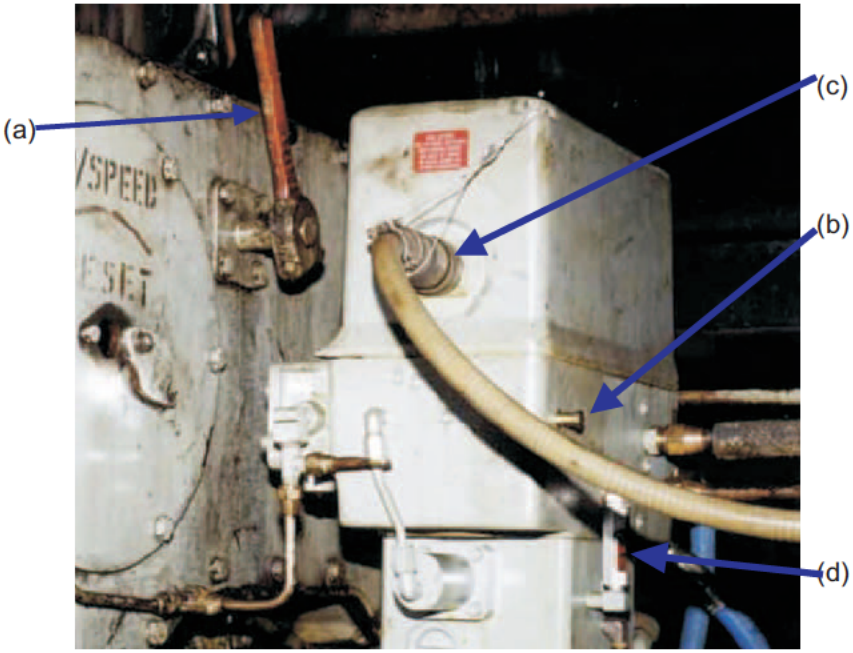


Fig. 12 - The engine governor

(a) Overspeed lever (b) Governor oil button
(c) Governor cable and plug (d) Oil sight glass

The crankcase detector is located at the same end of the engine as the governor, but at the right hand side. The top button detects crankcase pressure, the lower button water pressure.

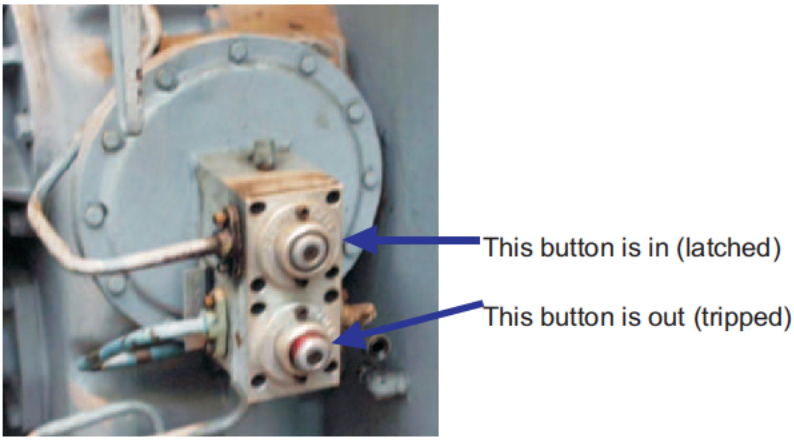


Fig. 13 - The crankcase detector

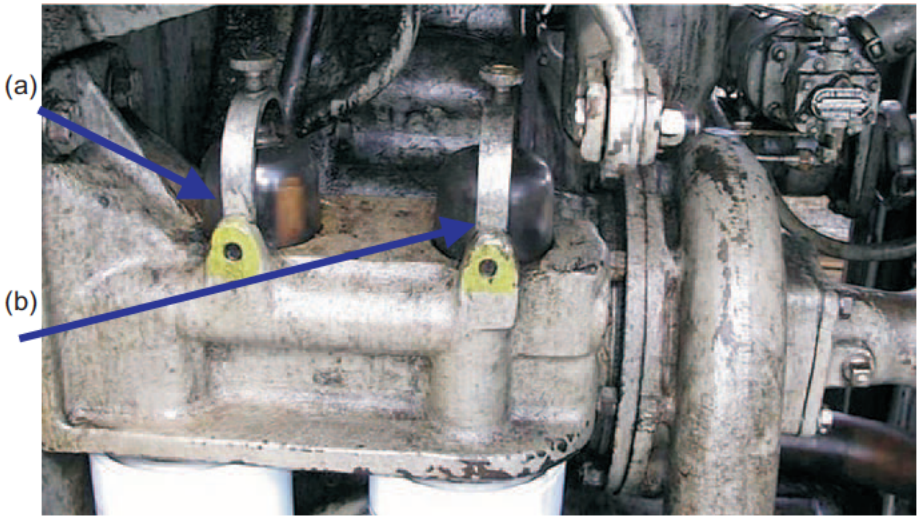


Fig. 14 - The two fuel filter sight glasses

(a) This is the fuel return sight glass – full under normal operation

(b) The by-pass sight glass, which fills when the fuel filters are blocked and need changing. Only one sight glass will be full when the engine is in operation. Neither sight glass will be full when the engine has been shut down for some time.

The compressor/exhauster, viewed from the right hand catwalk.

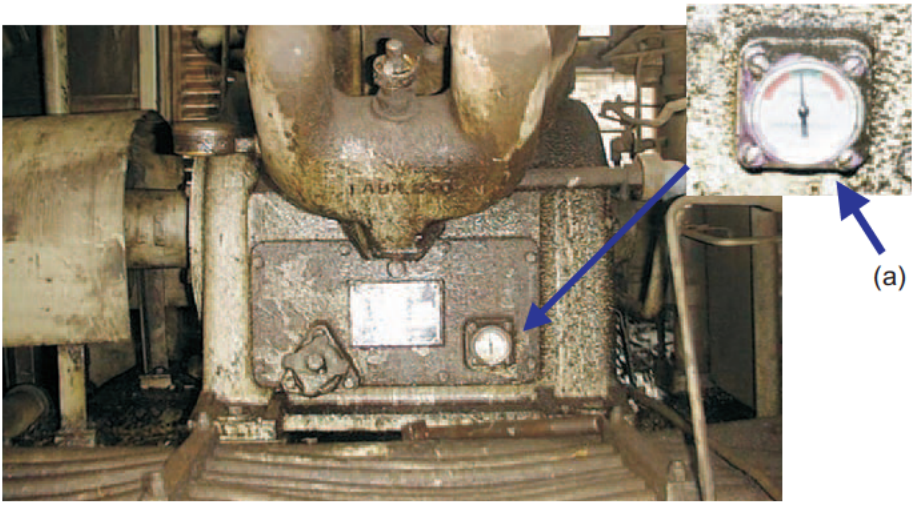


Fig. 15 - The compressor/exhauster

The level indicator on the compressor/exhauster. The needle should be pointing upwards, in the green section of the gauge (a).

The deadman's valve isolation lever correctly sealed.

Fig. 16 - The brake compartment

The air reservoirs are equipped with manual blow down cocks.

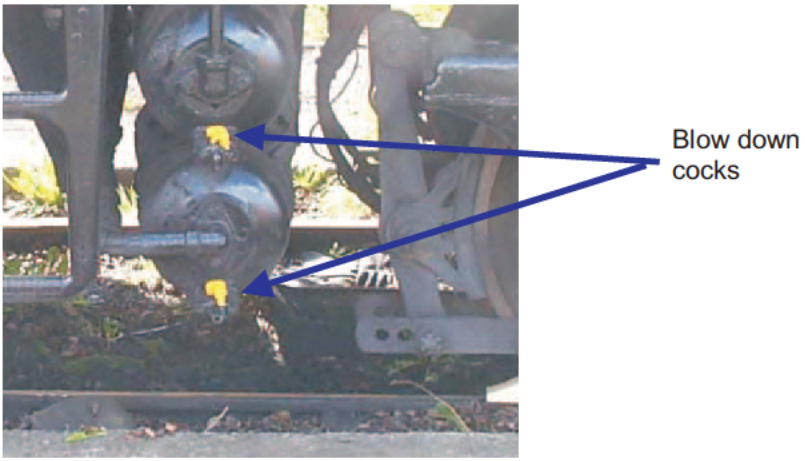


Fig. 17 - The main air reservoirs

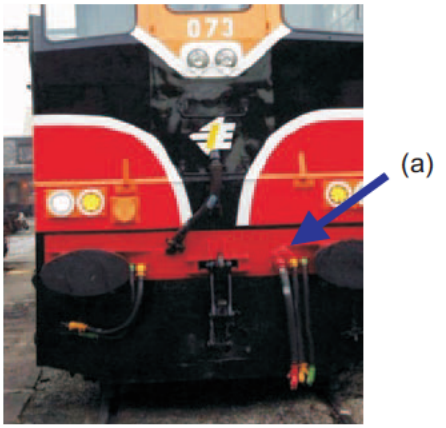


Fig. 18

(a) Brake pipe cock (red)

Fig. 19

(b) Main reservoir cock (yellow)

(c) Independent brake pipe cock (green)

The brake hoses in Fig. 18 are deliberately removed from glad-hands for illustration purposes.

Isolating cocks for the braking system

Section 4

OPERATING INSTRUCTIONS

INDEX TO SECTION 4

REMOVAL OF KEYS

Where this text refers to removing the key, it must be understood that you take any removable key with you, and do not leave it in the locomotive cab. If you are disposing of your locomotive and the key is not a personal issue, you must hand the key to your supervisor at the end of your turn of duty.

LOCOMOTIVE HANDBRAKE

Where this text refers to applying the handbrake, the following method must be used :

1. Apply the locomotive and train brake handles to full service.

2. Apply the handbrake.

3. Release the locomotive and train brake handles. When the locomotive and train brakes are fully released, as indicated by the cab gauges, ensure that the handbrake applied is adequate to hold the locomotive or train.

4. Re-apply the locomotive and train brake handles to full service.

Important : The MU2 must not be relied upon to secure an unattended locomotive or train.

4.1 PREPARATION FOR SERVICE (LOCOMOTIVE SHUT DOWN)

4.1.A EXTERNAL EXAMINATION

(1) When first going to the locomotive ensure that the following conditions apply :

- (i) it is secured by handbrake (and scotches if necessary)
- (ii) no person is working on or around it
- (iii) there are no not to be moved notices on display, such as red flags, hold off or battery on charge notices
- (iv) there are no fuel hoses, air lines or electrical cables connected to the locomotive.

(2) At each end of the locomotive examine :

- (i) buffers
- (ii) drawgear
- (iii) brake hoses, glad hands and air cocks
- (iv) vacuum hose on dummy plug and secured by pin
- (v) jumper receptacle covers (ensure they are closed)
- (vi) two portable tail lamps (which may either be on the lamp brackets at either end or in one of the cabs)
- (vii) stone guards
- (viii) CAWS pick-up coils
- (ix) braking system isolating cocks (see figs.18 and 19).

(3) Along each side of the locomotive examine :

- (i) axle boxes and bearing caps
- (ii) brake blocks and brake gear
- (iii) springs

(iv) handrails and steps

(v) fuel filling points and gauges

(vi) cab and car body doors, equipment box doors – closed and secured

(vii) air reservoir blow down cocks – blow down and close if the reservoirs are up to pressure

(viii) the speedometer drive cable to ensure it is in place and shows no external sign of damage.

While you are carrying out the above examination, remember to check that there are no loose, damaged or missing parts.

4.1.B INTERNAL EXAMINATION

Examine the logbook for reported defects and check that any defects that would require attention before the locomotive is taken into service have been signed off by maintenance. While carrying out your examination of the locomotive see, if possible, that any reported defects have been attended to.

(1) Ensure that the following emergency equipment is installed :

(i) two dry powder fire extinguishers, one in each cab

(ii) two automatic extinguishers, one over the engine, the other over the heat exchanger

(iii) TCOD, one in each cab with the padlock in the correct position and is not resting on the floor

(iv) four scotches. (These may already be in use securing the locomotive).

(2) Check that the deadman's isolation valve is sealed with the handle in the horizontal position.

4.1.C PREPARATION FOR STARTING

(1) In the engine room ensure that :

(i) the fuel sight glasses are intact

(ii) the overspeed lever is in the 11 o'clock position

(iii) the governor oil is between the marks on the sight glass and the governor button is latched (no red band showing)

(iv) the governor plug and cable are fully home and secure

(v) the water level on the sight glass is ¾ full

(vi) the crankcase detector low water and crankcase buttons are set (no red band showing). Check that they are latched. If they are not, and will not reset, after you have started the engine ensure that you latch them within 40 seconds

(vii) the compressor/exhauster oil level gauge needle is in the green sector

(viii) there is no combustible debris in the general area.

(2) Check the following in each cab (going to no.2 cab first):

(i) the MU2 valve is cut out

(ii) the forward/reverse handle is in the neutral position

(iii) the notch control handle is in idle position

(iv) the locomotive and train brake handles are in the full service position

(v) the engine run and gen field switches are switched off

(vi) the control and fuel pump switch is switched off

(vii) the emergency engine stop switch is in the run position

(viii) the marker lights and headlamps are switched off.

(3) In the no.1 cab open the electrical cabinet and set up as follows :

(i) ensure the CAWS MCB is off

(ii) close all the other MCBs on the panel

(iii) check that the ground relay knife switch is closed and sealed

(iv) close the battery switch firmly

(v) check the turbo lamp lights.

4.1.D STARTING UP THE DIESEL ENGINE

(1) Switch on the control and fuel pump switch in one cab only.

(2) With the start/run switch in the start position, turn and hold the fuel prime/engine start switch in the fuel prime position for 15 seconds.

(3) Turn and hold the fuel prime/engine start switch in the engine start position. The engine will start turning over. Hold the switch in this position for 20 seconds or until the engine starts. If the engine does not start within the 20 seconds allow 2 minutes for the starting motors to cool off before trying another start.

(4) When the engine starts release the fuel prime/engine start switch. The switch will return to the vertical position.

(5) Turn the start/run switch to the run position.

WARNING

To prevent engine damage

* **Turn and hold the fuel prime/engine start switch firmly in both the prime and start positions when operating it.**

* **Do not hold the switch in the prime position for longer than 15 seconds.**

* **Do not hold the switch in the start position for longer than 20 seconds.**

* **If the engine fails to start on the first attempt, allow two minutes cooling off time before attempting to start again.**

* **If the engine fails to start on the second attempt, refer to the fault finding section for this locomotive.**

4.1E RUNNING ENGINE EXAMINATION

(1) With the engine running carry out the following checks:

(i) within 40 seconds of starting the engine, ensure that the crankcase detector buttons have not tripped. Do not reset more than twice

(ii) that the fuel sight glass next to the engine is full and free of bubbles and that the other sight glass is empty

(iii) lift the engine oil dipstick and verify that the oil is between the marks on the dipstick

(iv) for leaks in the fuel, lubricating oil and water systems and listen for any air leaks

(v) in the rear cab, ensure the start/run switch is in the run position.

WATER LEAKS

Dripping water leaks are unfortunately common at clamp type joints (Marmon couplings) when engines are cold. Check that the leaks have gone when the engine has warmed up.

ALL LEAKS

If water leaks persist, or fuel oil, lube oil and other leaks are found during the initial external and internal examinations, these leaks should be rectified before taking the locomotive into service. Seek advice from maintenance.

4.1.F PRE – SERVICE CHECKS

(1) The following equipment must be tested as described below, these tests being carried out in both cabs :

(i) the operation of the wipers and the hooters

(ii) switch on the marker lights, tail lights and headlamps, check these lights from the ground, switching them off after checking as required.

CAUTION

Make sure that your handbrake is applied and that the locomotive is scotched if necessary. You will be releasing brakes during the brake and deadman's/vigilance tests.

(2) Brake test.

Check that the main reservoir air pressure has built up to 100 to 130 psi. before carrying out any further tests.

(i) Insert and turn on the master control key.

(ii) Cut in the MU2 valve.

(iii) Switch on the engine run and gen field switches.

(iv) Switch on the CAWS MCB, place the normal/ disable switch in the normal position.

When the CAWS is switched on the acknowledge button will light continuously, accompanied by an intermittent buzzer. After one minute this buzzer will stop sounding, but the lamp in the acknowledge button will stay lit.

(v) Press the acknowledge button. The lamp in the acknowledge button will go out. The locomotive brakes can now be released.

(vi) Select forward direction.

(vii) Depress the deadman's pedal and recycle it.

(viii) Release the train brake handle and hold for 1 minute to ensure that there are no leaks in the main reservoir system.

(ix) Release the locomotive brake handle and confirm that all the brakes are released from the brake gauges, clearing any penalty (deadman's) brake that may have applied.

(x) Ensure the pneumatic control (PC) lamp goes out.

(xi) Carry out a brake test verifying gauge readings as in the table over :

Brake Test

Step	Brake Handle Position	Gauge Indication	
1	Locomotive Full Service Train Release	MR Appl. BP BC Vac.	100 to 130 psi 100 to 130 psi 70 psi 35 psi 21 ins
2	Locomotive Released Train Released	MR Appl. BP BC Vac.	100 to 130 psi 100 to 130 psi 70 psi 0 psi 21 ins
3	Locomotive Released Train Full Service	MR Appl. BP BC Vac.	100 to 130 psi 100 to 130 psi 48 psi 40 psi 0 ins
4	Locomotive Released Train Emergency	MR Appl. BP BC Vac.	100 to 130 psi 100 to 130 psi 0 psi 40 psi 0 ins
5	Locomotive Full Service Train Full Service	MR Appl. BP BC Vac.	100 to 130 psi 100 to 130 psi 48 psi 40 psi 0 ins
main reservoir (MR); application (Appl.); brake pipe (BP); brake cylinder (BC) ; vacuum (Vac.)			

IMPORTANT

Check that all brake blocks are applied to the locomotive wheels.

Before leaving the cab ensure that the forward/reverse handle is in neutral and the master control key is removed.

Remove any scotches from the wheels and replace them on the locomotive.

Blow down the main air reservoirs at least once in every turn of duty.

(3) Deadman's/vigilance test :

Insert the master control key and turn it on.

Select a direction with the forward/reverse handle before continuing with these tests :

Cycle the deadman and keep the pedal depressed.

(i) release both the train brake and the locomotive brake handles and confirm the brake release on the brake gauges

(ii) ensure the PC lamp goes out

(iii) release the deadman's pedal and note that the warning device sounds. After 7 seconds see that the :

- brake pipe falls to 0 psi
- vacuum pipe falls to 0 ins Hg
- brake cylinders fully apply
- PC lamp lights
- engine revs increase

(iv) sound the hooter and test that it is not possible to take power by notching up the notch control handle. Note that the engine speed falls to idle and that the locomotive does not attempt to move

(v) return the notch control handle to idle and reset the deadman's, holding the pedal or button depressed until brakes are released and PC lamp goes out

(vi) hold the pedal or button depressed to prevent a deadman's brake application and note that the alarm sounds after a period of 105 to 135 seconds. Continue to depress the pedal or button and observe that the vigilance applies as follows :

- brake pipe falls to 0 psi
- vacuum pipe falls to 0 ins Hg
- brake cylinders fully apply
- PC lamp lights
- engine revs increase

(vii) reset the deadman's pedal

(viii) test the operation of the other pedal and the override button in this cab. Engage each pedal and button in turn and note that the warning device sounds each time the button or pedal is released

(ix) select neutral and apply the locomotive brake.

(4) Brake leakage test

Carry out a brake leakage test as follows :

(i) ensure that the handbrake is applied

(ii) apply both brake handles to full service

(iii) cut out the MU2 valve

(iv) check the brake cylinder gauge reading and observe that for 1 minute there is no drop in the brake cylinder pressure

(v) cut in the MU2 valve.

The brake leakage test need only be performed in one cab.

(5) CAWS test

Carry out the CAWS test as described in the General Appendix, Section J.

(6) Radio test

Carry out the radio tests as described in the General Appendix, Section F.

Note : With the exception of the brake leakage test, all the above tests must be carried out in both driving cabs of the locomotive. For the purpose of carrying out these tests it is necessary to change ends in accordance with the procedure described in the section Changing Cabs.

4.1.G SETTING UP THE CABS

(1) Ensure that the trailing cab is set up as follows :

(i) forward/reverse handle in neutral position
(ii) notch control handle in idle position
(iii) eng run and gen field switches off
(iv) train radio switched off
(v) CAWS in disable position
(vi) MU2 valve switched out
(vii) locomotive and train brake handles in full service
(viii) start/run switch in run position
(ix) wipers, hotplates, heaters and cab lights switched off
(x) marker lights, tail lights and headlamps set up in accordance with the Rule Book
(xi) close windows and lock cab doors.

(2) Go to the driving cab and :

(i) ensure that both brake handles are in the full service position

(ii) check that the main reservoir pressure has risen to 100/130 psi. and the gauges indicate that the brakes are applied

(iii) cut in the MU2 valve

(iv) insert and turn on the master control key

(v) fully release the handbrake

(vi) switch on the engine run and gen field switches.

Your locomotive is now ready to enter service.

Remember - before entering service, you must ensure that :

(i) the train radio I.D. and channel are correctly set up

(ii) the correct carrier is selected for the CAWS equipment (in a non-CAWS area leave disabled)

(iii) the correct head/marker lights are displayed

(iv) tail lamps are displayed on the locomotive as required.

4.2 PREPARATION FOR SERVICE (LOCOMOTIVE ENGINE RUNNING)

This section covers the preparation for service of a locomotive with the engine running, when the locomotive has been disposed of for a period in excess of two hours or has required the attention of maintenance.

4.2.A EXTERNAL EXAMINATION

(1) When first going to the locomotive ensure that the following conditions apply :

(i) it is secured by handbrake (and scotches if necessary)

(ii) no person is working on or around it

(iii) there are no not to be moved notices on display, such as red flags, hold off or battery on charge notices

(iv) there are no fuel hoses, air lines or electrical cables connected to the locomotive.

(2) At each end of the locomotive examine :

(i) buffers

(ii) drawgear

(iii) brake hoses, glad hands and air cocks

(iv) vacuum hose on dummy plug and secured by pin

(v) jumper receptacle covers (ensure they are closed)

(vi) two portable tail lamps. There must be two lamps provided on the locomotive when it is not attached to a train. These may be on one end of the locomotive or in a cab

(vii) stone guards

(viii) CAWS pick-up coils.

(3) Along each side of the locomotive examine :

(i) axle boxes and bearing caps

(ii) brake blocks and brake gear

(iii) springs

(iv) handrails and steps

(v) fuel filling points and gauges

(vi) cab and car body doors, equipment box doors-closed and secured

(vii) air reservoir blow down cocks – blow down and close if the reservoirs are up to pressure

(viii) the speedometer drive cable to ensure it is in place and shows no external signs of damage.

While you are carrying out the above examination, remember to check that there are no loose, damaged or missing parts.

4.2.B INTERNAL EXAMINATION

Examine the logbook for reported defects and check that any defects that would require attention before the locomotive is taken into service have been signed off by maintenance. While carrying out your examination of the locomotive see, if possible, that any logbook defects have been repaired.

(1) Ensure that the following emergency equipment is installed :

- (i) two dry powder fire extinguishers, one in each cab.
- (ii) two automatic extinguishers, one over the engine, the other over the heat exchanger.
- (iii) TCOD, one in each cab with the padlock in the correct position and is not resting on the floor.
- (iv) four scotches which may already be in use securing the locomotive.

(2) Check that the deadman's isolation valve is sealed with the handle in line with the valve body.

4.2.C RUNNING ENGINE EXAMINATION

(1) With the engine running carry out the following checks :

- (i) the fuel sight glass next to the engine is full and free of bubbles and that the other sight glass is empty
- (ii) lift the engine oil dipstick and verify that the oil is between the marks on the dipstick
- (iii) leaks in the fuel, lubricating oil and water systems and listen for any air leaks
- (iv) the governor oil is between the marks on the sight glass
- (v) the water level on the sight glass is approximately ¾ full
- (vi) the compressor/exhauster oil level gauge needle is in the green sector

(vii) there is no combustible debris in the general area.

(2) Check the following in each cab (going to cab no. 2 first) :

(i) the MU2 valve is cut out

(ii) the forward/reverse handle is in neutral

(iii) the notch control handle is in idle position

(iv) the locomotive and train brake handles are in the full service position

(v) the engine run and gen field switches are switched off

(vi) the control and fuel pump switch is switched off in one cab only

(vii) the marker lights and headlamps are switched off.

(3) In the electrical cabinet (rear of cab no. 1) check :

(i) That all MCBs are on.

(ii) The ground relay knife switch is closed and sealed.

(iii) The battery switch is fully closed.

WATER LEAKS

Dripping water leaks are unfortunately common at clamp type joints (Marmon couplings) when engines are cold. Check that the leaks have gone when the engine has warmed up.

ALL LEAKS

If water leaks persist, or fuel oil, lube oil and other leaks are found during the initial external and internal examinations, these leaks should be rectified before taking the locomotive into service. Seek advice from maintenance.

4.2.D PRE – SERVICE CHECKS

(1) The following equipment must be tested as described below, these tests being carried out in both cabs :

(i) the operation of the wipers and the hooters

(ii) switch on the marker lights, tail lights and headlamps. The driver must check these lights from the ground, switching them off after checking as required.

CAUTION

Make sure that your handbrake is applied and that the locomotive is scotched if necessary. You will be releasing brakes during the brake and deadman's/vigilance tests.

(2) Brake test.

Check that the main reservoir air pressure has built up to 100 to 130 psi. before carrying out any further tests.

(i) Insert and turn on the master control key

(ii) Cut in the MU2 valve

(iii) Switch on the engine run and gen field switches

(iv) switch on the CAWS MCB and place the normal/disable switch in the normal position

When the CAWS is switched on the acknowledge button will light continuously, accompanied by an intermittent buzzer. After one minute this buzzer will stop sounding, but the lamp in the acknowledge button will stay lit. When you press the acknowledge button the lamp will go out. The locomotive brakes can now be released.

(v) Select forward direction

(vi) Depress the deadman's pedal and recycle it

(vii) Release train brake handle and hold for one minute to ensure that there are no leaks in the main reservoir system

(viii) Release the locomotive brake handle and confirm that all the brakes are released the brake gauges, clearing any penalty (deadman's) brake that may have applied

(ix) Ensure PC lamp goes out

(x) Carry out brake test verifying gauge readings as in the table under :

BRAKE TEST

Step	Brake Handle Position	Gauge Indication	
1	Locomotive Full Service Train Released	MR Appl. BP BC Vac.	100 to 130 psi 100 to 130 psi 70 psi 35 psi 21 ins
2	Locomotive Released Train Released	MR Appl. BP BC Vac.	100 to 130 psi 100 to 130 psi 70 psi 0 psi 21 ins
3	Locomotive Released Train Full Service	MR Appl. BP BC Vac.	100 to 130 psi 100 to 130 psi 48 psi 40 psi 0 ins
4	Locomotive Released Train Emergency	MR Appl. BP BC Vac.	100 to 130 psi 100 to 130 psi 0 psi 40 psi 0 ins
5	Locomotive Full Service Train Full Service	MR Appl. BP BC Vac.	100 to 130 psi 100 to 130 psi 48 psi 40 psi 0 ins

main reservoir (MR); application (Appl.); brake pipe (BP); brake cylinder (BC) ; vacuum (Vac.)

IMPORTANT

Check that all brake blocks are applied to the locomotive wheels.

Before leaving the cab ensure that the forward/reverse handle is in neutral and the master control key is removed.

Remove any scotches from the wheels and replace them on the locomotive.

Blow down the main air reservoirs at least once in every turn of duty.

(3) Deadman's/vigilance test

Before carrying out this test insert the master control key and turn it on, cycle the deadman and keep the pedal depressed.

(i) release both the train brake and the locomotive brake handles and confirm the brake release on the brake gauges

(ii) ensure PC lamp goes out

(iii) release the deadman's pedal and note that the warning device sounds. After 7 seconds see that the :

- brake pipe falls to 0 psi
- vacuum pipe falls to 0 ins Hg
- brake cylinders fully apply
- PC lamp lights
- engine revs increase

(iv) sound the hooter and test that it is not possible to take power by notching up the notch control handle. Note that the engine speed falls to idle and that the locomotive does not attempt to move

(v) return the notch control handle to idle and reset the deadman, holding the pedal or button depressed until brakes are released and PC lamp goes out

(vi) hold the pedal or button depressed to prevent a deadman's brake application and note that the alarm sounds after a period of 105 to 135 seconds. Continue to depress the pedal or button and observe that the vigilance applies as follows:

- brake pipe falls to 0 psi
- vacuum pipe falls to 0 ins Hg
- brake cylinders fully apply
- PC lamp lights
- engine revs increase

(vii) recycle the deadman's pedal

(viii) test the operation of the other pedal and the override button in this cab. Engage each pedal and button in turn and note that the warning device sounds each time the button or pedal is released

(ix) select neutral and apply the locomotive brake.

(4) Brake leakage test

Carry out a brake leakage test as follows :

(i) ensure that the handbrake is applied

(ii) apply both brake handles to full service

(iii) cut out the MU2 valve

(iv) check the brake cylinder gauge reading and observe that for 1 minute there is no drop in the brake cylinder pressure

(v) cut in the MU2 valve.

The brake leakage test need only be carried out in one cab.

(5) CAWS test

Carry out the CAWS test as described in the General Appendix, Section J.

(6) Radio test

Carry out the radio tests as described in the General Appendix, Section F.

Note : With the exception of the brake leakage test, all the above tests must be carried out in both driving cabs of the locomotive. For the purpose of carrying out these tests it is necessary to change ends in accordance with the procedure described in the section Changing Cabs.

4.2.E SETTING UP THE CABS

(1) Ensure that the trailing cab is set up as follows:

(i) forward/reverse handle in neutral position
(ii) notch control handle in idle position
(iii) eng run and gen field switches off
(iv) radio switched off
(v) CAWS in disable position
(vi) MU2 valve switched out
(vii) locomotive brake handle in full service
(viii) train brake handle in full service
(ix) start/run switch in run position
(x) wipers, hotplates, heaters and cab lights switched off
(xi) marker lights, tail lights and headlamps set up in accordance with the Rule Book
(xii) close windows and lock cab doors.

(2) Go to the driving cab and:

(i) ensure that both brake handles are in the full service position
(ii) cut in the MU2 valve
(iii) check that the main reservoir air pressure has risen to 100 to 130 psi
(iv) insert and turn on the master control key

(v) fully release the handbrake

(vi) place the engine run and gen field switches in the on (up) position.

Your locomotive is now ready to enter service.

Remember - before entering service, you must ensure that :

(i) the train radio I.D. and channel are correctly set up

(ii) the correct carrier is selected for the CAWS equipment (in a non-CAWS area leave disabled)

(iii) the correct head/marker lights are displayed

(iv) tail lamps are displayed on the locomotive as required.

4.3 PARTIAL PREPARATION FOR SERVICE (LOCOMOTIVE ENGINE RUNNING)

In this case you are taking control of a locomotive with the engine running and which has been in service within the last two hours and has not required the attention of maintenance within that period.

4.3.A EXTERNAL EXAMINATION

(1) When first going to the locomotive ensure that the following conditions apply:

(i) it is secured by handbrake (and scotches if necessary)

(ii) that no person is working on or around it

(iii) that there are no not to be moved notices on display, such as red flags, hold off or battery on charge notices

(iv) that there are no fuel hoses, air lines or electrical cables connected to the locomotive.

4.3.B PRE – SERVICE CHECKS

Examine the logbook for reported defects and check that any defects that would require attention before the locomotive is taken into service have been signed off by maintenance. Check that the deadman's isolation valve is sealed with the handle in line with the valve body.

4.3.C SETTING UP THE CABS

(1) Ensure that the trailing cab is set up as follows:

(i) notch control handle in idle position
(ii) forward/reverse handle in neutral position
(iii) master control key removed
(iv) eng run and gen field switches down
(v) train radio switched off
(vi) CAWS in disable position
(vii) both brake handles in full service
(viii) MU2 valve switched out
(ix) start/run switch in run position
(x) wipers, hotplates, heaters and cab lights switched off
(xi) marker lights, tail lights and headlamps set up in accordance with the Rule Book
(xii) close windows and lock cab doors.

Go to the driving cab and:

(i) ensure that both brake handles are in the full service position
(ii) check that the main reservoir pressure has risen to 100 to 130 psi. and the gauges indicate that the brakes are applied
(iii) insert and turn on the master control key
(iv) cut in the MU2 valve
(v) place the engine run and gen field switches in the on position

(vi) Check that the deadman equipment is operational in both cabs

(vii) fully release the handbrake and remove scotches if in use.

Your locomotive is now ready to enter service.

Remember - before entering service, you must ensure that :

(i) the train radio I.D. and channel are correctly set up

(ii) the correct carrier is selected for the CAWS equipment (in a non-CAWS area leave disabled)

(iii) the correct head/marker lights are displayed

(iv) tail lamps are displayed as required.

4.4 CHANGING CABS

The following is the procedure that you must use when you are changing cabs:

4.4.A CAB BEING VACATED

(i) Apply both brake handles to the full service position and check that the brake gauges read accordingly

(ii) Apply the train brake handle to the emergency position. Observe that the brake pipe gauge pressure falls to 0 psi.

(iii) Cut-out the MU2 valve.

(iv) Place the train brake handle in the full service position.

(v) Remove the master control key.

(vi) Switch off the eng run and gen field switches.

(vii) Switch off the train radio.

(viii) Place the CAWS unit in the disable position.

(ix) Change marker lights as required.

(x) Switch off the headlamps and wipers.

(xi) Turn off heaters, hotplate and cab lights.

(xii) Close windows and lock cab doors.

4.4.B CAB BEING OCCUPIED

(i) Check that both brake handles are in full service position.

(ii) Insert and turn on the master control key.

(iii) Cut-in the MU2 valve.

(iv) Switch on (up) the eng run and gen field switches.

(v) Set up the train radio and test its operation.

(vi) Set up the CAWS unit as required.

(vii) Switch on marker lights/headlamps as required.

4.5 DISPOSAL OF A LOCOMOTIVE

This section deals with disposal of a locomotive under two headings :

A. Disposal of your locomotive, shutting down the engine

B. Disposal of your locomotive, leaving the engine running

Disposal of your locomotive by handing over to another driver is dealt with in Section 4.6 - Change of driver.

4.5.A DISPOSAL OF A LOCOMOTIVE, SHUTTING DOWN THE ENGINE

Before shutting down the diesel engine, examine the locomotive for any fuel oil, lube oil, water, air or vacuum leaks, or any loose or missing parts.

(i) Place both brake handles in the full service position.

(ii) Apply the handbrake (and use scotches if required).

(iii) Switch off the gen field and eng run switches.

(iv) Ensure that the notch control handle is shut off and the forward/reverse handle is in neutral.

(v) Remove the master control key.

(vi) Cut out the MU2 valve.

(vii) Place the start/run switch in the start position.

(viii) Press and hold the engine stop button until the engine shuts down.

(ix) Turn off the control and fuel pump switch.

(x) Turn off the train radio.

(xi) Place the CAWS equipment in the disable position.

(xii) Turn off the CAWS MCB.

(xiii) Turn off all wipers, heaters and hotplate.

(xiv) Turn off marker lights/headlamps as required.

(xv) Open the battery switch.

(xvi) Complete the logbook.

(xvii) Close windows and lock cab doors.

(xviii) Make a verbal report on the locomotive condition to the supervisor on arrival at the depot if there is any problem which would affect the locomotive re-entering service.

If you have shut down the locomotive and opened the battery switch, where the Rule Book requires tail lamps to be lit, portable lamps must be used.

4.5.B DISPOSAL OF A LOCOMOTIVE, LEAVING THE ENGINE RUNNING

Examine the locomotive for any fuel oil, lube oil, water, air or vacuum leaks, or any loose or missing parts, and carry out the following steps :

(i) Place both brake handles in the full service position.

(ii) Apply the handbrake (and use scotches if required).

(iii) Turn off the eng run and gen field switches.

(iv) Ensure that the notch control handle is shut off and the forward/reverse handle is in neutral.

(v) Remove the master control key.

(vi) Cut out the MU2 valve.

(vii) Place the start/run switch in the start position.

(viii) Place the CAWS in the disable position.

(ix) Turn off marker lights/headlamps as required.

(x) Turn off the train radio.

(xi) Complete the logbook.

(xii) Close windows and lock cab doors.

(xiii) Make a verbal report on the locomotive condition to the depot controller on arrival at the depot if there is anything which would affect the locomotive re-entering service.

4.6 CHANGE OF DRIVER

This section deals with the situation where

A. You hand over to another driver before you leave the footplate.

B. You hand over to another driver but the footplate is left unattended for the changeover.

C. You take over from another driver.

4.6.A HANDING OVER TO ANOTHER DRIVER ON YOUR FOOTPLATE

You must carry out the following before handing over to another driver :

(i) apply both brake handles to the full service position and confirm brake application on the brake gauges

(ii) select neutral

(iii) remove the master control key

(iv) ensure defects are recorded on the logbook

(v) inform the driver taking over of any defects or any special instructions regarding the working of the train.

4.6.B HANDING OVER TO ANOTHER DRIVER AWAY FROM THE FOOTPLATE

This section deals with the situation where you hand over to another driver, but the footplate has to be left unattended for the changeover. This situation can arise in service when two trains are being crossed.

In this situation you carry out 4.6.A above. In addition you must place the eng run and gen field switches in the off position, and ensure that the handbrake is applied.

4.6.C TAKING OVER FROM ANOTHER DRIVER

(i) Enquire from the driver being relieved if there is anything requiring special attention regarding the working of the train or if there are any defects on the locomotive.

(ii) Ensure that the handbrake is released.

(iii) Check the logbook regarding recorded defects.

(iv) Insert and turn on the master control key.

(v) Turn on the eng run and gen field switches.

(vi) Select forward.

(vii) Test the operation of the deadman's equipment in the driving cab by releasing the train brake, partially releasing the locomotive brake and then releasing the pedal to see that the brakes begin to apply.

FOR INFORMATION OF COMPANY'S EMPLOYEES ONLY

IARNRÓD ÉIREANN

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DRIVERS' MANUAL

VOLUME 8

Fault Finding

To operate on and from 31/05/2005

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201 CLASS LOCOMOTIVES

SECTION 1 FAULT FINDING 201 CLASS LOCOMOTIVES

Introduction

This section contains step by step instructions as to how you can overcome the effects of faults on the 201 class locomotive. The instructions are everything that can possibly be done without tools. This section has been laid out in an easy to follow and effective manner. To aid in fault finding, you should familiarise yourself with the contents of this section, so that you can refer quickly when that fault occurs.

As the section deals with the effects of faults, it does not cover problems due to incorrect set up of the locomotive. Also, it assumes that all MCB's are on and the computer screen is active. Please check that your locomotive has been correctly prepared for service.

Using The Section

When you are satisfied that your locomotive is correctly set up and that all MCB's are on, find the fault description that best describes the problem you are experiencing, from the contents list.

Under the fault description there will be one or more tables. Look first at the what happens row on the table or tables and find the description that best matches what you are experiencing. Follow the step by step instructions in this table, starting with what you do. Finally, a highlighted panel indicates important considerations in relation to dealing with the fault.

IMPORTANT

- **Before engaging in fault finding, make sure that your locomotive is correctly prepared.**
- **When performing fault finding, where it is necessary for testing purposes to release the brakes, the security of the train is of paramount importance e.g. considerable gradients, points etc. Where doubt exists, brakes should not be released and the locomotive failed.**
- **When performing fault finding, where it is necessary for testing purposes to take power in reverse direction, always comply with the provisions of the Rule Book.**
- **If you are bringing your locomotive to a stop because of a fault developing, always try to stop within the protection of station or interlocking signals.**
- **When fault finding, always check the crew messages by pressing the crew button on the computer screen.**
- **Always keep the signalman informed in accordance with the Rule Book.**

NOTES

Special Note Regarding The Computer Screen When Fault Finding

When any fault develops on a 201 class, first check that your computer screen is active, indicating that the locomotive's computer is functioning. To do this, just check the following.

1. Press the crew button and check that the screen is active, indicating the presence of crew messages or stating NO ACTIVE CREW MESSAGES. Read the crew messages and then continue fault finding.

2. If the screen does not respond, remains blank or just displays a dash in the bottom corner of the screen, switch off the computer control circuit breaker for 30 seconds and then switch it on again.

3. If the screen becomes active, press the crew button and check that the screen is active, indicating the presence of crew messages or stating NO ACTIVE CREW MESSAGES. Then, press main menu and select running totals followed by show running totals on display. Then select lifetime totals and verify that the figures can be read (i.e. not distorted) and then, that the totals are not zero.

4. If the screen remains blank, check the screen in the other cab. If the screen becomes active, press the crew button and check that the screen is active, indicating the presence of crew messages or stating NO ACTIVE CREW MESSAGES. Then, press main menu and select running totals followed by show running totals on display. Then select lifetime totals and verify that the figures can be read (i.e. not distorted) and then, that the totals are not zero.

5. If the lifetime totals are distorted or zero, do not take the locomotive into service without first consulting maintenance personnel. If the locomotive is already in service, continue fault finding.

6. If neither screen responds to your actions, fail the locomotive.

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LIST AND LOCATION OF CREW & FAULT ARCHIVE MESSAGES REFERRED TO IN THIS SECTION

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ENGINE DEAD LOCOMOTIVE IS NOT ISOLATED	4, 20
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GROUND RELAY LOCKOUT PRESS F3 TO RESET	14
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TM BLOWER #2 CIRCUIT BREAKER IS NOT CLOSED PRESS F3 KEY TO ATTEMPT RESET OF FAULT	23
TRACTION MOTOR #N FLASHOVER GROUND RELAY LOCKOUT	15

Fault Archive Message

TABLE 1 ENGINE WILL NOT START - ENGINE DOES NOT ROTATE

What happens	You turn fuel prime/engine start switch to engine start and nothing happens!
What you do	(i) Switch on cab lamps and see if they light. If there is no light or they are extremely dim, fail the locomotive. (ii) If they light brightly, prime and try for a start again and observe the lamps. If the lamps go out while in engine start and the engine does not rotate, fail the locomotive.
Crew Message CONTROL/FUEL PUMP SWITCH IS DOWN	(i) Switch off the control & fuel pump switch. (ii) Switch on the control & fuel pump switch in the <u>other</u> cab. With the crew message cleared, prime and try for a start.
Crew Message NO START - STARTER MOTOR ABUTMENT CONDITION, CHECK START FUSE	(i) Test the starting fuse using the fuse test facility. If blown, fail the locomotive.
Starting fuse is OK	There is no further check. Fail the locomotive.

<u>OR</u>

What happens	You turn fuel prime/engine start switch to engine start and starters engage but will not rotate engine or engine rotates extremely slowly.
What you do	Fail the locomotive.

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TABLE 2 ENGINE WILL NOT START - ENGINE ROTATES BUT WILL NOT FIRE

What happens	You turn fuel prime/engine start switch to engine start, engine begins to rotate normally in the purge phase and then stalls. Crew message NO START - STARTER MOTOR ABUTMENT CONDITION, CHECK START FUSE may display.
What you do	(i) Release the start switch immediately. (ii) Check the starting fuse using the fuse test facility. If it has blown, fail the locomotive.
Starting fuse is OK	Wait for the crew message NO START - STARTER MOTOR ABUTMENT CONDITION … to clear and then prime and try for a start. If it stalls again, release the start switch immediately and fail the locomotive.

OR

What happens	You turn fuel prime/engine start switch to engine start, engine rotates in purge stage, then in starting stage, but does not fire. Starting may be automatically stopped accompanied by crew message NO START - STARTER MOTOR OVERLOAD - WAITING FOR MOTORS TO COOL DOWN.
What you do	(i) At the governor end of the engine, check for presence of governor oil in the sight glass. If there is no oil visible, fail the locomotive. (ii) If governor oil is visible, check if any of the following protective devices are tripped 1. Governor button 2. Low water button 1 or 2 3. Crankcase button 4. Overspeed lever If any are found tripped, reset and wait for the crew message NO START - STARTER MOTOR OVERLOAD … to clear. Then prime and try for a start. If a protective device trips again, fail the locomotive.
Governor oil level is OK and no protective device is tripped	(i) Turn the fuel prime/engine start switch to fuel prime and with a cab door open try and hear if the fuel pump is running. You might need to turn the switch on and off to identify it apart from the turbo lubricating pump, which will be running at this stage. (ii) Check also after priming that the fuel return sight glass is full. (iii) If the fuel pump is not running and both sight glasses are empty fail the locomotive.
Fuel pump is running and both sight glasses are empty	The locomotive may have run out of fuel. (i) If fuel is required, ensure that there are no fuel leaks on the locomotive.

Contd. over...

Fuel pump is running fuel return sight glass is full and engine will not fire	(i) Find an assistant to operate the governor layshaft (fig.1). (ii) Instruct this person to start gently pushing in the layshaft when the engine starts rotating. (iii) When the engine starts, the layshaft should be released gradually. Do not push the layshaft in fully, as the engine will trip the overspeed lever if it starts. (iv) Report in the logbook, or direct to maintenance personnel, if it was necessary for you to start the engine in this manner.
Engine will not fire with layshaft operated manually	There is no further check. Fail the locomotive.

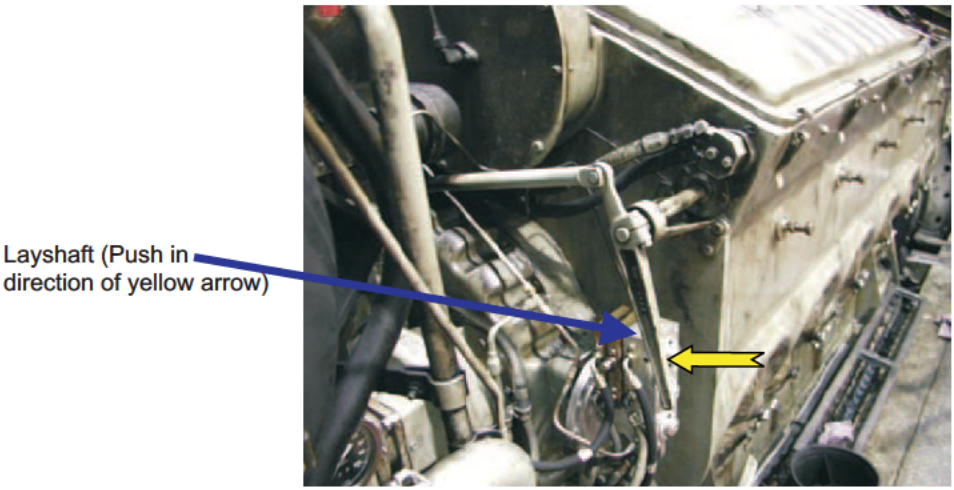

Fig. 1 - Governor layshaft

TABLE 3 ENGINE SHUTTING DOWN - TRIPPING LOW OIL BUTTON

What happens	Trainline alarm bell rings, crew message displays ENGINE PROTECTION SHUTDOWN and engine shuts down smartly.
What you do	(i) Notch off and bring the locomotive to a stop. (ii) Switch the start/run switch, in your driving cab, to isolate and silence the alarm bell and clear crew message ENGINE DEAD - LOCOMOTIVE IS NOT ISOLATED. (iii) At the governor end of the engine, check for presence of governor oil in the sight glass. If there is no oil visible, fail the locomotive. (iv) If governor oil is visible, reset the tripped governor button. Check if any of the following protective devices are also tripped and reset as described : 1. Low water button 1 or 2 Check the header tank sight glass. If water level is low, look for any visible water leaks. If there are leaks, fail the locomotive. If there are no leaks, or the header tank level is normal, reset the button 2. Crankcase button reset 3. Overspeed lever reset. (v) Check also that the crankcase detector test cocks are in the normal position, (fig.2). If not, correct their position. (vi) Prime and try for a start.
Governor button and/or protective device trips again	There is no further check. Fail the locomotive.

IMPORTANT

> **You should never attempt to open any inspection cover, or remove the dipstick on an engine when the crankcase button has tripped. A crankcase explosion may occur, the results of which could be FATAL.**

> **When a 201 class engine shuts down, always apply the parking brake on the locomotive and use scotches if necessary before fault finding. This protects against brake cylinder leak off. Remember to remove any scotches and release the parking brake before proceeding.**

Contd. over...

Fig. 2 - Cranckcase detector test cocks

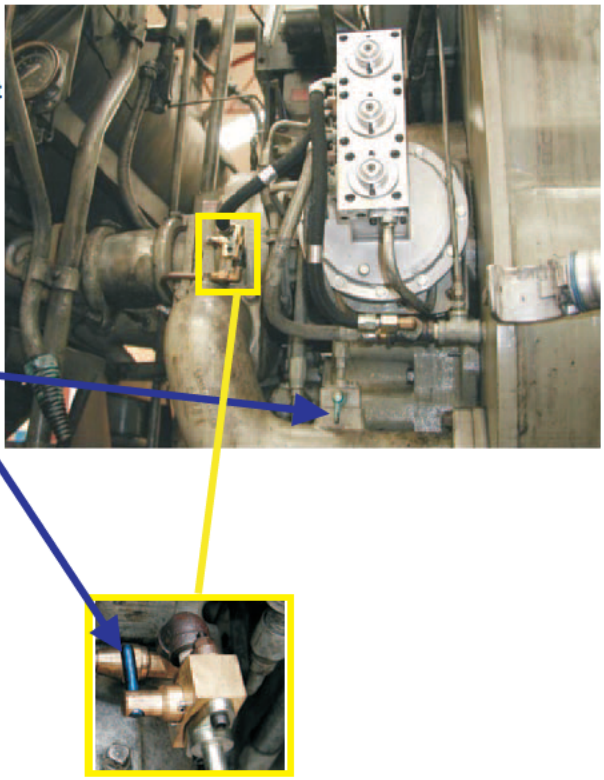

TABLE 4 ENGINE SHUTTING DOWN - NO PROTECTIVE DEVICES TRIPPED

What happens	Engine shuts down smartly and trainline alarm bell rings with no unusual computer crew messages.
What you do	(i) Notch off and bring the locomotive to a stop. (ii) Switch the start/run switch, in your driving cab, to isolate and silence the alarm bell and clear crew message ENGINE DEAD - LOCOMOTIVE IS NOT ISOLATED. (iii) At the governor end of the engine, check for presence of governor oil in the sight glass. If there is no oil visible, fail the locomotive.
Governor oil is visible and no protective devices tripped	(i) Prime and try for a start. (ii) If the engine will not start, go to fault finding table 1 Engine Will Not Start Engine Does Not Rotate or table 2 Engine Will Not Start Engine Rotates But Will Not Fire.
Engine starts	(i) Return the start/run switch to run in your driving cab. (ii) Switch off gen field switch on the console and notch up progressively to notch 8. Observe that the engine revs up normally with a clean exhaust. (iii) Notch off progressively and observe that the engine returns to normal idle revs with no smoke. (iv) Take power and proceed.

OR

What happens	Engine shuts down in notch 5 or higher, trainline alarm bell rings with crew message MU ENGINE PROTECTION SHUTDOWN.
What you do	(i) Notch off and bring the locomotive to a stop. (ii) Switch the start/run switch, in your driving cab, to isolate and silence the alarm bell and clear crew message ENGINE DEAD - LOCOMOTIVE IS NOT ISOLATED. (iii) Move the notch control handle briskly over its full range several times. (iv) Prime and try for a start. (v) Return the start/run switch to run in your driving cab. (vi) Switch off gen field switch on the console and notch up progressively to notch 8. Observe that the engine revs up normally with a clean exhaust. Notch off progressively and observe that the engine returns to normal idle revs with no smoke. (vii) Take power and proceed.

Contd. over...

Engine still shuts down in notch 5 or higher with crew message MU ENGINE PROTECTION SHUTDOWN	(i)	Look at the notch control handle from under the desk. If you can see the microswitches (fig.3), tap them gently.
	(ii)	Prime and try for start.
	(iii)	Return the start/run switch to run in your driving cab.
	(iv)	Switch off gen field switch on the console and notch up progressively to notch 8. Observe that the engine revs up normally with a clean exhaust. Notch off progressively and observe that the engine returns to normal idle revs with no smoke.
	(v)	Take power and proceed.
Fault remains	(i)	Prime and try for a start.
	(ii)	Take power and proceed avoiding notch 5 or higher. The locomotive will not suffer damage. If you feel you can work your train safely and without difficulty, proceed. If not, fail the locomotive.

IMPORTANT

> **When a 201 class engine shuts down, always apply the parking brake on the locomotive and use scotches if necessary before fault finding. This protects against brake cylinder leak off. Remember to remove any scotches and release the parking brake before proceeding.**

> **It may not always be possible to observe the engine exhaust.**

Microswitches viewed from underneath console

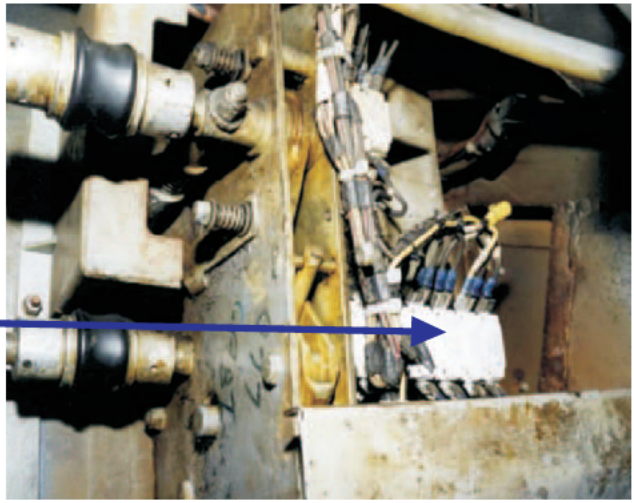

Fig. 3 - Controller microswitches

TABLE 5 ENGINE SHUTTING DOWN - SLOW DEATH (NO SMOKE)

What happens	Engine revs start to drop (bogs down) and engine dies slowly with a missing or rough sound from the exhaust. When engine stops trainline alarm bell rings and crew message ENGINE PROTECTION SHUTDOWN may display depending on governor button tripping or not.
What you do	(i) Notch off and bring the locomotive to a stop. (ii) Switch the start/run switch, in your driving cab, to isolate and silence the alarm bell and clear crew message ENGINE DEAD - LOCOMOTIVE IS NOT ISOLATED. (iii) Clear crew message ENGINE PROTECTION SHUTDOWN, if present, by resetting the governor button. (iv) Prime and try for a start.
Engine will not start	(i) Go to fault finding table 1 Engine Will Not Start Engine Does Not Rotate or table 2 Engine Will Not Start Engine Rotates But Will Not Fire.
Engine starts	(i) Return the start/run switch to run in your driving cab. (ii) Take power and proceed.
Engine shuts down with a slow death again	(i) There is no further check. Fail the locomotive.

IMPORTANT

> **When a 201 class engine shuts down, always apply the parking brake on the locomotive and use scotches if necessary before fault finding. This protects against brake cylinder leak off. Remember to remove any scotches and release the parking brake before proceeding.**

NOTES

TABLE 6 ENGINE SHUTTING DOWN - SLOW DEATH (SMOKE FROM EXHAUST)

What happens	Engine revs start to drop (bogs down) and engine dies slowly with a rattling or rough sound. Dense black smoke pours from the engine exhaust. When engine stops (which may take some time) trainline alarm bell rings and crew message ENGINE PROTECTION SHUTDOWN may display depending on governor button tripping or not.
What you do	(i) Notch off and bring the locomotive to a stop. (ii) Press the engine stop button. (iii) When the engine stops, switch the start/run switch, in your driving cab, to isolate and silence the alarm bell and clear crew message ENGINE DEAD - LOCOMOTIVE IS NOT ISOLATED (iv) Wait for the smoke to clear. Check the engine inspection covers. If you find one loose or blown off, fail the locomotive.
Engine inspection covers are in place	(i) Clear crew message ENGINE PROTECTION SHUTDOWN, if present, by resetting the governor button. (ii) Prime and try for a start.
Engine will not start	(i) Fail the locomotive.
Engine starts	(i) Return the start/run switch to run in your driving cab. (ii) Switch off gen field switch on the console and notch up progressively to notch 8. Observe that the engine revs up normally with a clean exhaust. Notch off progressively and observe that the engine returns to normal idle revs with no smoke. (iii) Take power and proceed.
Engine revs start to drop again with dense black smoke pouring from the exhaust	(i) Notch off and bring the locomotive to a stop. (ii) Press the engine stop button. (iii) Fail the locomotive.

IMPORTANT

> **When a 201 class engine shuts down, always apply the parking brake on the locomotive and use scotches if necessary before fault finding. This protects against brake cylinder leak off. Remember to remove any scotches and release the parking brake before proceeding.**

> **It may not always be possible to observe the engine exhaust.**

NOTES

TABLE 7 UNABLE TO BUILD MAIN RESERVOIR PRESSURE

What happens	Main res will not build to or falls below normal operating pressure, 100 130 psi. Crew message ENGINE SPEED INCREASE - LOW MAIN RES PRESSURE displays. Park brk applied lamp lights and will not go out if park brk off button is pressed. If driving, trainline alarm bell rings and crew message ALARM - PARKING BRAKE APPLIED WITH THROTTLE NOT IN IDLE OR LOCOMOTIVE IS MOVING displays.
What you do	(i) Notch off and bring the locomotive to a stop. (ii) Apply the train brake handle to emergency position. (iii) Press the park brk on button, even though the park brk applied lamp is lit. (iv) Check that the main res air cocks, supplying the main res hoses not in use, are closed. If any are open, close them and observe main res building.
Main res will still not build	(i) If the locomotive is coupled to an air braked train, isolate the locomotive main res air hose from its train. If air pressure builds, there is a fault on the locomotive main res pipe hose (hose or washer) or on the train.
Main res does not build when locomotive isolated from a train or locomotive is light	(i) Check the auto blowdown valves on the main res tanks for leakage. If any leak is apparent, or a valve blows down for in excess of 5 seconds isolate the faulty valve. If main res starts to build, report in the logbook, or direct to maintenance personnel, that an auto blowdown valve is isolated.
Auto blowdown valves are operating correctly	Check that the radar blower, which points at the radar behind the cowcatcher at the no.1 end of the locomotive (fig.4), is not blowing air continuously. If it is, isolate the supply air cock at the base of the brake rack (fig.5). Observe main res pressure building to normal.

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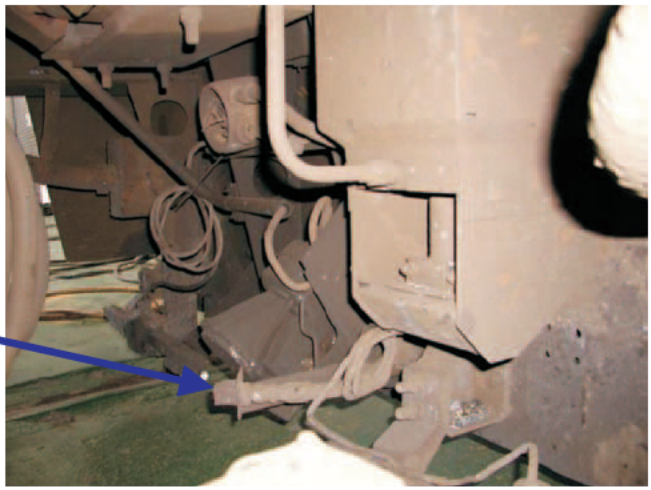

Fig. 4 - Radar

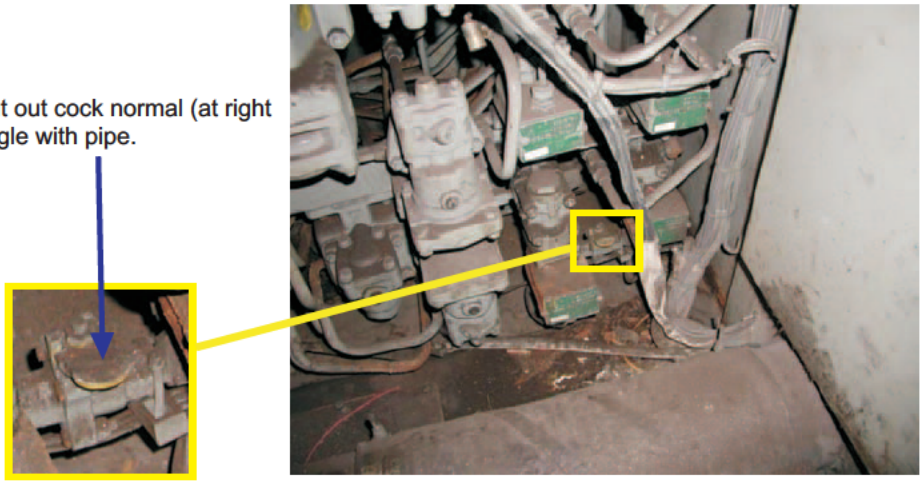

Fig. 5 - Brake rack

Radar blower is operating normally	(i) Press park brk off button and then press park brk on button. If main res starts to build allow it to achieve normal pressure. Crew message ENGINE SPEED INCREASE - LOW MAIN RES PRESSURE will clear. (ii) Press park brk off button and observe if main res starts to fall immediately. (iii) If main res falls immediately, there is a leak on the parking brake circuit. Press park brk on button again. Allow main res to recover. If in the section, take power and clear the section at 24 kph (15 mph). The trainline alarm bell will ring with crew message ALARM - PARKING BRAKE APPLIED WITH THROTTLE NOT IN IDLE OR LOCOMOTIVE IS MOVING displayed. When clear of the section, fail the locomotive.
There is no leak on the parking brake circuit	(i) Press down and hold the 'T' bar on the compressor control magnet valve on the brake rack (fig.6). (ii) Release the 'T' bar and listen for an exhaust of air from the magnet valve. If air exhausts, the compressor unloader is operating correctly. (iii) There are no further checks. Fail the locomotive.
There is no exhaust of air from the magnet valve	(i) Blow down the main res tanks by venting the auto drain valves. (ii) Close the cut out cock below the main res gauge on the brake rack (fig.6). (iii) Restore the main res tank drain valves to the normal position. If main res builds, it will now be controlled by the main res tank safety valve, which will lift occasionally to regulate pressure. Please report to maintenance personnel, if this isolation of the compressor unloader was carried out to achieve main res pressure.
Fault remains	There are no further checks. Fail the locomotive.

IMPORTANT

> **When experiencing low main res on a 201 class, always apply the parking brake on the locomotive and use scotches if necessary, before fault finding. This protects against brake cylinder leak off. Remember to remove any scotches and release the parking brake before proceeding.**

> **When fault finding low main res, if you have a cab cut in, ensure that the train brake handle, in this cab, is in the emergency position. Keep it there until normal main res pressure is achieved.**

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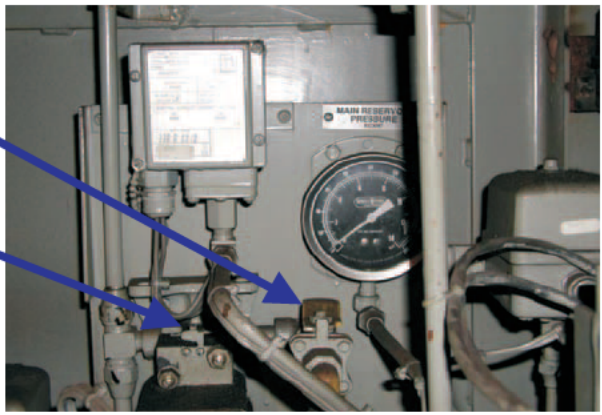


Fig. 6 - Brake rack

TABLE 8 BRAKE TROUBLE - UNABLE TO BUILD AIR BRAKE

What happens	Air brake pipe will not build to 68 72 psi with train brake handle in release position.
What you do	(i) Apply the train brake handle to the emergency position. (ii) Ensure that the main res gauge builds to and stabilises between 100 130 psi. If the main res gauge settles below this, go to fault finding table 7 Unable To Build Main Reservoir Pressure.
Main res gauge achieves between 100 130 psi	(i) Check that CAWS is operational. (ii) If not, switch off the CAWS circuit breaker for 30 seconds and then switch on again. Acknowledge the CAWS after the 1 min reset cycle. (iii) Try for brake release. (iv) If the fault remains, cut out the CAWS override switch and try for brake release.
CAWS is operational **201-205 & 210 - 234 only**	(i) Release the train brake handle. (ii) If the brake pipe sits at 0 psi, main res remains steady, change cabs and try for brake release. (iii) If successful or not, change back to the desired cab and try for brake release. (iv) If fault remains, cut out the vigilance override switch and try for brake release. If successful, remember you must obtain a secondman to proceed. If no response, fail the locomotive.
CAWS is operational **206-209 only**	(i) Release the train brake handle. (ii) If the brake pipe sits at 0 psi, main res remains steady, press the AWS reset button. (iii) If fault remains, change cabs and try for brake release. (iv) If successful or not, change back to the desired cab and try for brake release. (v) If fault remains isolate the AWS and try for brake release. (vi) If fault persists, cut out the vigilance override switch and try for brake release. If successful, remember you must obtain a secondman to proceed. If no response, fail the locomotive.
Brake pipe attempts to rise but main res starts falling with train brake handle in release	You are looking for a leak in the train brake pipe. (i) Isolate locomotive brake pipe and main res hoses from its air braked train, if attached, by closing the isolation cocks. (ii) Try for brake release. If the fault clears, the fault is on the locomotive brake pipe hose (hose or washer) or on the train.

Contd. over...

Fault remains on the locomotive	(i) Check each of the following Driving cab : • Emergency brake valve flap is closed and no sound of air. Trailing cab : • Train brake handle is in the full service position • Emergency brake valve flap is closed and no sound of air. On the ground : • Brake pipe cock is closed on the front of the locomotive. (ii) If any of these items needed to be adjusted, try for brake release.
Fault remains	There is no further check. Fail the locomotive.

IMPORTANT

> **You isolate the locomotive brake pipe from the train and you are successful in clearing the fault! When reconnecting the locomotive hoses to its train you will need to carry out a brake continuity test in accordance with General Appendix instructions.**

> **If during checks you discover a leaking or broken pipe in the brake rack or cab, DO NOT attempt to blank the pipe. You could leave yourself without brakes!**

> **Before releasing the train brake, ensure you have full main res pressure. If main res is building and a cab is cut in, place the train brake handle in the emergency position until main res stabilises. This will assist rapid brake release.**

> **If the brakes can only be released from the rear cab, it is permissible to clear the section driving from the rear cab provided a brakesman is available to travel in the leading cab in accordance with General Appendix instructions.**

TABLE 9 BRAKE TROUBLE - UNABLE TO BUILD VACUUM

What happens	Vacuum brake pipe will not build to the minimum 18 ins with train brake handle in release.
What you do	(i) Check the brake pipe gauge. This should be reading 70 72 psi. If it is not, go to fault finding table 8 Brake Trouble Unable To Build Air Brake.
Brake pipe gauge is at 70 72 psi	(i) Apply the train brake handle to emergency. (ii) Check the vac main res gauge. This should be reading greater than 21ins, normally as high as 28ins. If it is reading zero or low, check the exhauster filter casing end cap (fig.7) for security. If the vac main res does not rise, fail the locomotive.
Vac main res is normal with train brake handle in emergency	(i) Release the train brake handle and check if vac main res falls and does not recover with vac brake pipe steady. If it does not recover, you are looking for a leak in the train pipe. (ii) Isolate the locomotive vacuum pipe from its vacuum braked train, if attached, placing the locomotive hose on its dummy bracket. (iii) Try for brake release. If the fault clears, the problem is on the train.
Fault remains on the locomotive	(i) Check that the vacuum hose washers are intact and the hoses are sealing on the dummy brackets. (ii) Try for brake release. If the fault remains, fail the locomotive.
Vac main res is normal with train brake handle in release position	(i) If the vac main res stabilises to its normal level, but vac brake pipe settles below 18ins minimum, there is a control valve fault. (ii) Try tapping the HS4 valve (fig.8), the VA1 valve (fig.9) and VA1 release valve (fig.8). (iii) Try for vacuum brake release.
Fault Remains	There is no further check. Fail the locomotive.

Contd. over...

IMPORTANT

> **You disconnect the locomotive vacuum hose from the train and you are successful in clearing the fault! When reconnecting the locomotive vacuum hose to its train you will need to carry out a brake continuity test in accordance with General Appendix instructions.**

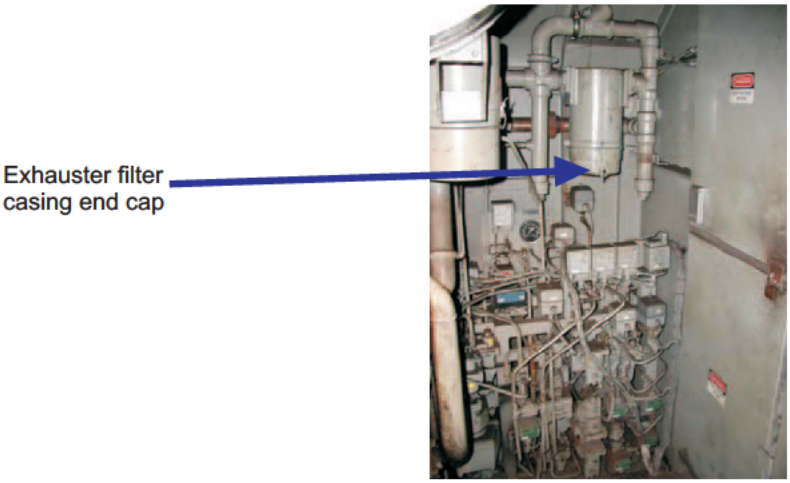


Fig. 7 - Brake rack

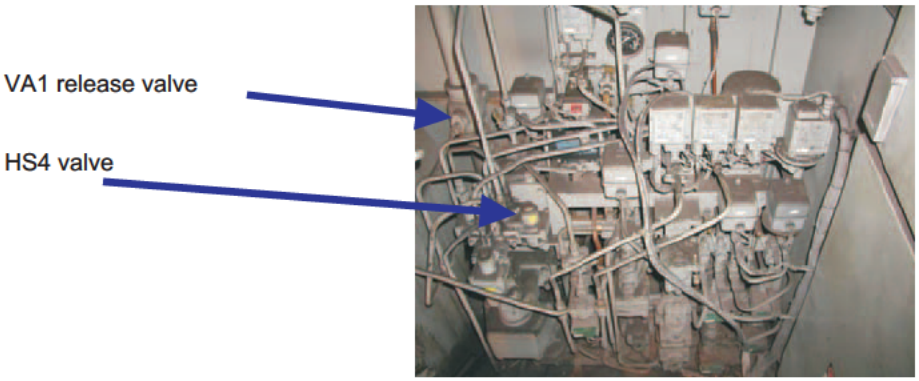


Fig. 8 - Brake rack

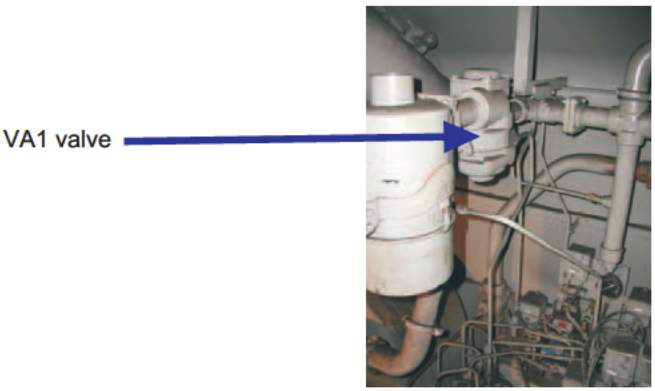


Fig. 9 - Brake rack

TABLE 10 BRAKE TROUBLE - LOCOMOTIVE BRAKE WILL NOT RELEASE

What happens	With train and locomotive brake handles released and brake gauge readings correct 1. Main res gauge 100 130 psi 2. Brake pipe gauge 68 72 psi 3. Vac brk pipe gauge 18 21ins. Brake cylinder pressure fails to release completely and locomotive brake cylinders are applied. Power may be cut with crew message NO LOAD - INDEPENDENT AIR BRAKES APPLIED FOR AN EXCESSIVE TIME displayed.
What you do	(i) Notch off and bring the locomotive to a stop. (ii) Apply the locomotive brake handle and apply the train brake handle to emergency position. (iii) Apply the parking brake and use scotches if necessary. (iv) In the brake rack, prise open the relief valve on the 27A control valve reservoir (fig. 10) and blow down the air pressure. (v) Return to the cab. Release both brake handles and verify that the brake cylinder gauge shows 0, indicating full release. Keep both brake handles released for one minute. (vi) Apply the train brake handle to full service and verify brake cylinder pressure rising. (vii) Release the train brake handle and verify brake cylinder release. (viii) Check that the crew message NO LOAD - INDEPENDENT AIR BRAKES APPLIED FOR AN EXCESSIVE TIME has cleared. Remove any scotches, release the parking brake, take power and proceed.
Brake cylinder pressure fails to release again after applying and releasing the train brake	There are no further checks. Fail the locomotive.

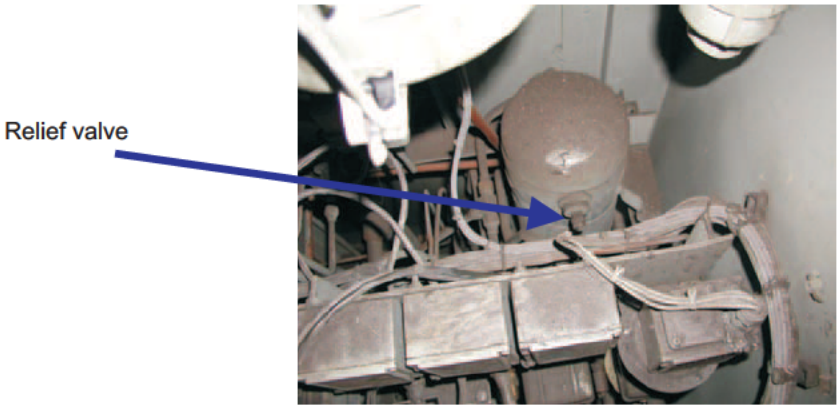


Fig. 10 - 27A Control valve reservoir

NOTES

TABLE 11 PC LAMP WILL NOT CLEAR

What happens	PC lamp lights on console, gen field is cut and engine revs drop to idle in power
What you do	(i) Notch off and bring the locomotive to a stop. (ii) With the locomotive brake applied, select forward and release the train brake handle. If the engine revs to notch 3 and the PC lamp remains lighting, check : 1. Main Res gauge 100 130 psi 2. Brake pipe gauge 68 72 psi 3. Vac brk pipe gauge 18 21ins If any are not reading as above, follow the steps in fault finding table 9 Brake Trouble Unable To Build Vacuum. If they are OK, in the brake rack, try tapping the vacuum brake switch (VBS) (fig.11). Check if the PC lamp will clear. If it does, take power and proceed. If the PC lamp remains lit, fail the locomotive.
The engine remains at idle, with forward selected, notch control handle at idle, train brake released and PC lamp lighting	(i) Move the notch control handle smartly out of and back to idle several times. Release the train and locomotive brake handles and see if the PC lamp clears. If it clears, take power and proceed. (ii) **206 - 209 only** Check that neither DRA button is depressed in the cab. Press each button in and pull out to release to be sure. If the PC lamp clears, take power and proceed.
PC lamp still remains lighting	(i) Look at the notch control handle from under the desk. If you can see the microswitches (fig.4), tap them gently. Release the train and locomotive brake handles and see if the PC lamp clears. If it clears, take power and proceed.
PC lamp remains lighting	(i) Change cabs and see if the PC lamp clears in this cab. If it remains lighting, move the notch control handle smartly out of and back to idle. Release the train and locomotive brake handles again and see if the PC lamp clears. If it clears, change to the desired cab and attempt to take power. (ii) **206 - 209 only** Check that neither DRA button is depressed in the cab. Press each button in and pull out to release to be sure. If the PC lamp clears, change to the desired cab and attempt to take power.
PC lamp still remains lighting	(i) In the brake rack, try tapping the pressure brake switch (PBS) (fig.11) and the power cut off switch (PCS) (fig.11). Check if the PC lamp will clear. If it does, take power and proceed. If the PC lamp remains lit, there are no further checks. Fail the locomotive.

Contd. over...

IMPORTANT

> **If the PC can only be cleared in the rear cab, it is permissible to clear the section driving from the rear cab provided a brakesman is available to travel in the leading cab in accordance with General Appendix instructions.**

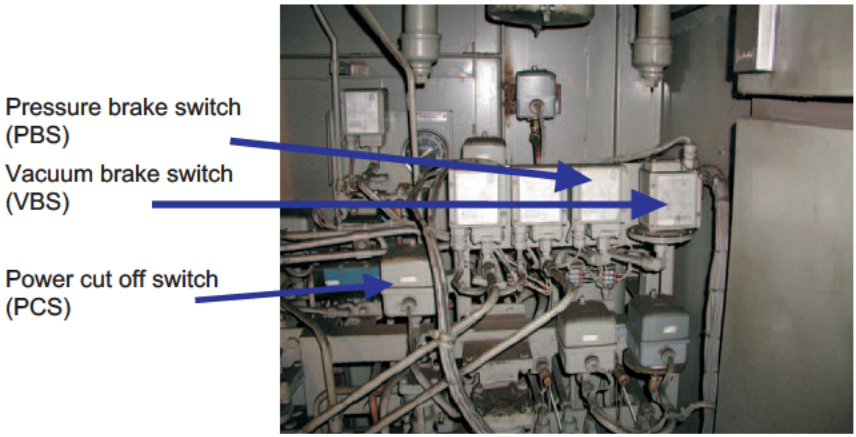


Fig. 11 - Brake rack

TABLE 12 PARKING BRAKE WILL NOT RELEASE ON AIR BRAKED COACHING

What happens	Main res is normal (100 130 psi), but parking brake gauges on coaching stock are indicating in the white zone (partial release).
What you do	(i) Apply the train brake handle to emergency. (ii) Blow down the main res tanks by venting the auto drain cocks. (iii) Restore the auto drain cocks to their normal position and allow main res to build. (iv) Confirm parking brake release on the train.
Parking brake gauges remain in the white zone	There are no further checks. Fail the locomotive.

IMPORTANT

> **When carrying out the above procedure always apply the parking brake on the locomotive and use scotches if necessary before fault finding. This protects against brake cylinder leak off. Remember to remove any scotches and release the parking brake before proceeding.**

NOTES

TABLE 13 NO POWER/DOWN IN POWER

What happens	You notch up but engine revs remain at idle, trainline alarm bell does not ring, no warning lamps light and no unusual crew messages display.
What you do	(i) With the locomotive in forward and the notch control handle in idle, apply a full service brake. If the locomotive revs up to notch 3 and the PC lamp does not light, the PC lamp may be blown. Check by pressing in the lamp unit. (ii) See if the PC lamp lights on the opposite console in the cab. Then release both brake handles. If the PC lamp does not go out, go to fault finding table 11 PC Lamp Will Not Clear.
The engine does not rev up when the PC lamp lights	(i) Check that the governor plug is secure on the governor.
The governor plug is secure	(i) Shut down the engine and open the battery switch for 30 seconds. (ii) Close the battery switch. (iii) Restart the engine. Try for power.
No response	There is no further check. Fail the locomotive.

OR

What happens	You notch up, engine responds to the notches, trainline alarm bell does not ring, no warning lamps light and no unusual crew messages display, but traction extremely weak or non existent.
What you do	(i) Notch off and bring the locomotive to a stop. (ii) Select reverse direction and attempt to take power. Bring the train to an immediate halt after ascertaining that it has taken power. (iii) Move the forward/reverse handle backwards and forwards smartly several times. (iv) Try for power in the desired direction. If power is still not available, change cabs and repeat the procedure. (v) If power is regained in the desired direction in the trailing cab, bring the train to an immediate halt, change cabs, take power and proceed. (vi) If there is still no power in the desired direction, switch off the computer control circuit breaker for 30 seconds and then switch on again. Try for power in the desired direction again. If the fault has not cleared, fail the locomotive.

OR

Contd. over...

There is no power in forward or reverse direction	(i)	Move the notch control handle smartly out of and back to idle several times and switch the gen field switch off and on several times. Try for power. If power is still not available, change cabs and test for power in both directions. If power is available in the trailing cab, change back to the driving cab. Try to take power.
There is no power in the trailing cab	(i)	Check the fault archive in the main menu on the computer screen. View the most recent message and the two older messages.
Archive message FEEDBACK ERROR - AXLE ALT FEEDBACK INCONSISTENT WITH OTHER SPEED SIGNALS	(i) (ii)	Disconnect the axle generator cable plug from its socket on the underbody above axle 3 on no.1 bogie (fig.12). Release the plug by unscrewing the locking collar and secure the cable to the locomotive. Try for power.
Archive message FAILED FEEDBACK - RADAR	(i) (ii) (iii) (iv)	Switch off the computer control circuit breaker. Disconnect the radar cable plug from its socket behind the cowcatcher at the no.1 end of the locomotive (fig.13). Release the plug by twisting the locking collar. Secure the cable to the locomotive. Switch on the computer control breaker. Try for power.
None of the above archive messages displayed	(i) (ii)	Switch off the computer control circuit breaker for 30 seconds and then switch on again. Try for power.
There is still no power	There are no further checks. Fail the locomotive.	

OR

What happens	Engine responds to the notches but locomotive not achieving desired maximum speeds. Trainline alarm bell does not ring, no warning lamps light and no unusual crew messages display.	
What you do	(i) (ii)	Notch off and bring the locomotive to a stop. Check the fault archive in the main menu on the computer screen. View the most recent message and the two older messages.
Archive message FEEDBACK ERROR - AXLE ALT FEEDBACK INCONSISTENT WITH OTHER SPEED SIGNALS	(i) (ii)	Disconnect the axle generator cable plug from its socket on the underbody above axle 3 on no.1 bogie (fig.12). Release the plug by unscrewing the locking collar and secure the cable to the locomotive. Try for power.

OR

Contd. over...

Archive message FAILED FEEDBACK - RADAR	(i) Switch off the computer control circuit breaker. (ii) Disconnect the radar cable plug from its socket behind the cowcatcher at the no.1 end of the locomotive (fig.13). Release the plug by twisting the locking collar. Secure the cable to the locomotive. (iii) Switch on the computer control breaker. (iv) Try for power.
None of the above archive messages displayed	(i) Switch off the computer control circuit breaker for 30 seconds and then switch on again. (ii) Try for power.
Locomotive still not achieving desired maximum speeds	If you feel you can work your train safely and without difficulty, proceed. If not, fail the locomotive.

OR

What happens	Engine loses revs in particular notches or revs will not increase over certain notches.
What you do	(i) Notch off and bring the locomotive to a stop. (ii) Apply train brake handle to light the PC lamp. (iii) Move the notch control handle smartly through its full range several times. (iv) Clear the PC lamp and with gen field switch off, notch up progressively and see that the engine revs increase with each notch. Notch off and take power.
Fault remains	(i) Look at the notch control handle from under the desk. If you can see the microswitches (fig.3), tap them gently. (ii) Clear the PC lamp and with gen field switch off, notch up progressively and see that the engine revs increase with each notch. Notch off and take power.
Fault remains	(i) Take power and proceed avoiding the problem notches. The locomotive will not suffer damage. If you feel you can work your train safely and without difficulty, proceed. If not, fail the locomotive.

OR

What happens	Engine loses revs (bogs down) or hunts in the higher notches and no exhaust smoke.
What you do	(i) Keep the locomotive in the lower notches where the engine revs sound normal. The locomotive will not suffer damage. If you feel you can work your train safely and without difficulty, proceed. If not, fail the locomotive.

IMPORTANT

> **If power is only available in the desired direction in the rear cab, it is permissible to clear the section driving from the rear cab provided a brakesman is available to travel in the leading cab in accordance with General Appendix instructions.**

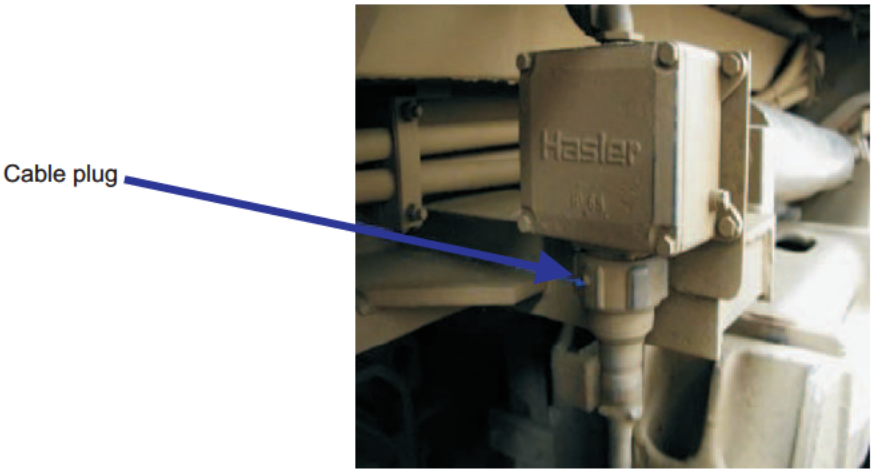


Fig. 12 - Axle generator cable

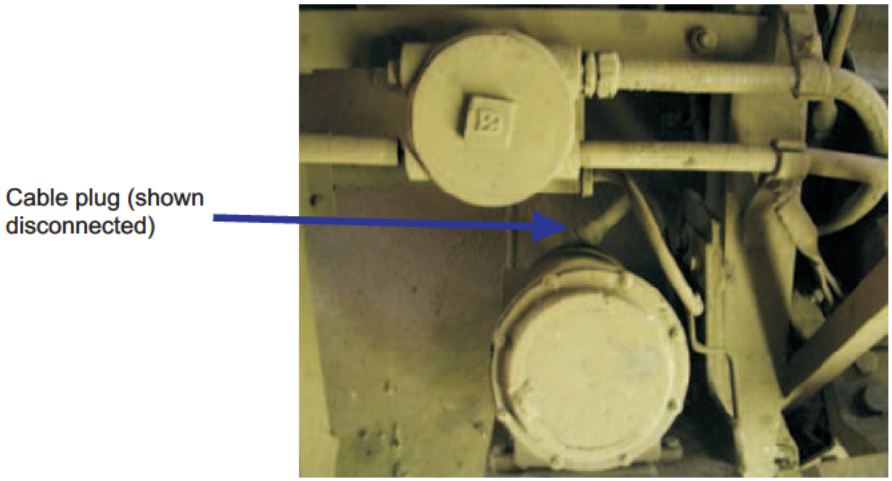


Fig. 13 - Radar

TABLE 14 GROUND RELAY

What happens	Trainline alarm bell rings, crew message GROUND RELAY - POWER displays, gen field is cut and engine revs drop to idle. After about 6 10 seconds the ground relay will reset automatically. The alarm bell will silence and crew message will clear.
What you do	(i) Notch off immediately (before the ground relay resets) and bring the locomotive to a stop. (ii) Switch the start/run switch, in your driving cab, to isolate. (iii) In the computer main menu select TRACTION CUT OUT. (iv) Disable truck no.1 (bogie no.1). (v) Return the start/run switch in your driving cab to run and regain power.
What you do if ground relay activates again	(i) Notch off immediately (before the ground relay resets) and bring the locomotive to a stop. (ii) Switch the start/run switch, in your driving cab, to isolate. (iii) In the computer main menu select TRACTION CUT OUT. (iv) Enable truck no.1 (Bogie no.1). (v) Select truck no.2. (vi) Disable truck no.2 (bogie no.2). (vii) Return the start/run switch in your driving cab to run and regain power.
Ground relay still activates after you have cut out each bogie in turn	(i) Having cut out each bogie in turn, this indicates that the fault is in the generator circuitry or in 1 or more motors on each bogie e.g. 1&5. Try and clear the section and fail the locomotive.

Contd. over...

What you do if ground relay does not reoccur having cut out a complete truck.	(i) Bring the locomotive to a stop. (ii) Switch the start/run switch, in your driving cab, to isolate. (iii) In the computer main menu select TRACTION CUT OUT. (iv) Enable the disabled truck. (v) Cut out the first traction motor of that truck. (vi) Return the start/run switch in your driving cab to run and regain power. If the ground relay reoccurs, repeat the procedure, cutting in the first traction motor and cutting out the next traction motor until the defective traction motor is isolated. If a traction motor was already cut out before fault finding, leave it cut out.
What you do if crew message GROUND RELAY LOCKOUT - PRESS F3 TO RESET displays	(i) Carry out the crew message instruction and continue fault finding as above. (ii) If the lockout will not reset fail the locomotive.

Contd. over...

IMPORTANT

- **When you proceed with traction motors cut out check that axles are rotating freely and there is no smoke or smell of burning from bogies. If you do observe trouble, STOP and immediately seek advice from maintenance personnel.**
- **When taking power following a ground relay, traction power will be limited to as low as 500 HP with the crew message VOLTAGE LIMITING DUE TO GROUND RELAY displayed. This will last approximately 6 mins. If no ground relay reoccurs in this time, the crew message will clear and normal traction power will be restored.**
- **The computer automatically reduces power in proportion to the number of traction motors cut out. You can operate as normal, in accordance with the speeds and trailing loads set down for these locomotives, without overloading the motors.**
- **When disabling a complete truck the computer automatically takes account of a traction motor already cut out. This means that if you enable the truck again, the computer will still leave that motor cut out.**
- **Once traction motors are cut out, wheel creep is not active and the locomotive acts in back up mode, which gives wheel slip protection similar to an 071 class. In poor rail adhesion, you still have a lot of power on less axles so be extra careful of provoking wheel slip (see Volume 1 - Professional Driving Technique).**
- **If the fault is cleared by disabling a complete truck, you may decide that to continue fault finding further would delay your train more than if you were to work your train leaving the truck disabled. It is in order to proceed on this basis.**
- **A 201 class needs at least 2 traction motors cut in to take power.**
- **Don't be tempted to proceed after the first ground relay activation without carrying out fault finding.**
- **CARELESS TREATMENT OF THE GROUND RELAY SYSTEM COULD CAUSE FIRE!**

NOTES

TABLE 15 TRACTION MOTOR FLASHOVER

What happens	Trainline alarm bell rings, crew message displays TRACTION MOTOR #N FLASHOVER - POWER, gen field is cut and engine revs drop to idle.
What you do	(i) Notch off immediately. (ii) Wait for the trainline alarm bell to stop ringing and the crew message to clear. (iii) Take power and proceed.
Fault activates again	(i) Notch off immediately and bring the locomotive to a stop. (ii) Switch the start/run switch, in your driving cab, to isolate. (iii) Cut out the traction motor using TRACTION CUT OUT in the main menu. (iv) Return the start/run switch in your driving cab to run and regain power.

OR

What happens	Trainline alarm bell rings, crew message displays NO POWER - TRACTION MOTOR #N FLASHOVER - GROUND RELAY LOCKOUT, gen field is cut and engine revs drop to idle.
What you do	(i) Notch off immediately and bring the locomotive to a stop. (ii) Switch the start/run switch, in your driving cab, to isolate. (iii) Select the crew message. There will be an option to cut out the traction motor in the menu using the F3 key. This will give a shortcut to the traction cut out menu. (iv) Cut out the traction motor. (v) Press crew and return to the crew message. (vi) Reset the fault using the F3 key if requested. (vii) Return the start/run switch in your driving cab to run and regain power.

Contd. over...

IMPORTANT

- **When you proceed with traction motors cut out look out and check that axles are rotating freely and there is no smoke or smell of burning from bogies. If you do observe trouble, STOP and immediately seek advice from maintenance personnel.**
- **When taking power following a ground relay, traction power will be limited to as low as 500 HP with the crew message VOLTAGE LIMITING DUE TO GROUND RELAY displayed. This will last approximately 6 mins. If no ground relay reoccurs in this time, the crew message will clear and traction power will be restored.**
- **The computer automatically reduces power in proportion to the number of traction motors cut out. You can operate as normal, in accordance with the speeds and trailing loads set down for these locomotives, without overloading the motors.**
- **Once traction motors are cut out, wheel creep is not active and the locomotive acts in back up mode, which gives wheel slip protection similar to an 071 class. In poor rail adhesion, you still have a lot of power on less axles so be extra careful of provoking wheel slip (see Volume 1 - Professional Driving Technique).**
- **A 201 class needs at least 2 traction motors cut in to take power.**

TABLE 16 SLIPPED PINION

What happens	Trainline alarm bell rings, crew message displays POSSIBLE SLIPPED PINION DETECTED - VOLTAGE LIMITING IN ORDER TO VERIFY and reduced power on locomotive.
What you do	(i) Continue operation. The slipped pinion routine will last approximately 6 mins, after which the crew message will clear and full traction power will be restored.

OR

What happens	Trainline alarm bell rings, crew message displays TRACTION MOTOR #N SLIPPED PINION LOCKOUT - PRESS F3 TO RESET, wheelslip lamp flashes on/off on console and no power.
What you do	(i) Notch off and bring the locomotive to a stop. (ii) Reset the fault using the crew message. (iii) Take power and proceed.
Fault activates again	(i) Notch off and bring the locomotive to a stop. (ii) If you have experienced excessive wheelslip due to poor track conditions, reset the fault, take power and proceed as above. (iii) If track conditions are good, cut out the traction motor using TRACTION CUT OUT in the main menu. (iv) Reset the fault using the crew message.

IMPORTANT

- **When you proceed with traction motors cut out ALWAYS look out and check that, axles are rotating freely and there is no smoke or smell of burning from bogies. If you do observe trouble, STOP and immediately seek advice from maintenance personnel.**
- **The computer automatically reduces power in proportion to the number of traction motors cut out. You can operate as normal, in accordance with the speeds and trailing loads set down for these locomotives, without overloading the motors.**
- **Once traction motors are cut out, wheel creep is not active and the locomotive acts in back up mode, which gives wheel slip protection similar to an 071 class. In poor rail adhesion, you still have a lot of power on less axles so be extra careful of provoking wheel slip (see Volume 1 - Professional Driving Technique).**
- **A 201 class needs at least 2 traction motors cut in to take power.**

NOTES

TABLE 17 LOCKED POWER WHEEL

What happens	Trainline alarm bell rings, crew message displays #N LOCKED POWER WHEEL.
What you do	(i) Notch off and bring the locomotive to a stop. (ii) Attempt to take power again and move the locomotive slowly. If the crew message clears, proceed, initially looking out to check that the axle is rotating freely and there is no smoke or smell of burning from the bogie. (iii) If in any doubt, stop and obtain advice from maintenance personnel.
Fault activates again	(i) Notch off and bring the locomotive to a stop. (ii) Obtain advice from maintenance personnel.

NOTES

TABLE 18 NO COMPANION ALTERNATOR OUTPUT

What happens	Trainline alarm bell rings, crew message displays LOCOMOTIVE WILL NOT LOAD - NO COMPANION ALTERNATOR OUTPUT and no power on locomotive.
What you do	This is an indication that the aux gen output or companion alternator output has failed. (i) Notch off and bring the locomotive to a stop. (ii) Push the engine layshaft gently and increase engine revs for several seconds. Release the layshaft gently and allow engine return to idle. (iii) If the crew message clears, take power and proceed to the next location where the locomotive can be failed. When disposing of the locomotive, the engine must be shut down.
Fault remains	(i) Fail the locomotive. Shut down the engine as soon as is practicable.

NOTES

TABLE 19 DIGITAL INPUT SYSTEM FAILURE

What happens	Trainline alarm bell rings, crew message displays DIGITAL INPUT SYSTEM FAILURE (CHECK MUX CIRCUIT). Locomotive may lose power or shut down depending on the fault.
What you do	This is an indication that a low tension (74V DC) earth fault has developed affecting computer operation. (i) Notch off and bring the locomotive to a stop. (ii) In no.1 cab, trip and then reset each of the white labelled circuit breakers in turn. If the crew message clears when one of the circuit breakers is tripped, leave this circuit breaker tripped. (iii) Take power and proceed.
Fault remains	(i) Shut down the engine and open the battery switch for 30 seconds. (ii) Close the battery switch. (iii) Restart the engine. Try for power.
Fault remains	(i) Fail the locomotive.

IMPORTANT

- **If power is maintained while digital input system failure fault is displayed, obtain further advice from maintenance personnel.**
- **When tripping circuit breakers, inform the signalman that train radio contact will be lost when you trip the radio/PA circuit breaker. If tripping this circuit breaker clears the fault, inform the signalman that you will need to proceed with this circuit breaker tripped and that no train radio contact will be possible.**
- **Remember that proceeding with a circuit breaker tripped means that the equipment protected by that circuit breaker will not function.**

NOTES

TABLE 20 TRAINLINE ALARM BELL

What happens	Trainline alarm bell rings on/off, crew message displays TRAINLINE ALARM BELL, trouble/fire alarm activates and locomotive may or may not shut down. (If the locomotive shuts down, crew message MU ENGINE STOP REQUEST will also display).
What you do	This is an indication that the fire system has activated or has developed a fault (i) Notch off and bring the locomotive to a stop. (ii) If the locomotive shuts down, switch the start/run switch, in your driving cab, to isolate, to silence the alarm bell and clear crew message ENGINE DEAD - LOCOMOTIVE IS NOT ISOLATED. (iii) Check if the fire or trouble lamp is lit on the fire extinguishing system cab panel.
Fire lamp is lit	(i) Assume a fire in the engine hood or electrical cabinet as indicated by the warning lamps.
Trouble lamp is lit	(i) Press the silence alarm button. If the alarms silence and the crew message clears, take power and proceed. (ii) If the silence alarm button has no effect, trip the fire protection circuit breaker for 30 seconds. Reset the breaker. If the alarms and crew messages clear, take power and proceed. If the alarms and crew messages reappear, trip the circuit breaker again and leave it tripped. (iii) Take power and proceed.

NOTES

TABLE 21 NO LOAD - COACH DOORS ARE NOT CLOSED

What happens	Crew message displays NO LOAD - COACH DOORS ARE NOT CLOSED when attempting to take power.
What you do	This is an indication that the 24V power supply has developed a fault (i) Notch off and bring the locomotive to a stop. (ii) In no. 1 cab trip the 24V PS circuit breaker for 30 seconds. (iii) Reset the circuit breaker and attempt to take power. (iv) If the fault clears, take power and proceed.
Fault remains	(i) Break the seal on the door interlock override switch and switch it up to isolate. (ii) Take power and proceed.

IMPORTANT

> **This fault finding procedure only applies to 201 class locomotives that are working trains other than in push/pull mode. It includes where a push/pull train is being hauled and the locomotive MU jumper cable is not connected between the locomotive and its train.**

NOTES

TABLE 22 NO LOAD - IMPROPER GFA CONTACTOR STATUS

What happens	After starting up locomotive and attempting to take power, crew message displays NO LOAD - IMPROPER GFA CONTACTOR STATUS and no power.
What you do	(i) Trip the computer control circuit breaker for 30 seconds. (ii) Reset the circuit breaker and attempt to take power. If the fault clears, take power and proceed.
Fault remains	(i) Fail the locomotive.

NOTES

TABLE 23 HOT ENGINE

What happens	Trainline alarm bell rings, crew message displays HOT ENGINE - THROTTLE 6 LIMIT and power limited to notch 6.
What you do	(i) Proceed in notch 6 or less if possible and allow the alarm to clear. Then proceed as normal.
What you do if the alarm clears and repeats or does not clear.	Proceed to the next location where you can clear the section and check the following items. (i) In the computer main menu select COOLING SYSTEM DATA. (ii) Check the temperature readings for the two engine temperature probes ETP1 and ETP2. • If the readings are similar and greater than or equal to ETPF 215 (ETPC 102), then the locomotive has a hot engine. Fail the locomotive. • If only one probe reads greater than or equal to ETPF 215 (ETPC 102), then there is a probe fault and the locomotive does not actually have a hot engine. You may proceed, but as long as the probe fault remains the alarm and power reduction will remain. If you feel you can work your train safely and without difficulty, proceed. If not, fail the locomotive. In some cases, the hot engine event is not recorded in the fault archive. Report in the logbook or direct to maintenance personnel if you experienced a hot engine and if you detected a probe fault.

NOTES

TABLE 24 #2 TM BLOWER CIRCUIT BREAKER TRIPPING

What happens	Crew message displays REDUCED POWER, DYNAMIC BRAKE - TRACTION MOTOR BLOWER LOCKOUT and no power.
What you do	This is an indication that the #2 traction motor blower circuit breaker has tripped or failed. (i) Notch off and bring the locomotive to a stop. (ii) In no.1 cab, check the #2 TM blower circuit breaker. If it is tripped, reset it.
Circuit breaker takes reset or was not tripped	(i) Select the next crew message which will read TM BLOWER #2 CIRCUIT BREAKER IS NOT CLOSED - PRESS F3 KEY TO ATTEMPT RESET OF FAULT. (ii) Reset the fault. (iii) Take power and proceed.
Circuit breaker will not reset or fault will not clear	(i) Select crew message TM BLOWER #2 CIRCUIT BREAKER IS NOT CLOSED - PRESS F3 KEY TO ATTEMPT RESET OF FAULT. (ii) Use the cut out option to access the traction motor cut out menu. (iii) Switch the start/run switch, in your driving cab, to isolate. (iv) Disable truck no.2 (bogie no.2). (v) Return the start/run switch in your driving cab to run. (vi) Return to crew message TM BLOWER #2 CIRCUIT BREAKER IS NOT CLOSED - PRESS F3 KEY TO ATTEMPT RESET OF FAULT. (vii) Reset the fault. (viii) Take power and proceed.
Fault remains	Fail the locomotive.

Contd. over...

IMPORTANT

- **When you proceed with traction motors cut out check that axles are rotating freely and there is no smoke or smell of burning from bogies. If you do observe trouble, STOP and immediately seek advice from maintenance personnel.**
- **The computer automatically reduces power in proportion to the number of traction motors cut out. You can operate as normal, in accordance with the speeds and trailing loads set down for these locomotives, without overloading the motors.**
- **When disabling a complete truck the computer automatically takes account of a traction motor already cut out. This means that if you enable the truck again, the computer will still leave that motor cut out.**
- **Once traction motors are cut out, wheel creep is not active and the locomotive acts in back up mode, which gives wheel slip protection similar to an 071 class. In poor rail adhesion, you still have a lot of power on less axles so be extra careful of provoking wheel slip (see Volume 1 - Professional Driving Technique).**
- **A 201 class needs at least 2 traction motors cut in to take power.**

TABLE 25 LOCATION OF EQUIPMENT REQUIRED IN FAULT FINDING

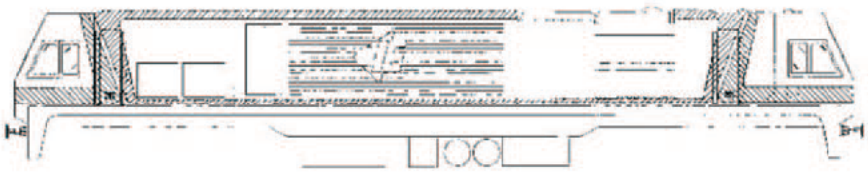
NO. 1 END **NO. 2 END**

LEFT HAND SIDE

Radar

Brake Rack

Overspeed lever
Fuel sight glasses
Governor plug



NO. 2 END **NO. 1 END**

RIGHT HAND SIDE

Governor layshaft
Crankcase detector
Low oil button

Axle generator

NOTES

071 CLASS LOCOMOTIVES

SECTION 2 FAULT FINDING 071 CLASS LOCOMOTIVES

Introduction

This section contains step by step instructions as to how you can overcome the effects of faults on the 071 class locomotive. The instructions are everything that can possibly be done without tools. This section has been laid out in an easy to follow and effective manner. To aid in fault finding, you should familiarise yourself with the contents of this section, so that you can refer quickly when that fault occurs.

As the section deals with the effects of faults, it does not cover problems due to incorrect set up of the locomotive. Also, it assumes that all MCB's are on. Please check that your locomotive has been correctly prepared for service.

Using The Section

When you are satisfied that your locomotive is correctly set up and that all MCB's are on, find the fault description that best describes the problem you are experiencing, from the contents list.

Under the fault description there will be one or more tables. Look first at the what happens row on the table or tables and find the description that best matches what you are experiencing. Follow the step by step instructions in this table, starting with what you do. Finally, a highlighted panel indicates important considerations in relation to dealing with the fault.

IMPORTANT

- **Before engaging in fault finding, make sure that your locomotive is correctly prepared.**
- **When performing fault finding, where it is necessary for testing purposes to release the brakes, the security of the train is of paramount importance e.g. considerable gradients, points etc. Where doubt exists, brakes should not be released and the locomotive failed.**
- **When performing fault finding, where it is necessary for testing purposes to take power in reverse direction, always comply with the provisions of the Rule Book.**
- **If you are bringing your locomotive to a stop because of a fault developing, always try to stop within the protection of station or interlocking signals.**
- **Always keep the signalman informed in accordance with the Rule Book.**

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NOTES

TABLE 1 ENGINE WILL NOT START - ENGINE DOES NOT ROTATE

What happens	You turn fuel prime/engine start switch to engine start and nothing happens!
What you do	(i) Switch on cab lamps and see if they light. If there is no light or they are extremely dim, fail the locomotive. (ii) If they light brightly, prime and try for a start again and observe the lamps. If the lamps go out while in engine start and the engine does not rotate, fail the locomotive.
The cab lamps remain bright while in engine start	(i) Switch off the control & fuel pump switch. (ii) Switch on the control & fuel pump switch in the other cab. (iii) Prime and try for a start.
Still no response	(i) Test the starting fuse using the fuse test facility. If blown, fail the locomotive.
Starting fuse is OK	(i) Check that the battery charging socket lid is fully closed on the rear wall of the electrical cabinet, behind cab no.1 (fig.1). Open the lid and close it again to be sure. (ii) Prime and try for a start.
Still no response	There is no further check. Fail the locomotive.

OR

What happens	You turn fuel prime/engine start switch to engine start and starters engage but will not rotate engine or engine rotates extremely slowly.
What you do	Fail the locomotive.

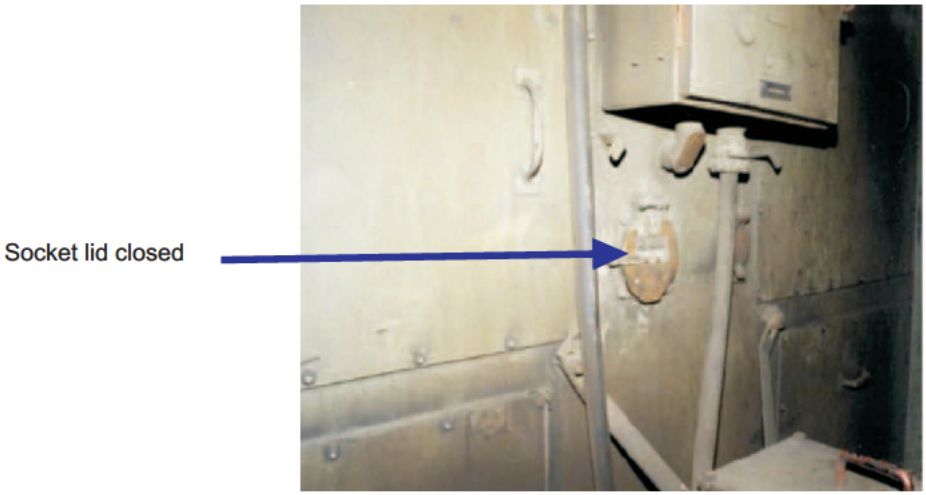

Fig. 1 - Battery charging socket

NOTES

TABLE 2 ENGINE WILL NOT START - ENGINE ROTATES BUT WILL NOT FIRE

What happens	You turn fuel prime/engine start switch to engine start, engine begins to rotate normally in the purge phase and then stalls.
What you do	(i) Release the start switch immediately. (ii) Check the starting fuse using the fuse test facility. If it has blown, fail the locomotive.
Starting fuse is OK	(i) Prime and try to start the engine. If it stalls again, release the start switch immediately and fail the locomotive.

OR

What happens	You turn fuel prime/engine start switch to engine start, engine rotates in purge stage, then in starting stage, but does not fire.
What you do	(i) At the governor end of the engine, check for presence of governor oil in the sight glass. If there is no oil visible, fail the locomotive. (ii) If governor oil is visible, check if any of the following protective devices are tripped 1. Governor button 2. Low water button 3. Crankcase button 4. Overspeed lever If any are found tripped, reset, prime and try for a start. If a protective device trips again, fail the locomotive.
Governor oil level is OK and no protective device is tripped	(i) Turn the fuel prime/engine start switch to fuel prime and with a cab door open try and hear if the fuel pump is running. You might need to turn the switch on and off to identify it apart from the turbo lubricating pump, which will be running at this stage. (ii) Check also after priming that the fuel return sight glass is full. (iii) If the fuel pump is not running and both sight glasses are empty fail the locomotive.
Fuel pump is running and both sight glasses are empty	The locomotive may have run out of fuel. (i) If fuel is required, ensure that there are no fuel leaks on the locomotive.

Contd. over...

Fuel pump is running, fuel return sight glass is full and engine will not fire	(i) Find an assistant to operate the governor layshaft (fig.2). (ii) Instruct this person to start gently pushing in the layshaft when the engine starts rotating. (iii) When the engine starts, the layshaft should be released gradually. Do not push the layshaft in fully, as the engine will trip the overspeed lever if it starts. (iv) Report in the logbook, or direct to maintenance personnel, if it was necessary for you to start the engine in this manner.
Engine will not fire with layshaft operated manually	There is no further check. Fail the locomotive.

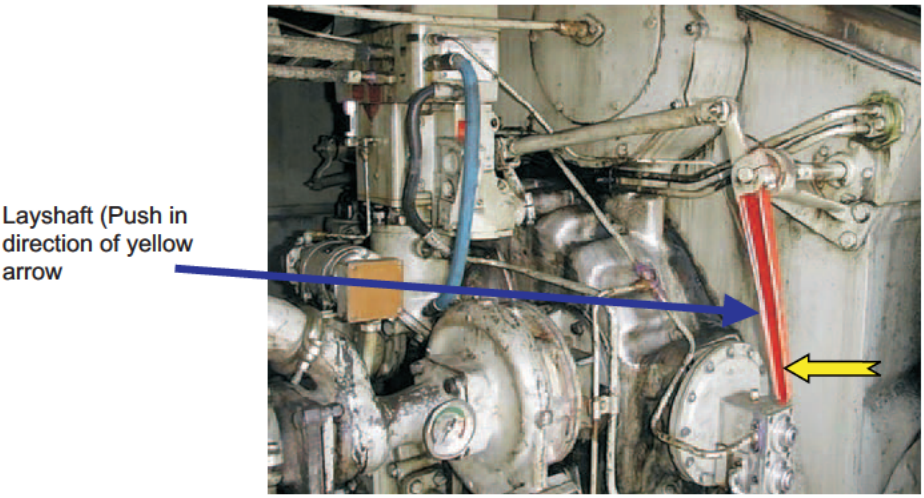

Fig. 2 - Governor layshaft

TABLE 3 ENGINE SHUTTING DOWN - TRIPPING LOW OIL BUTTON

What happens	Governor shutdown lamp lights on console and engine shuts down smartly.
What you do	(i) Notch off and bring the locomotive to a stop. (ii) Switch the start/run switch, in your driving cab, to isolate. (iii) At the governor end of the engine, check for presence of governor oil in the sight glass. If there is no oil visible, fail the locomotive. (iv) If governor oil is visible, reset the tripped governor button. Check if any of the following protective devices are also tripped and reset as described : 1. Low water button check the header tank sight glass. If water level is low, look for any visible water leaks. If there are leaks, fail the locomotive. If there are no leaks, or the header tank level is normal, reset the button. 2. Crankcase button reset. 3. Overspeed lever reset. (v) Check also that the crankcase detector test cock is in the normal position, (fig.3). If not, correct its position. (vi) Prime and try for a start.
Governor button and/or protective device trips again	Therer is no further check. Fail the locomotive.

IMPORTANT

- **You should never attempt to open any inspection cover, or remove the dipstick on an engine when the crankcase button has tripped. A crankcase explosion may occur, the results of which could be FATAL.**
- **When an 071 class engine shuts down, always apply the handbrake on the locomotive and use scotches if necessary before fault finding. This protects against brake cylinder leak off. Remember to remove any scotches and release the handbrake before proceeding.**

Contd. over...

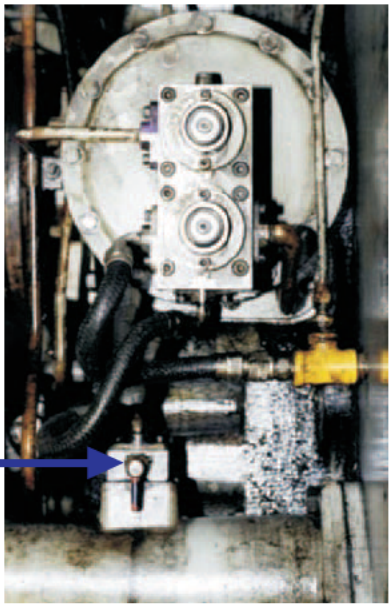

Fig. 3 - Crankcase detector test cock

TABLE 4 ENGINE SHUTTING DOWN - NO PROTECTIVE DEVICES TRIPPED

What happens	Engine shuts down smartly. No warning lamps light on console.
What you do	(i) Notch off and bring the locomotive to a stop. (ii) Switch the start/run switch, in your driving cab, to isolate. (iii) At the governor end of the engine, check for presence of governor oil in the sight glass. If there is no oil visible, fail the locomotive.
Governor oil is visible and no protective devices tripped	(i) Prime and try for a start. (ii) If the engine will not start, go to fault finding table 1 Engine Will Not Start Engine Does Not Rotate or table 2 Engine Will Not Start Engine Rotates But Will Not Fire.
Engine starts	(i) Return the start/run switch to run in your driving cab. (ii) Switch off gen field switch on the console and notch up progressively to notch 8. Observe that the engine revs up normally with a clean exhaust. (iii) Notch off progressively and observe that the engine returns to normal idle revs with no smoke. (iv) Take power and proceed.
Engine shuts down in notch 5 or higher	(i) Switch the start/run switch, in your driving cab, to isolate. (ii) Move the notch control handle briskly over its full range several times. (iii) Prime and try for a start. (iv) Return the start/run switch to run in your driving cab. (v) Switch off gen field switch on the console and notch up progressively to notch 8. Observe that the engine revs up normally with a clean exhaust. Notch off progressively and observe that the engine returns to normal idle revs with no smoke. (vi) Take power and proceed.
Engine still shuts down in notch 5 or higher	(i) Look at the notch control handle from under the desk. If you can see the microswitches (fig.4), tap them gently. (ii) Prime and try for start. (iii) Return the start/run switch to run in your driving cab. (iv) Switch off gen field switch on the console and notch up progressively to notch 8. Observe that the engine revs up normally with a clean exhaust. Notch off progressively and observe that the engine returns to normal idle revs with no smoke. (v) Take power and proceed.

Contd. over...

Fault remains	(i)	Prime and try for a start
	(ii)	Take power and proceed avoiding notch 5 or higher. The locomotive will not suffer damage. If you feel you can work your train safely and without difficulty, proceed. If not, fail the locomotive.

IMPORTANT

> **When an 071 class engine shuts down, always apply the handbrake on the locomotive and use scotches if necessary before fault finding. This protects against brake cylinder leak off. Remember to remove any scotches and release the handbrake before proceeding.**

> **It may not always be possible to observe the engine exhaust.**

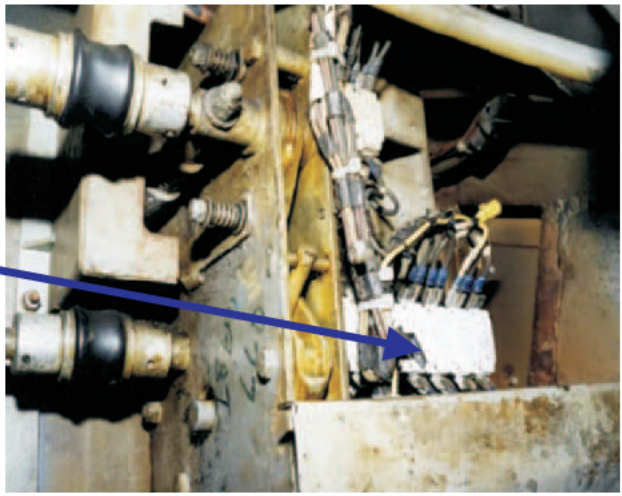

Fig. 4 - Controller microswitches

TABLE 5 ENGINE SHUTTING DOWN - SLOW DEATH (NO SMOKE)

What happens	Engine revs start to drop (bogs down) and engine dies slowly with a missing or rough sound from the exhaust. When engine stops governor shutdown lamp may light on console depending on governor button tripping or not.
What you do	(i) Notch off and bring the locomotive to a stop. (ii) Switch the start/run switch, in your driving cab, to isolate. (iii) If the governor shutdown lamp is lit, reset the governor button. (iv) Prime and try for a start.
Engine will not start	(i) Go to fault finding table 1 Engine Will Not Start Engine Does Not Rotate or table 2 Engine Will Not Start Engine Rotates But Will Not Fire.
Engine starts	(i) Return the start/run switch to run in your driving cab. (ii) Check that the no batt charge no power lamp is extinguished on the engine control panel in cab no.1. (iii) If the lamp is lit, push the engine layshaft gently and increase engine revs for several seconds. Release the layshaft gently and allow engine return to idle. (iv) If the no batt charge no power lamp remains lit, shut down the engine and fail the locomotive.
Engine is running and no batt charge no power lamp goes out on starting or after using layshaft	(i) Take power and proceed to the next location where the locomotive can be failed. When disposing of the locomotive, the engine must be shut down.

IMPORTANT

> **When an 071 class engine shuts down, always apply the handbrake on the locomotive and use scotches if necessary before fault finding. This protects against brake cylinder leak off. Remember to remove any scotches and release the handbrake before proceeding.**

NOTES

TABLE 6 ENGINE SHUTTING DOWN - SLOW DEATH (SMOKE FROM EXHAUST)

What happens	Engine revs start to drop (bogs down) and engine dies slowly with a rattling or rough sound. Dense black smoke pours from the engine exhaust. When engine stops (which may take some time) governor shutdown lamp may light on console depending on governor button tripping or not.
What you do	(i) Notch off and bring the locomotive to a stop. (ii) Switch the emergency engine stop switch to stop. (iii) When the engine stops, switch the start/run switch, in your driving cab, to isolate, to silence the alarm bell. (iv) Wait for the smoke to clear. Check the engine inspection covers. If you find one loose or blown off, fail the locomotive.
Engine inspection covers are in place	(i) If the governor shutdown lamp is lit, reset the governor button. (ii) Return the emergency engine stop switch to run. (iii) Prime and try for a start.
Engine will not start	(i) Fail the locomotive.
Engine starts	(i) Return the start/run switch to run in your driving cab. (ii) Switch off gen field switch on the console and notch up progressively to notch 8. Observe that the engine revs up normally with a clean exhaust. Notch off progressively and observe that the engine returns to normal idle revs with no smoke. (iii) Take power and proceed.
Engine revs start to drop again with dense black smoke pouring from the exhaust	(i) Notch off and bring the locomotive to a stop. (ii) Switch the emergency engine stop switch to stop. (iii) Fail the locomotive.

IMPORTANT

> **When an 071 class engine shuts down, always apply the handbrake on the locomotive and use scotches if necessary before fault finding. This protects against brake cylinder leak off. Remember to remove any scotches and release the handbrake before proceeding.**

> **It may not always be possible to observe the engine exhaust.**

NOTES

TABLE 7 UNABLE TO BUILD MAIN RESERVOIR PRESSURE

What happens	On starting the locomotve, main res will not build.
What you do	(i) Check that the main res air cocks, supplying the main res hoses not in use, are closed. If any are open, close them and observe main res building.
Main res will still not build	(i) If the locomotive is coupled to an air braked train, isolate the locomotive main res air hose from its train. If air pressure builds, there is a fault on the locomotive main res pipe hose (hose or washer) or on the train.
Main res does not build when locomotive isolated from a train or locomotive is light	(i) Close the cut out cock at the auxiliary air filter beside the compressor (fig.5). If main res starts to build, return the cut out cock to its normal position.
Main res does not build	There is no further check. Fail the locomotive.

OR

What happens	Main res stabilises at 70 psi and will not build.
What you do	(i) Check that the compressor unloader 3 way valve handle (fig.5) is pointing vertically downwards. If it is not, move it to this position and observe if main res builds.
Main res still remains at 70 psi	(i) Press down and release the T bar several times on the compressor control magnet valve (fig.5) and observe if main res builds.
Fault remains	(i) Turn the compressor unloader 3 way valve handle (fig 5) to the horizontal position and back to the vertical position several times. Make sure to return the handle pointing vertically downwards. Observe if main res builds.
Fault remains	(i) Blow down the main res tanks by opening the drain cocks. (ii) Close the cut out cock at the auxiliary air filter beside the compressor (fig.5). (iii) Close the main res tank drain cocks. If main res builds, it will now be controlled by the main res tank safety valve, which will lift occasionally to regulate pressure. Please report to maintenance personnel, if this isolation of the compressor unloader was carried out to achieve main res pressure.
Fault remains	There are no further checks. Fail the locomotive.

Contd. over...

IMPORTANT

- **When experiencing low main res on an 071 class, always apply the handbrake on the locomotive and use scotches if necessary, before fault finding. This protects against brake cylinder leak off. Remember to remove any scotches and release the handbrake before proceeding.**
- **When fault finding low main res, if you have a cab cut in, ensure that the train brake handle, in this cab, is in the emergency position. Keep it there until normal main res pressure is achieved.**

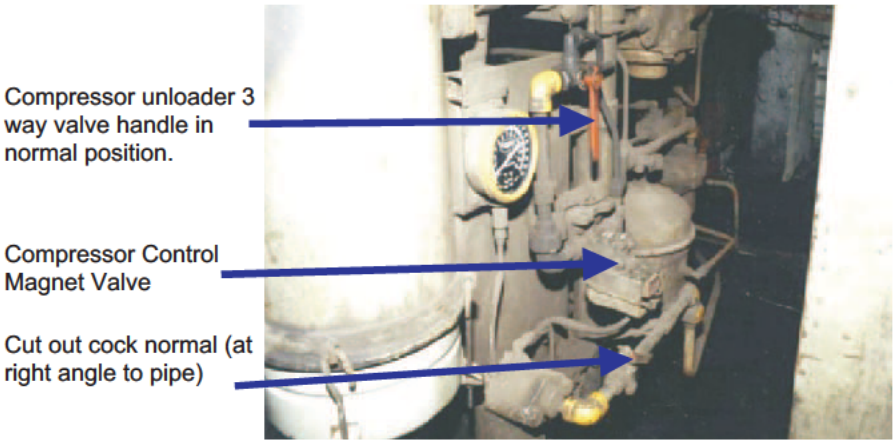

Fig. 5 - Compressor exhauster rack

TABLE 8 BRAKE TROUBLE - UNABLE TO BUILD AIR BRAKE

What happens	Air brake pipe will not build to 68 72 psi with train brake handle in release position.
What you do	(i) Apply the train brake handle to the emergency position. (ii) Ensure that the main res gauge builds to and stabilises between 100 130 psi. If the main res gauge settles below this, go to fault finding table 7 Unable To Build Main Reservoir Pressure.
Main res gauge achieves between 100 to 130 psi	(i) Release the train brake handle. (ii) If the brake pipe sits at 0 psi, main res does not change and application remains at 70 psi, change cabs and try for brake release. (iii) If successful or not, change back to the desired cab and try for brake release. If fault remains, isolate the deadman's valve and try for brake release. If no response, fail the locomotive.
Brake pipe attempts to rise but main res and application starts falling with train brake handle in release	You are looking for a leak in the train brake pipe. (i) Isolate locomotive brake pipe and main res hoses from its air braked train, if attached, by closing the isolation cocks. (ii) Try for brake release. If the fault clears, the fault is on the locomotive brake pipe hose (hose or washer) or on the train.
Fault remains on the locomotive	(i) Check each of the following <u>Driving cab</u> : • Emergency brake valve flap is closed and no sound of air. <u>Trailing cab</u> : • Train brake handle is in the full service position • Emergency brake valve flap is closed and no sound of air. <u>On the ground</u> : • Brake pipe cock is closed on the front of the locomotive. (ii) If any of these items needed to be adjusted, try for brake release.
Fault remains	There is no further check. Fail the locomotive.

Contd. over...

IMPORTANT

- **You isolate the locomotive brake pipe from the train and you are successful in clearing the fault! When reconnecting the locomotive hoses to its train you will need to carry out a brake continuity test in accordance with General Appendix instructions.**
- **If during checks you discover a leaking or broken pipe in the deadman's compartment or cab, DO NOT attempt to blank the pipe. You could leave yourself without brakes!**
- **Before releasing the train brake, ensure you have full main res pressure. If main res is building and a cab is cut in, place the train brake handle in the emergency position until main res stabilises. This will assist rapid brake release.**
- **If the brakes can only be released from the rear cab, it is permissible to clear the section driving from the rear cab provided a brakesman is available to travel in the leading cab in accordance with General Appendix instructions.**

TABLE 9 BRAKE TROUBLE - UNABLE TO BUILD VACUUM

What happens	Vacuum brake pipe will not build to the minimum 18 ins with train brake handle in release.
What you do	(i) Check the brake pipe gauge. This should be reading 70 72 psi. If it is not, go to fault finding table 8 Brake Trouble Unable To Build Air Brake.
Brake pipe gauge is at 70 72 psi	(i) Apply the train brake handle to emergency. (ii) Check the vac main res gauge. This should be reading greater than 21ins, normally as high as 28ins. If it is reading zero or low, check the exhauster filter casing end cap (fig.6) for security. If the vac main res does not rise, fail the locomotive.
Vac main res is normal with train brake handle in emergency	(i) Release the train brake handle and check if vac main res falls and does not recover with vac brake pipe steady. If it does not recover, you are looking for a leak in the train pipe. (ii) Isolate the locomotive vacuum pipe from its vacuum braked train, if attached, placing the locomotive hose on its dummy bracket. (iii) Try for brake release. If the fault clears, the problem is on the train.
Fault remains on the locomotive	(i) Check that the vacuum hose washers are intact and the hoses are sealing on the dummy brackets. (ii) Try for brake release. If the fault remains, fail the locomotive.
Vac main res is normal with train brake handle in release position	(i) If the vac main res stabilises to its normal level, but vac brake pipe settles below 18ins minimum, there is a control valve fault. (ii) Try tapping the HS4 valve (fig.7), the VA1 valve and VA1 release valve (fig.6). (iii) Try for vacuum brake release.
Fault remains	There is no further check. Fail the locomotive.

IMPORTANT

> **You disconnect the locomotive vacuum hose from the train and you are successful in clearing the fault! When reconnecting the locomotive vacuum hose to its train you will need to carry out a brake continuity test in accordance with General Appendix instructions.**

Contd. over...

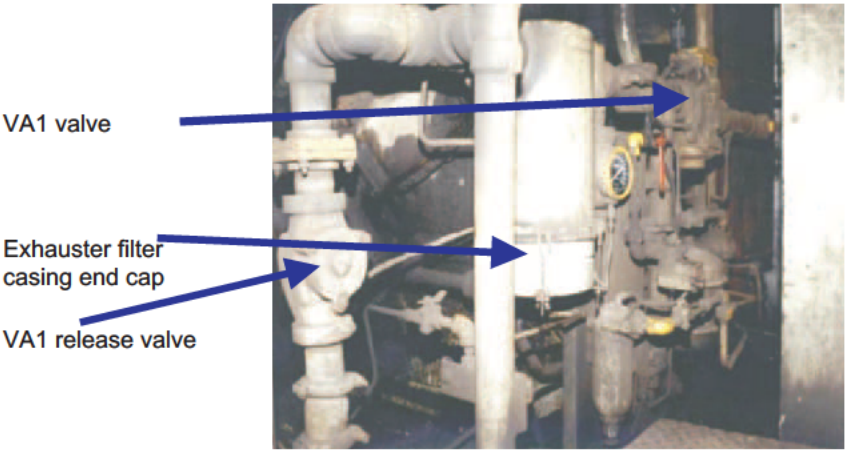

Fig. 6 - Compressor/exhauster rack

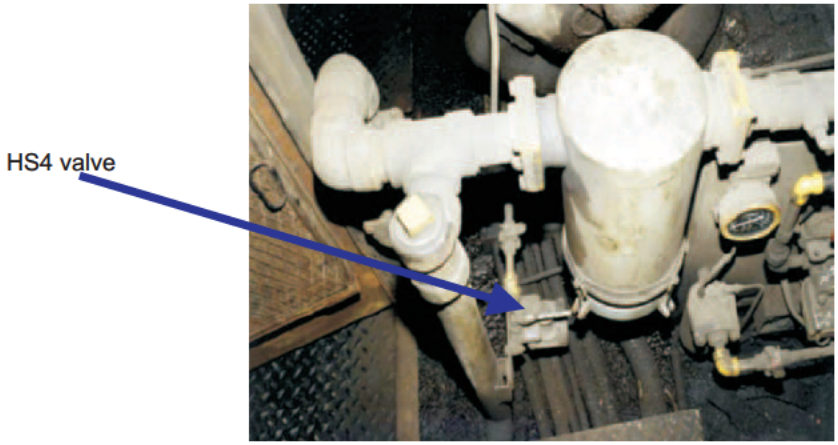

Fig. 7 - Compressor/exhauster rack

TABLE 10 BRAKE TROUBLE - LOCOMOTIVE BRAKE WILL NOT RELEASE

What happens	With train and locomotive brake handles released and brake gauge readings correct 1. Main res gauge 100 130 psi 2. Brake pipe gauge 68 72 psi 3. Vac brk pipe gauge 18 21ins. Brake cylinder pressure fails to release completely and locomotive brake cylinders are applied.
What you do	(i) Notch off and bring the locomotive to a stop. (ii) Apply the locomotive brake handle and apply the train brake handle to emergency position. (iii) Apply the handbrake and use scotches if necessary. (iv) In the deadman's compartment, prise open the relief valve on the 27A control valve reservoir (fig.8) and blow down the air pressure. (v) Return to the cab. Release both brake handles and verify that the brake cylinder gauge shows 0, indicating full release. Keep both brake handles released for one minute. (vi) Apply the train brake handle to full service and verify brake cylinder pressure rising. (vii) Release the train brake handle and verify brake cylinder release. (viii) Remove any scotches, release the handbrake, take power and proceed.
Brake cylinder pressure fails to release again after applying and releasing the train brake	There are no further checks. Fail the locomotive.

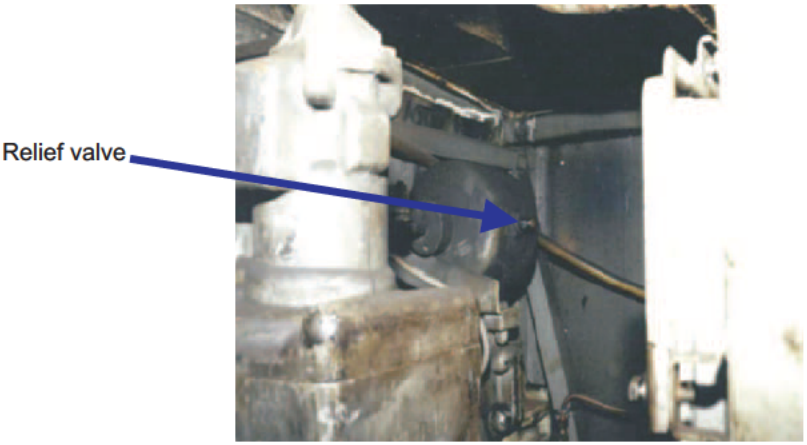

Fig. 8 - 27A Control valve reservoir

NOTES

TABLE 11 PC LAMP WILL NOT CLEAR

What happens	PC lamp lights on console, gen field is cut and engine revs drop to idle in power.
What you do	(i) Notch off and bring the locomotive to a stop. (ii) With the locomotive brake applied, select forward and release the train brake handle. If the engine revs to notch 3 and the PC lamp remains lighting, check 1. Main res gauge 100 130 psi 2. Brake pipe gauge 68 72 psi 3. Vac brk pipe gauge 18 21ins. If any are not reading as above, follow the steps in fault finding table 9 Brake Trouble Unable To Build Vacuum. If they are OK, in the deadman's compartment, try tapping the vacuum brake switch (VBS) (fig.9). Check if the PC lamp will clear. If it does, take power and proceed. If the PC lamp remains lit, fail the locomotive.
The engine remains at idle, with forward selected, notch control handle at idle, train brake released and PC lamp lighting	(i) Move the notch control handle smartly out of and back to idle several times. Release the train and locomotive brake handles and see if the PC lamp clears. If it clears, take power and proceed.
PC lamp still remains lighting	(i) Look at the notch control handle from under the desk. If you can see the microswitches (fig.4), tap them gently. Release the train and locomotive brake handles and see if the PC lamp clears. If it clears, take power and proceed.
PC lamp remains lighting	(i) Change cabs and see if the PC lamp clears in this cab. If it remains lighting, move the notch control handle smartly out of and back to idle. Release the train and locomotive brake handles again and see if the PC lamp clears. If it clears, change to the desired cab and attempt to take power.
PC lamp still remains lighting	(i) In the deadman's compartment, try tapping the pressure brake switch (PBS) (fig.9), the power cut off switch (PCS) (fig.9) and the locomotive brake switch (VAPS) (fig.10). Check if the PC lamp will clear. If it does, take power and proceed. If the PC lamp remains lit, there are no further checks. Fail the locomotive.

Contd. over...

IMPORTANT

> **If the PC can only be cleared in the rear cab, it is permissible to clear the section driving from the rear cab provided a brakesman is available to travel in the leading cab in accordance with General Appendix instructions.**

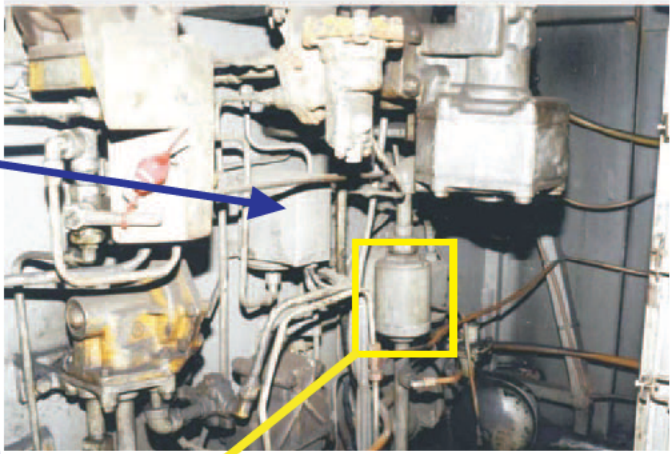

Fig. 9 - Deadman's compartment

Fig. 10 - Deadman's compartment

TABLE 12 PARKING BRAKE WILL NOT RELEASE ON AIR BRAKED COACHING

What happens	Main res is normal (100 130 psi), but parking brake gauges on coaching stock are indicating in the white zone (partial release).
What you do	(i) Apply the train brake handle to the emergency position. (ii) Press the main res boost button beside the MU2 valve. Main res should fall immediately to 70 90 psi. Hold the button pressed until the main res achieves normal pressure. (iii) Release the button and confirm parking brake release on the train.
Parking brake gauges remain in the white zone and/or no drop in main res when boost button is pressed	If no drop in main res was noticed when the boost button was pressed, this indicates that the system is not operating. (i) With the train brake handle in emergency, blow down the main res tanks by opening the drain cocks. (ii) Close the drain cocks and allow main res to build. (iii) Confirm parking brake release on the train.
Parking brake gauges remain in white zone	There are no further checks. Fail the locomotive.

IMPORTANT

> **When carrying out the above procedure always apply the handbrake on the locomotive and use scotches if necessary before fault finding. This protects against brake cylinder leak off. Remember to remove any scotches and release the handbrake before proceeding.**

NOTES

TABLE 13 NO POWER/DOWN IN POWER

What happens	You notch up but engine revs remain at idle, trainline alarm bell does not ring and no warning lamps light.
What you do	(i) With the locomotive in forward and the notch control handle in idle, apply a full service brake. If the locomotive revs up to notch 3 and the PC lamp does not light, the PC lamp may be blown. (ii) Repeat this test in the other cab and see if the PC lamp lights. Then release both brake handles. If the PC lamp does not go out, go to fault finding table 11 PC Lamp Will Not Clear.
The engine does not rev up when the PC lamp lights	(i) Check that the governor plug is secure on the governor.
The governor plug is secure	(i) Shut down the engine and open the battery switch for 30 seconds. (ii) Close the battery switch. (iii) Restart the engine. Try for power.
No response	There is no further check. Fail the locomotive.

OR

What happens	You notch up, engine responds to the notches, trainline alarm bell does not ring, no warning lamps light, but traction power extremely weak or non existent.
What you do	(i) Notch off and bring the locomotive to a stop. (ii) Select reverse direction and attempt to take power. Bring the train to an immediate halt after ascertaining that it has taken power. (iii) Move the forward/reverse handle backwards and forwards smartly several times. (iv) Try for power in the desired direction. If power is still not available, change cabs and repeat the procedure. (v) If power is regained in the desired direction in the trailing cab, bring the train to an immediate halt, change cabs, take power and proceed. (vi) If there is still no power in the desired direction, shut down the engine and open the battery switch for 30 seconds. (vii) Close the battery switch again and restart the engine. Try for power in the desired direction again. If the fault has not cleared, fail the locomotive.

Contd. over...

There is no power in forward or reverse direction	(i) Move the notch control handle smartly out of and back to idle several times and switch the gen field switch off and on several times. Try for power. If power is still not available, change cabs and test for power in both directions. If power is available in the trailing cab, change back to the driving cab. Try to take power.
There is no power in the trailing cab	(i) Observe if the wheelslip lamp lights in this cab. If it does, go to fault finding table 15 Continuous Wheelslip Lamp. (ii) If it does not light, go to fault finding table 15 Continuous Wheelslip Lamp and follow the procedure, as if the wheelslip lamp was lighting.
There is still no power	There are no further checks. Fail the locomotive.

OR

What happens	You notch up but engine revs remain at idle, trainline alarm bell rings and no batt charge no power lamp lights.
What you do	(i) Push the engine layshaft gently and increase engine revs for several seconds. Make sure not to trip the engine overspeed lever which will shut down the engine. Release the layshaft gently and allow engine return to idle. If the no batt charge no power lamp goes out, take power and proceed.
No batt charge no power lamp remains lit	There are no further checks. Shut down the engine and fail the locomotive.

OR

What happens	Engine loses revs in particular notches or revs will not increase over certain notches.
What you do	(i) Notch off and bring the locomotive to a stop. (ii) Apply train brake handle to light the PC lamp. (iii) Move the notch control handle smartly through its full range several times. (iv) Clear the PC lamp and with gen field switch off, notch up progressively and see that the engine revs increase with each notch. Notch off and take power.
Fault remains	(i) Look at the notch control handle from under the desk. If you can see the microswitches (fig.4), tap them gently. (ii) Clear the PC lamp and with gen field switch off, notch up progressively and see that the engine revs increase with each notch. Notch off and take power.
Fault remains	(i) Take power and proceed avoiding the problem notches. The locomotive will not suffer damage. If you feel you can work your train safely and without difficulty, proceed. If not, fail the locomotive.

OR

Contd. over...

What happens	Engine loses revs (bogs down) or hunts in the higher notches and no exhaust smoke.
What you do	(i) Keep the locomotive in the lower notches where the engine revs sound normal. The locomotive will not suffer damage. If you feel you can work your train safely and without difficulty, proceed. If not, fail the locomotive.

IMPORTANT

> **If power is only available in the desired direction in the rear cab, it is permissible to clear the section driving from the rear cab provided a brakesman is available to travel in the leading cab in accordance with General Appendix instructions.**

NOTES

TABLE 14 GROUND RELAY

What happens	Trainline alarm bell rings, ground relay lamp lights on console, gen field is cut and engine revs drop to idle. After about 6 10 secs the ground relay will reset automatically. The alarm bell will silence and the ground relay lamp will go out.
What you do with motors all in (on 6 motors)	(i) Notch off immediately (before the ground relay resets) and bring the locomotive to a stop. (ii) Switch the start/run switch, in your driving cab, to isolate. (iii) In no.1 cab, press in the traction motor cut out switch and rotate it to align the arrow with 1&4 out. (iv) Return the start/run switch in your driving cab to run and regain power. If no more ground relays occur, operate as normal.
What you do if ground relay activates again	(i) Follow the procedure again and choose the next motor pair e.g. 2&5 out, which has not been selected previously.
What you do with motors already cut out	(i) Follow the procedure as above and select a different motor pair to those already cut out, starting with 1&4 out, if not already selected.
Ground relay still activates after you have cut out all motor pairs in turn	(i) If the ground relay activates a 4th time within 12 mins it will lock out and will not reset. Having cut out all of the motor pairs in turn, this indicates that the fault is in the generator circuitry or in 2 or more non paired motors e.g. 1&3. Fail the locomotive. (ii) Should a 4th ground relay occur outside of the 12 min interval it will reset, but you should proceed in the lowest notch possible to the next location where you can clear the section and fail the locomotive.

IMPORTANT

- **When you proceed with traction motors cut out ALWAYS look out and check that, axles are rotating freely and there is no smoke or smell of burning from bogies. If you do observe trouble, STOP and immediately seek advice from maintenance personnel.**
- **With motors cut out your power is automatically reduced by approximately $^{1}/_{3}$. You can operate as normal, in accordance with the speeds and trailing loads set down for these locomotives, without overloading the motors. Remember, however, in poor rail adhesion, you still have a lot of power on only 4 axles, so be extra careful of provoking wheel slip (see Volume 1 - Professional Driving Technique).**
- **Don't be tempted to proceed after the first ground relay activation without cutting out motors. If motor no. 3 is defective, you will have ground relay lockout before you get to cut out motors 3 & 6.**
- **Ground relay lockout can in some circumstances be cleared. Maintenance personnel must be contacted to do this.**
- **CARELESS TREATMENT OF THE GROUND RELAY SYSTEM COULD CAUSE FIRE!**

NOTES

TABLE 15 CONTINUOUS WHEELSLIP LAMP

What happens	Wheelslip lamp on console lights continuously when notch control handle is in notch 1 or higher. Engine responds but severely reduced or no power and no wheel slip experienced.
What you do	(i) Notch off immediately and bring the locomotive to a stop. (ii) Switch the start/run switch, in your driving cab, to isolate. (iii) In no.1 cab, press in the traction motor cut out switch and rotate it to align the arrow with 1&4 out. (iv) Return the start/run switch in your driving cab to run and regain power.
What you do if wheelslip lamp remains on when attempting to take power	(i) Follow the procedure again and choose the next motor pair e.g. 2&5 out, which has not been selected previously.
What you do with motors already cut out	(i) Follow the procedure as above and select a different motor pair to those already cut out, starting with 1&4 out, if not already selected.
Wheelslip lamp remains on when attempting to take power after you have cut out all motor pairs in turn	(i) Shut down the engine. (ii) Open the battery switch for 30 seconds. (iii) Close the battery switch again. (iv) Restart the engine. If the wheelslip lamp lights when attempting to take power, fail the locomotive.

IMPORTANT

> **When you proceed with traction motors cut out ALWAYS look out and check that, axles are rotating freely and there is no smoke or smell of burning from bogies. If you do observe trouble, STOP and immediately seek advice from maintenance personnel.**

> **With motors cut out your power is automatically reduced by approximately $^{1}/_{3}$. You can operate as normal, in accordance with the speeds and trailing loads set down for these locomotives, without overloading the motors. Remember, however, in poor rail adhesion, you have still a lot of power on only 4 axles, so be extra careful of provoking wheel slip (see Volume 1 - Professional Driving Technique).**

NOTES

TABLE 16 HOT ENGINE

What happens	Trainline alarm bell rings, hot engine lamp lights on console, engine revs and power limited to notch 6.
What you do	Reduced power indicates that the engine coolant temperature is excessive. (i) Proceed in notch 6 or less if possible and allow the alarm to clear. Then proceed as normal.
What you do if the alarm clears and repeats or does not clear	Proceed to the next location where you can clear the section and check the following items. (i) Check that both cooling fans are rotating. If not, press and release the test button on the engine temperature switch (fig.11) and see if the alarm cancels. If not, fail the locomotive. If it cancels, regain power and proceed. (ii) If the fans are running, next verify that the radiator shutters are open. If they are open, fail the locomotive. (iii) If they are closed, push down and lock the test button on the shutter solenoid valve (fig.12). If they open see that the alarm clears. Regain power and proceed. If they do not open, fail the locomotive.

OR

What happens	Trainline alarm bell rings, hot engine lamp lights on console, engine revs drop to idle and no power.
What you do	No power indicates coolant level is below the low level in the header tank. (i) Notch off and bring the locomotive to a stop. (ii) Check the header tank sight glass. It should be low or empty. (iii) Check for any visible coolant leaks. If there are leaks, fail the locomotive. (iv) If there are no leaks, contact maintenance personnel for advice. If this is not possible, fail the locomotive.

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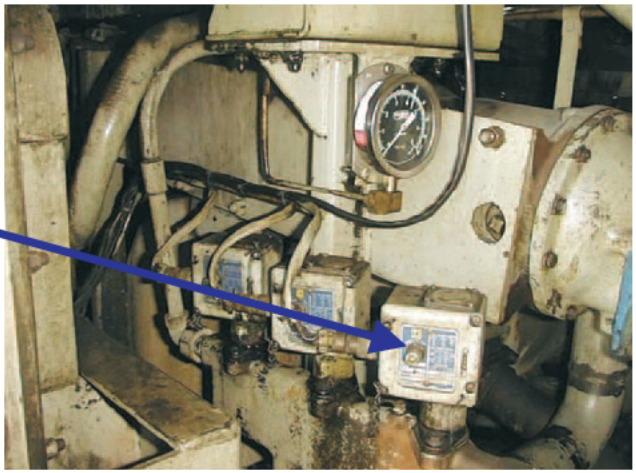


Fig. 11 - Temperature switches

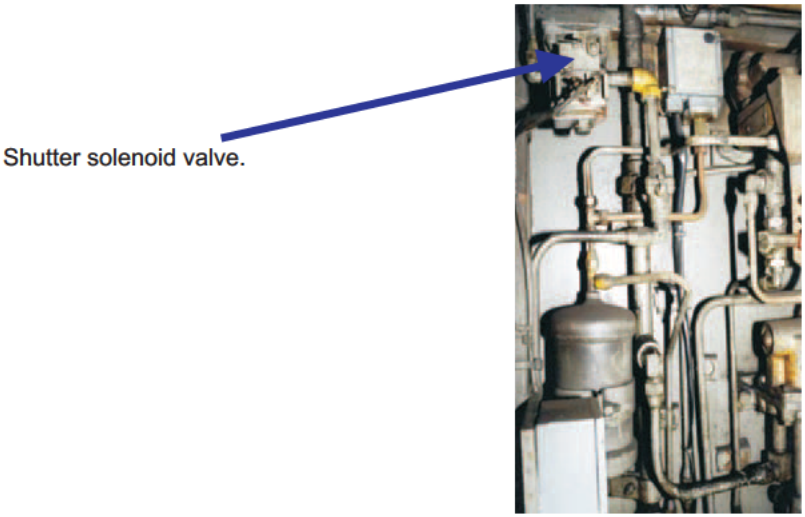
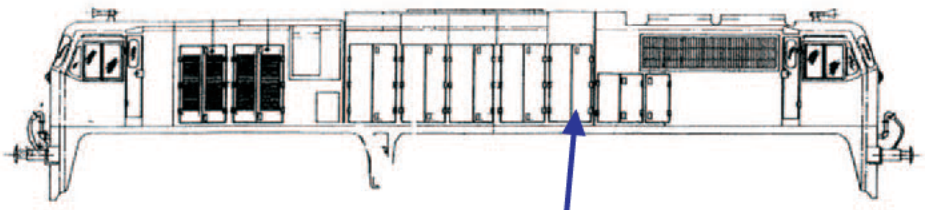


Fig. 12 - Deadman's compartment

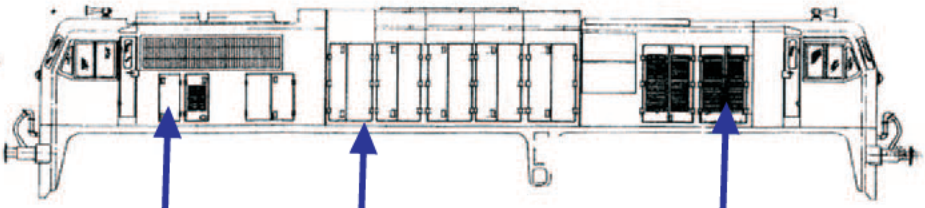
TABLE 17 LOCATION OF EQUIPMENT REQUIRED IN FAULT FINDING



NO. 1 END NO. 2 END

LEFT HAND SIDE

Fuel sight glasses
Overspeed lever
Low oil button
Governor plug



NO. 2 END NO. 1 END

RIGHT HAND SIDE

Deadman's compartment

Governor layshaft
Crankcase detector
Engine temperature switches

Compressor/exhauster rack
Battery charging socket

NOTES

141/181 CLASS LOCOMOTIVES

SECTION 3 FAULT FINDING 141/181 CLASS LOCOMOTIVES

Introduction

This section contains step by step instructions as to how you can overcome the effects of faults on the 141/181 class locomotive. The instructions are everything that can possibly be done without tools. This section has been laid out in an easy to follow and effective manner. To aid in fault finding, you should familiarise yourself with the contents of this section, so that you can refer quickly when that fault occurs.

As the section deals with the effects of faults, it does not cover problems due to incorrect set up of the locomotive. Also, it assumes that all MCB's are on. Please check that your locomotive has been correctly prepared for service.

Using The Section

When you are satisfied that your locomotive is correctly set up and that all MCB's are on, find the fault description that best describes the problem you are experiencing, from the contents list.

Under the fault description there will be one or more tables. Look first at the what happens row on the table or tables and find the description that best matches what you are experiencing. Follow the step by step instructions in this table, starting with what you do. Finally, a highlighted panel indicates important considerations in relation to dealing with the fault.

IMPORTANT

- **Before engaging in fault finding, make sure that your locomotive is correctly prepared.**
- **When performing fault finding, where it is necessary for testing purposes to release the brakes, the security of the train is of paramount importance e.g. considerable gradients, points etc. Where doubt exists, brakes should not be released and the locomotive failed.**
- **When performing fault finding, where it is necessary for testing purposes to take power in reverse direction, always comply with the provisions of the Rule Book.**
- **If you are bringing your locomotive to a stop because of a fault developing, always try to stop within the protection of station or interlocking signals.**
- **Except where specified, the instructions apply to both 141 and 181 class locomotives.**
- **Always keep the signalman informed in accordance with the Rule Book.**

NOTES

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NOTES

TABLE 1 ENGINE WILL NOT START - ENGINE DOES NOT ROTATE

What happens	You turn fuel prime/engine start switch to engine start and nothing happens!
What you do	(i) Switch on cab lamps and see if they light. If there is no light or they are extremely dim, fail the locomotive. (ii) If they light brightly, prime and try for a start again and observe the lamps. If the lamps go out while in engine start and the engine does not rotate, fail the locomotive.
The cab lamps remain bright while in engine start	(i) Switch off the control & fuel pump switch. (ii) Switch on the control & fuel pump switch in the other cab. (iii) Prime and try for a start.
Still no response	Test the starting fuse using the fuse test facility. If blown, fail the locomotive.
Starting fuse is OK	(i) Check that the battery charging socket lid is fully closed on the rear wall of the electrical cabinet, behind cab no.1 (fig.1). Open the lid and close it again to be sure. (ii) Prime and try for a start.
Still no response	There is no further check. Fail the locomotive.

OR

What happens	You turn fuel prime/engine start switch to engine start and engine rotates extremely slowly.
What you do	Fail the locomotive.

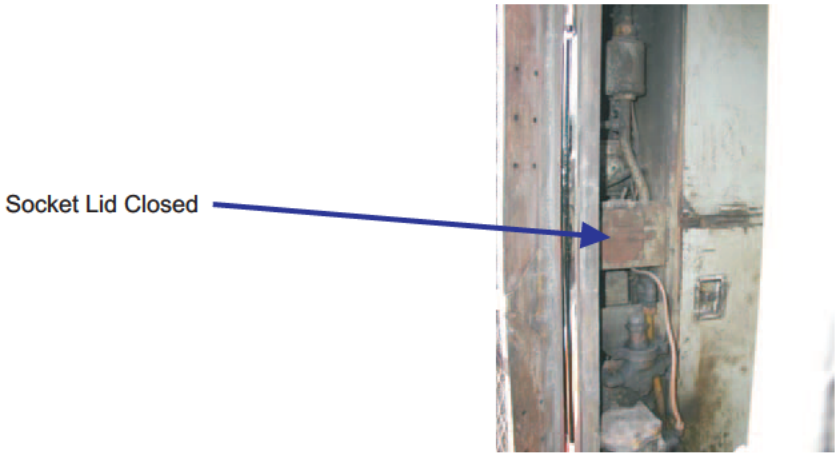

Fig. 1 - Battery charging socket

NOTES

TABLE 2 ENGINE WILL NOT START - ENGINE ROTATES BUT WILL NOT FIRE

What happens	You turn fuel prime/engine start switch to engine start, engine begins to rotate and then stalls.
What you do	(i) Release the start switch immediately. (ii) Check the starting fuse using the fuse test facility. If it has blown, fail the locomotive.
Starting fuse is OK	(i) Prime and try to start the engine. If it stalls again, release the start switch immediately and fail the locomotive.

OR

What happens	You turn fuel prime/engine start switch to engine start, engine rotates but does not fire.
What you do	(i) At the governor end of the engine, check for presence of governor oil in the sight glass. If there is no oil visible, fail the locomotive. (ii) If governor oil is visible, check if any of the following protective devices are tripped 1. Governor button 2. Low water button 3. Crankcase button 4. Overspeed lever. If any are found tripped, reset, prime and try for a start. If a protective device trips again, fail the locomotive.
Governor oil level is OK and no protective device is tripped	(i) Turn the fuel prime/engine start switch to fuel prime and with a cab door open try and hear if the fuel pump is running. You might need to turn the switch on and off to identify it. (ii) Check also after priming that the fuel return sight glass is full. (iii) If the fuel pump is not running and both sight glasses are empty fail the locomotive.
Fuel pump is running and both sight glasses are empty	The locomotive may have run out of fuel. (i) If fuel is required, ensure that there are no fuel leaks on the locomotive.

Contd. over...

Fuel pump is running, fuel return sight glass is full and engine will not fire	(i) Find an assistant to operate the governor layshaft (fig.2). (ii) Instruct this person to start gently pushing in the layshaft when the engine starts rotating. (iii) When the engine starts, the layshaft should be released gradually. Do not push the layshaft in fully, as the engine will trip the overspeed lever if it starts. (iv) Report in the logbook, or direct to maintenance personnel, if it was necessary for you to start the engine in this manner.
Engine will not fire with layshaft operated manually	There is no further check. Fail the locomotive.

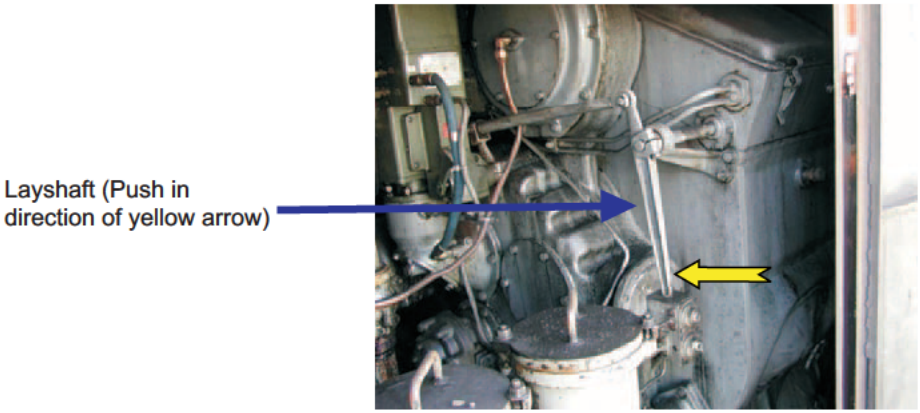

Fig. 2 - Governor layshaft

TABLE 3 ENGINE SHUTTING DOWN - TRIPPING LOW OIL BUTTON

What happens	Trainline alarm bell rings, low oil lamp lights on console and engine shuts down smartly.
What you do	(i) Notch off and bring the locomotive to a stop. (ii) Switch the start/run switch, in no.1 cab, to start. (iii) At the governor end of the engine, check for presence of governor oil in the sight glass. If there is no oil visible, fail the locomotive. (iv) If governor oil is visible, reset the tripped governor button. Check if any of the following protective devices are also tripped and reset as described 1. Low water button Check the header tank sight glass. If water level is low, look for any visible water leaks. If there are leaks, fail the locomotive. If there are no leaks, or the header tank level is normal, reset the button. 2. Crankcase button reset. 3. Overspeed lever reset. (v) Check also that the crankcase detector test cock is in the normal position, (fig.3). If not, correct its position. (vi) Prime and try for a start.
Governor button and/or protective device trips again.	There is no further check. Fail the locomotive.

IMPORTANT

> **You should never attempt to open any inspection cover, or remove the dipstick on an engine when the crankcase button has tripped. A crankcase explosion may occur, the results of which could be FATAL.**

> **When a 141/181 class engine shuts down, always apply the handbrake on the locomotive and use scotches if necessary before fault finding. This protects against brake cylinder leak off. Remember to remove any scotches and release the handbrake before proceeding.**

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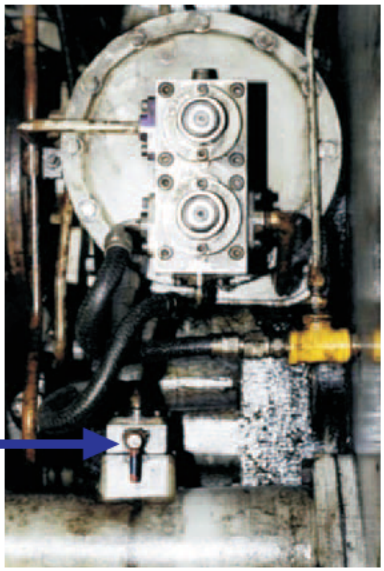

Fig. 3 - Crankcase detector test cock

TABLE 4 ENGINE SHUTTING DOWN - NO PROTECTIVE DEVICES TRIPPED

What happens	Engine shuts down smartly. No warning lamps light on console.
What you do	(i) Notch off and bring the locomotive to a stop. (ii) Switch the start/run switch, in no.1 cab, to start. (iii) At the governor end of the engine, check for presence of governor oil in the sight glass. If there is no oil visible, fail the locomotive.
Governor oil is visible and no protective devices tripped	(i) Prime and try for a start. (ii) If the engine will not start, go to fault finding table 1 Engine Will Not Start Engine Does Not Roate or table 2 Engine Will Not start Engine Rotates But Will Not Fire.
Engine starts	(i) Return the start/run switch to run in no.1 cab. (ii) In the cab you are driving from, switch off gen field switch on the console and notch up progressively to notch 8. Observe that the engine revs up normally with a clean exhaust. (iii) Notch off progressively and observe that the engine returns to normal idle revs with no smoke. (iv) Take power and proceed.
Engine shuts down in notch 5 or higher	(i) Switch the start/run switch, in no.1 cab, to start. (ii) Move the notch control handle, in the cab you are driving from, briskly over its full range several times. (iii) Prime and try for a start. (iv) Return the start/run switch to run in no.1 cab. (v) In the cab you are driving from, switch off gen field switch on the console and notch up progressively to notch 8. Observe that the engine revs up normally with a clean exhaust. Notch off progressively and observe that the engine returns to normal idle revs with no smoke. (vi) Take power and proceed.
Engine still shuts down in notch 5 or higher	(i) Look at the notch control handle from under the desk in the cab you are driving from. If you can see the microswitches (fig.4), tap them gently. (ii) Prime and try for start. (iii) Return the start/run switch to run in no.1 cab. (iv) In the cab you are driving from, switch off gen field switch on the console and notch up progressively to notch 8. Observe that the engine revs up normally with a clean exhaust. Notch off progressively and observe that the engine returns to normal idle revs with no smoke. (v) Take power and proceed.

Contd. over...

Fault remains	(i)	Prime and try for a start.
	(ii)	Take power and proceed avoiding notch 5 or higher. The locomotive will not suffer damage. If you feel you can work your train safely and without difficulty, proceed. If not, fail the locomotive.

IMPORTANT

> **When a 141/181 class engine shuts down, always apply the handbrake on the locomotive and use scotches if necessary before fault finding. This protects against brake cylinder leak off. Remember to remove any scotches and release the handbrake before proceeding.**

> **It may not always be possible to observe the engine exhaust.**

Microswitches viewed from underneath console

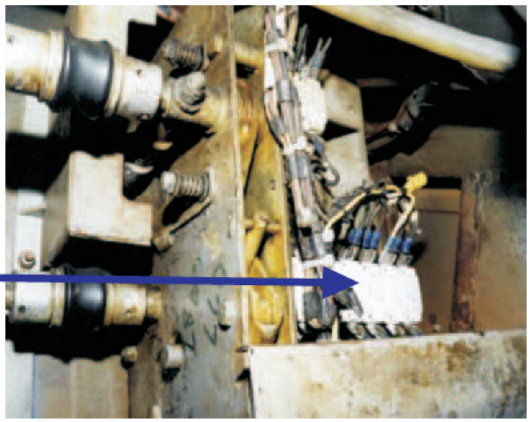

Fig. 4 - Controller microswitches

TABLE 5 ENGINE SHUTTING DOWN - SLOW DEATH (NO SMOKE)

What happens	Engine revs start to drop (bogs down) and engine dies slowly with a missing or rough sound from the exhaust. When engine stops low oil lamp may light on console and trainline alarm bell may ring depending on governor button tripping or not.
What you do	(i) Notch off and bring the locomotive to a stop. (ii) Switch the start/run switch, in no.1 cab, to start. (iii) If the low oil lamp is lit, reset the governor button. (iv) Try for a start.
Engine will not start	(i) Go to fault finding table 1 Engine Will Not Start Does Not Rotate or table 2 Engine Will Not start Engine Rotates But Will Not Fire.
Engine starts	(i) Return the start/run switch to run in no.1 cab. (ii) Push the engine layshaft gently and increase engine revs for several seconds. Release the layshaft gently and allow engine return to idle. (iii) If engine remains running, take power and proceed.
Engine shuts down with a slow death again	(i) There is no further check. Fail the locomotive.

IMPORTANT

> **When a 141/181 class engine shuts down, always apply the handbrake on the locomotive and use scotches if necessary before fault finding. This protects against brake cylinder leak off. Remember to remove any scotches and release the handbrake before proceeding.**

NOTES

TABLE 6 ENGINE SHUTTING DOWN - SLOW DEATH (SMOKE FROM EXHAUST)

What happens	Engine revs start to drop (bogs down) and engine dies slowly with a rattling or rough sound. Dense black smoke pours from the engine exhaust. When engine stops (which may take some time) low oil lamp may light on console and trainline alarm bell may ring depending on governor button tripping or not.
What you do	(i) Notch off and bring the locomotive to a stop. (ii) Switch the emergency engine stop switch to stop. (iii) When the engine stops, switch the start/run in no.1 cab to start. (iv) Wait for the smoke to clear. Check the engine inspection covers. If you find one loose or blown off, fail the locomotive.
Engine inspection covers are in place	(i) If the low oil lamp is lit, reset the governor button. (ii) In the cab you are driving from, return the emergency engine stop switch to run. (iii) Prime and try for a start.
Engine will not start	(i) Fail the locomotive.
Engine starts	(i) Return the start/run switch to run in no.1 cab. (ii) In the cab you are driving from, switch off gen field switch on the console and notch up progressively to notch 8. Observe that the engine revs up normally with a clean exhaust. Notch off progressively and observe that the engine returns to normal idle revs with no smoke. (iii) Take power and proceed.
Engine revs start to drop again with dense black smoke pouring from the exhaust	(i) Notch off and bring the locomotive to a stop. (ii) Switch the emergency engine stop switch to stop. (iii) Fail the locomotive.

IMPORTANT

> **When a 141/181 class engine shuts down, always apply the handbrake on the locomotive and use scotches if necessary before fault finding. This protects against brake cylinder leak off. Remember to remove any scotches and release the handbrake before proceeding.**

> **It may not always be possible to observe the engine exhaust.**

NOTES

TABLE 7 UNABLE TO BUILD MAIN RESERVOIR PRESSURE

What happens	On starting the locomotive, main res will not build
What you do	(i) Check that the main res air cocks, supplying the main res hoses not in use, are closed. If any are open, close them and observe main res building.
Main res will still not build	(i) If the locomotive is coupled to an air braked train, isolate the locomotive main res air hose from its train. If air pressure builds, there is a fault on the locomotive main res pipe hose (hose or washer) or on the train.
Main res does not build when locomotive isolated from a train or locomotive is light	(i) Close the cut out cock supplying the compressor unloader (fig.5). If main res starts to build, return the cut out cock to its normal position.
Main res does not build	There is no further check. Fail the locomotive.

OR

What happens	Main res stabilises at 70 psi and will not build
What you do **141 class only**	(i) Check that the compressor unloader 3 way valve handle (fig.5) is pointing vertically downwards. If it is not, move it to this position and observe if main res builds.
Main Res still remains at 70 psi **141 class only**	(i) Turn the compressor unloader 3 way valve handle (fig 5) to the horizontal position and back to the vertical position several times. Make sure to return the handle pointing vertically downwards. Observe if main res builds.
What you do **181 class only**	(i) Press down and release the 'T' bar several times on the compressor control magnet valve (fig.6) and observe if main res builds.
Fault remains	(i) Blow down the main res tanks by opening the drain cocks. (ii) Close the cut out cock supplying the compressor unloader (fig.5). (iii) Close the main res tank drain cocks. If main res builds, it will now be controlled by the main res tank safety valve, which will lift occasionally to regulate pressure. Please report to maintenance personnel, if this isolation of the compressor unloader was carried out to achieve main res pressure.
Fault remains	There are no further checks. Fail the locomotive.

Contd. over...

IMPORTANT

- **When experiencing low main res on a 141/181 class, always apply the handbrake on the locomotive and use scotches if necessary, before fault finding. This protects against brake cylinder leak off. Remember to remove any scotches and release the handbrake before proceeding.**
- **When fault finding low main res, if you have a cab cut in, ensure that the train brake handle, in this cab, is in the emergency position. Keep it there until normal main res pressure is achieved.**

Fig. 5 - Compressor unloader 141 class

Fig 6 - Compressor unloader 181 class

TABLE 8 BRAKE TROUBLE - UNABLE TO BUILD AIR BRAKE

What happens	Air brake pipe will not build to 68 72 psi with train brake handle in release position.
What you do	(i) Apply the train brake handle to the emergency position. (ii) Ensure that the main res gauge builds to and stabilises between 100 130 psi. If the main res gauge settles below this, go to fault finding table 7 Unable To Build Main Reservoir Pressure.
Main res gauge achieves between 100 130 psi	(i) Release the train brake handle. (ii) If the brake pipe sits at 0 psi, main res does not change and application remains at 70 psi, change cabs and try for brake release. (iii) If successful or not, change back to the desired cab and try for brake release. If fault remains, isolate the deadman's valve and try for brake release. If no response, fail the locomotive.
Brake pipe attempts to rise but main res and application starts falling with train brake handle in release	You are looking for a leak in the train brake pipe. (i) Isolate locomotive brake pipe and main res hoses from its air braked train, if attached, by closing the isolation cocks. (ii) Try for brake release. If the fault clears, the fault is on the locomotive brake pipe hose (hose or washer) or on the train.
Fault remains on the locomotive	(i) Check each of the following <u>Driving cab</u> : • Emergency brake valve flap is closed and no sound of air. <u>Trailing cab</u> : • Train brake handle is in the full service position • Emergency brake valve flap is closed and no sound of air. <u>On the ground</u> : • Brake pipe cock is closed on the front of the locomotive. (ii) If any of these items needed to be adjusted, try for brake release.
Fault remains	There is no further check. Fail the locomotive.

Contd. over...

IMPORTANT

- **You isolate the locomotive brake pipe from the train and you are successful in clearing the fault! When reconnecting the locomotive hoses to its train you will need to carry out a brake continuity test in accordance with General Appendix instructions.**
- **If during checks you discover a leaking or broken pipe in the deadman's compartment or cab, DO NOT attempt to blank the pipe. You could leave yourself without brakes!**
- **Before releasing the train brake, ensure you have full main res pressure. If main res is building and a cab is cut in, place the train brake handle in the emergency position until main res stabilises. This will assist rapid brake release.**
- **If the brakes can only be released from the rear cab, it is permissible to clear the section driving from the rear cab provided a brakesman is available to travel in the leading cab in accordance with General Appendix instructions.**

TABLE 9 BRAKE TROUBLE - UNABLE TO BUILD VACUUM

What happens	Vacuum brake pipe will not build to the minimum 18 ins with train brake handle in release.
What you do	(i) Check the brake pipe gauge. This should be reading 70 72 psi. If it is not, go to fault finding table 8 Brake Trouble Unable To Build Air Brake.
Brake pipe gauge is at 70 72 psi	(i) Apply the train brake handle to emergency. (ii) Check the vac main res gauge. This should be reading greater than 21ins, normally as high as 28ins. If it is reading zero or low, check the exhauster filter casing end cap (fig.6) for security. If the vac main res does not rise, fail the locomotive.
Vac main res is normal with train brake handle in emergency	(i) Release the train brake handle and check if vac main res falls and does not recover with vac brake pipe steady. If it does not recover, you are looking for a leak in the train pipe. (ii) Isolate the locomotive vacuum pipe from its vacuum braked train, if attached, placing the locomotive hose on its dummy bracket. (iii) Try for brake release. If the fault clears, the problem is on the train.
Fault remains on the locomotive	(i) Check that the vacuum hose washers are intact and the hoses are sealing on the dummy brackets. (ii) Try for brake release. If the fault remains, fail the locomotive.
Vac main res is normal with train brake handle in release position	(i) If the vac main res stabilises to its normal level, but vac brake pipe settles below 18ins minimum, there is a control valve fault. (ii) Try tapping the HS4 valve (fig.7), the VA1 valve and VA1 release valve (fig.6). (iii) Try for vacuum brake release.
Fault remains	There is no further check. Fail the locomotive.

IMPORTANT

> **You disconnect the locomotive vacuum hose from the train and you are successful in clearing the fault! When reconnecting the locomotive vacuum hose to its train you will need to carry out a brake continuity test in accordance with General Appendix instructions.**

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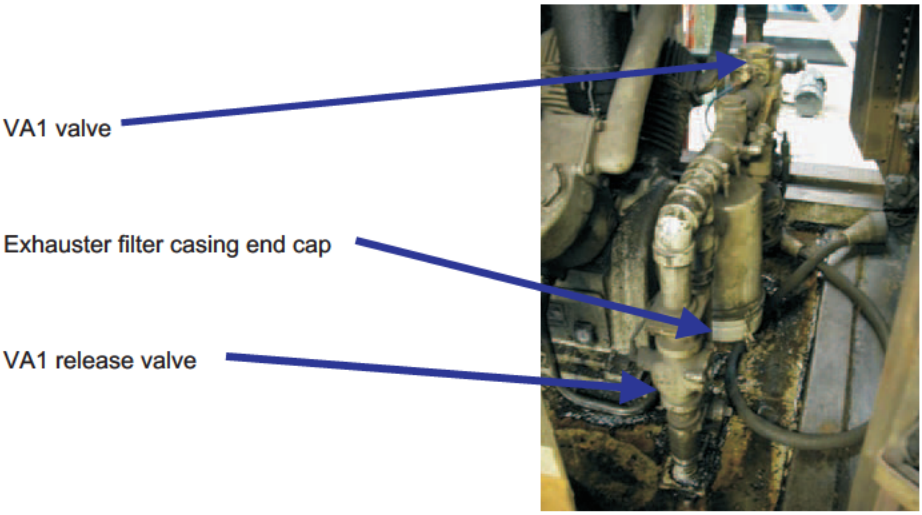


Fig. 6 - Compressor/exhauster rack

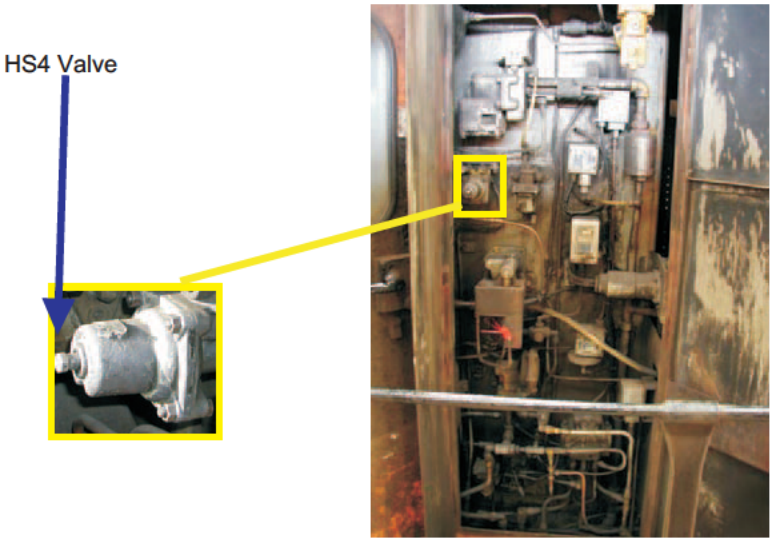


Fig. 7 - Deadman's compartment

TABLE 10 BRAKE TROUBLE - LOCOMOTIVE BRAKE WILL NOT RELEASE

What happens	With train and locomotive brake handles released and brake gauge readings correct 1. Main res gauge 100 130 psi 2. Brake pipe gauge 68 72 psi 3. Vac brk pipe gauge 18 21ins. Brake cylinder pressure fails to release completely and locomotive brake cylinders are applied.
What you do	(i) Notch off and bring the locomotive to a stop. (ii) Apply the locomotive brake handle and apply the train brake handle to emergency position. (iii) Apply the handbrake and use scotches if necessary. (iv) In the deadman's compartment, prise open the relief valve on the 27A control valve reservoir (fig.8) and blow down the air pressure. (v) Return to the cab. Release both brake handles and verify that the brake cylinder gauge shows 0, indicating full release. Keep both brake handles released for one minute. (vi) Apply the train brake handle to full service and verify brake cylinder pressure rising. (vii) Release the train brake handle and verify brake cylinder release. (viii) Remove any scotches, release the handbrake, take power and proceed.
Brake cylinder pressure fails to release again after applying and releasing the train brake.	There are no further checks. Fail the locomotive.

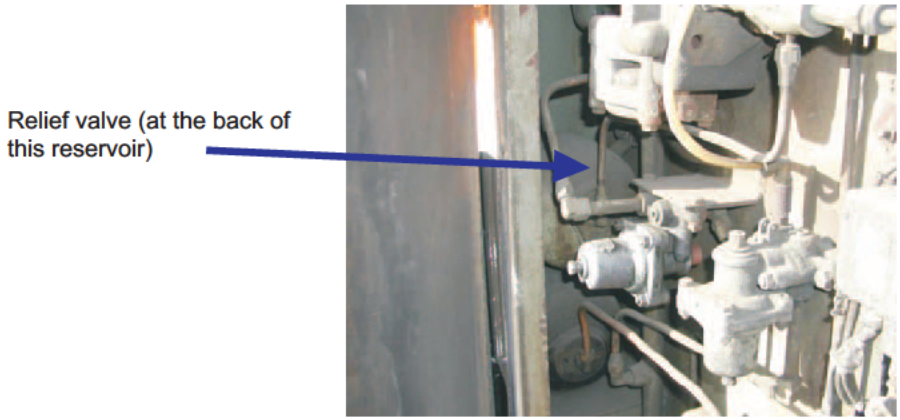


Fig. 8 - 27A Control valve reservoir

NOTES

TABLE 11 PC LAMP WILL NOT CLEAR

What happens	PC lamp lights on console, gen field is cut and engine revs drop to idle in power.
What you do	(i) Notch off and bring the locomotive to a stop. (ii) With the locomotive brake applied, select forward and release the train brake handle. If the engine revs to notch 3 and the PC lamp remains lighting, check 1. Main res gauge 100 130 psi 2. Brake pipe gauge 68 72 psi 3. Vac brk pipe gauge 18 21ins. If any are not reading as above, follow the steps in fault finding table 9 Brake Trouble Unable To Build Vacuum. If they are OK, in the deadman's compartment, try tapping the vacuum brake switch (VBS) (fig.9). Check if the PC lamp will clear. If it does, take power and proceed. If the PC lamp remains lit, fail the locomotive.
The engine remains at idle, with forward selected, notch control handle at idle, train brake released and PC lamp lighting	(i) Move the notch control handle smartly out of and back to idle several times. Release the train and locomotive brake handles and see if the PC lamp clears. If it clears, take power and proceed.
PC lamp still remains lighting	(i) Look at the notch control handle from under the desk. If you can see the microswitches (fig.4), tap them gently. Release the train and locomotive brake handles and see if the PC lamp clears. If it clears, take power and proceed.
PC lamp still remains lighting	(i) Change cabs and see if the PC lamp clears in this cab. If it remains lighting, move the notch control handle smartly out of and back to idle. Release the train and locomotive brake handles again and see if the PC lamp clears. If it clears, change to the desired cab and attempt to take power.
PC lamp still remains lighting	(i) In the deadman's compartment, try tapping the pressure brake switch (PBS) (fig.9) and the power cut off switch (PCS) (fig.9). Check if the PC lamp will clear. If it does, take power and proceed. If the PC lamp remains lit, there are no further checks. Fail the locomotive.

Contd. over...

IMPORTANT

> **If the PC can only be cleared in the rear cab, it is permissible to clear the section driving from the rear cab provided a brakesman is available to travel in the leading cab in accordance with General Appendix instructions.**

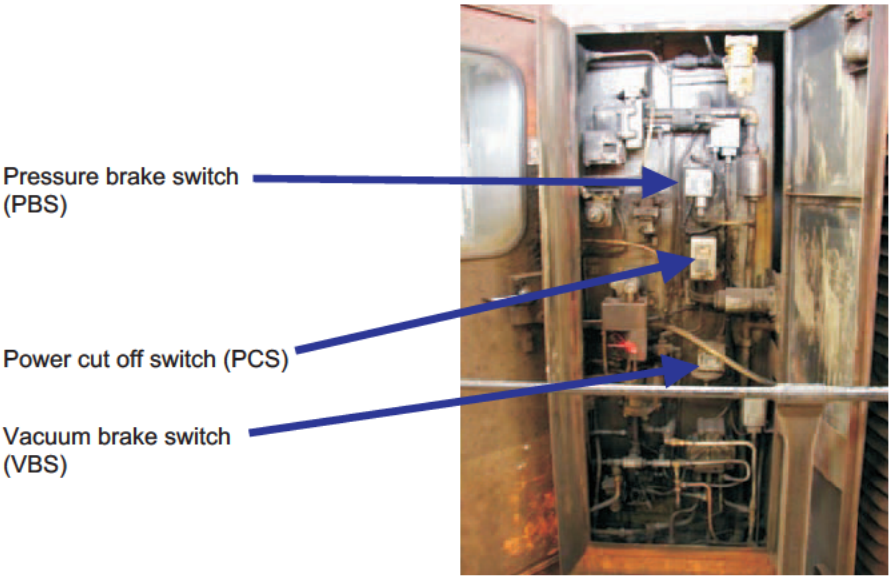


Fig. 9 - Deadman's compartment

TABLE 12 PARKING BRAKE WILL NOT RELEASE ON AIR BRAKED COACHING

What happens	Main res is normal (100 130 psi), but parking brake gauges on coaching stock are indicating in the white zone (partial release).
What you do	(i) Apply the train brake handle to emergency. (ii) Blow down the main res tanks by opening the drain cocks. (iii) Close the drain cocks and allow main res to build. (iv) Confirm parking brake release on the train.
Parking brake gauges remain in the white zone	There are no further checks. Fail the locomotive.

IMPORTANT

> **When carrying out the above procedure always apply the handbrake on the locomotive and use scotches if necessary before fault finding. This protects against brake cylinder leak off. Remember to remove any scotches and release the handbrake before proceeding.**

NOTES

TABLE 13 NO POWER/DOWN IN POWER

What happens	You notch up but engine revs remain at idle, trainline alarm bell does not ring and no warning lamps light.
What you do	(i) With the locomotive in forward and the notch control handle in idle, apply a full service brake. If the locomotive revs up to notch 3 and the PC lamp does not light, the PC lamp may be blown. (ii) Repeat this test in the other cab and see if the PC lamp lights. Then release both brake handles. If the PC lamp does not go out, go to fault finding table 11 PC Lamp Will Not Clear.
The engine does not rev up when the PC lamp lights	(i) Check that the governor plug is secure on the governor.
The governor plug is secure	(i) Shut down the engine and open the battery switch for 30 seconds. (ii) Close the battery switch. (iii) Restart the engine. Try for power.
No response	There is no further check. Fail the locomotive.

OR

What happens	You notch up, engine responds to the notches, trainline alarm bell does not ring, no warning lamps light, but traction power extremely weak or non existent.
What you do	(i) Notch off and bring the locomotive to a stop. (ii) Select reverse direction and attempt to take power. Bring the train to an immediate halt after ascertaining that it has taken power. (iii) Move the forward/reverse handle backwards and forwards smartly several times. (iv) Try for power in the desired direction. If power is still not available, change cabs and repeat the procedure. (v) If power is regained in the desired direction in the trailing cab, bring the train to an immediate halt, change cabs, take power and proceed. (vi) If there is still no power in the desired direction, shut down the engine and open the battery switch for 30 seconds. (vii) Close the battery switch again and restart the engine. Try for power in the desired direction again. If the fault has not cleared, fail the locomotive.

OR

Contd. over...

There is no power in forward or reverse direction	(i) Move the notch control handle smartly out of and back to idle several times and switch the gen field switch off and on several times. Try for power. If power is still not available, change cabs and test for power in both directions. If power is available in the trailing cab, change back to the driving cab. Try to take power.
There is no power in the trailing cab	There are no further checks. Fail the locomotive.

OR

What happens	Engine loses revs in particular notches or revs will not increase over certain notches.
What you do	(i) Notch off and bring the locomotive to a stop. (ii) Apply train brake handle to light the PC lamp. (iii) Move the notch control handle smartly through its full range several times. (iv) Clear the PC lamp and with gen field switch off, notch up progressively and see that the engine revs increase with each notch. Notch off and take power.
Fault remains	(i) Look at the notch control handle from under the desk. If you can see the microswitches (fig.4), tap them gently. (ii) Clear the PC lamp and with gen field switch off, notch up progressively and see that the engine revs increase with each notch. Notch off and take power.
Fault remains	(i) Take power and proceed avoiding the problem notches. The locomotive will not suffer damage. If you feel you can work your train safely and without difficulty, proceed. If not, fail the locomotive.

OR

What happens	Engine loses revs (bogs down) or hunts in the higher notches and no exhaust smoke.
What you do	(i) Keep the locomotive in the lower notches where the engine revs sound normal. The locomotive will not suffer damage. If you feel you can work your train safely and without difficulty, proceed. If not, fail the locomotive.

IMPORTANT

> **If power is only available in the desired direction in the rear cab, it is permissible to clear the section driving from the rear cab provided a brakesman is available to travel in the leading cab in accordance with General Appendix instructions.**

TABLE 14 GROUND RELAY

What happens	Trainline alarm bell rings, ground relay lamp lights on console, gen field is cut and engine revs drop to idle. After about 6 10 secs the ground relay will reset automatically. The alarm bell will silence and the ground relay lamp will go out.
What you do	(i) Notch off immediately (before the ground relay resets). Allow the locomotive to coast or bring it to a stop depending on running circumstances (signals, gradient). (ii) When the ground relay resets, notch up slowly giving the locomotive time to recover. If the ground relay does not reactivate, proceed as normal.
Ground relay still activates	(i) If 3 ground relay activations occur inside of a 12 min interval the ground relay will reset, but you should proceed in the lowest notch possible to the next location where you can clear the section and fail the locomotive. (ii) If the ground relay activates 4 times within 12 mins it will lock out and will not reset. Fail the locomotive.

IMPORTANT

- **When you proceed after the ground relay has reset ALWAYS look out and check that, axles are rotating freely and there is no smoke or smell of burning from bogies. If you do observe trouble, STOP and immediately seek advice from maintenance personnel.**
- **When taking power after a ground relay reset, if the running circumstances permit, try to notch up the locomotive gradually.**
- **Ground relay lockout can in some circumstances be cleared. Maintenance personnel must be contacted to do this.**
- **CARELESS TREATMENT OF THE GROUND RELAY SYSTEM COULD CAUSE FIRE!**

NOTES

TABLE 15 CONTINUOUS WHEELSLIP LAMP

What happens	Wheelslip lamp on console lights continuously when notch control handle is in notch 1 or higher. Engine responds but severely reduced or no power and no wheel slip experienced.
What you do	(i) Notch off immediately and bring the locomotive to a stop. (ii) Move the forward/reverse handle backwards and forwards smartly several times. (iii) Attempt to take power. If the fault has cleared, proceed.
What you do if wheelslip lamp remains on when attempting to take power	(i) Shut down the engine. (ii) Open the battery switch for 30 seconds. (iii) Close the battery switch again. (iv) Restart the engine. If the wheelslip lamp lights when attempting to take power, fail the locomotive.

IMPORTANT

> **If the fault clears and you proceed, look out and check that, axles are rotating freely and there is no smoke or smell of burning from bogies. If you do observe trouble, STOP and immediately seek advice from maintenance personnel.**

NOTES

TABLE 16 HOT ENGINE

What happens	Trainline alarm bell rings, hot engine lamp lights on console, engine revs drop to idle and no power.
What you do	(i) Notch off and allow the locomotive to coast or bring it to a stop depending on running circumstances (signals, gradient). (ii) Allow the engine to cool and when the hot engine alarm clears, take power and proceed.
What you do if the alarm clears and repeats or does not clear	(i) Notch off and bring the locomotive to a stop. (ii) Check the header tank sight glass. If it is low or empty, look for any visible coolant leaks. If there are leaks, fail the locomotive. (iii) If there are no leaks, contact maintenance personnel for advice. If this is not possible, fail the locomotive.
Header tank sight glass is full **<u>141 class only</u>**	(i) If the hot engine alarm clears, take power and proceed. If you feel you can work your train safely and without difficulty, proceed. If not, fail the locomotive. (ii) If the hot engine alarm does not clear, press and release the test button on the engine temperature switch (fig.11) and see if the alarm cancels. If not, fail the locomotive. If it cancels, regain power and proceed.
Header tank sight glass is full **<u>181 class only</u>**	(i) If the hot engine alarm clears, take power and proceed. If you feel you can work your train safely and without difficulty, proceed. If not, fail the locomotive. (ii) If the hot engine alarm does not clear, check that the cooling fan is rotating. If not, press and release the test button on the engine temperature switch (fig.12) and see if the alarm cancels. If not, fail the locomotive. If it cancels, regain power and proceed.

<u>OR</u>

What happens	Trainline alarm bell rings, hot engine lamp lights on console, engine shuts down or will not start.
What you do	Engine shutting down or not starting indicates coolant level is below the low level in the header tank. (i) Notch off and bring the locomotive to a stop. (ii) Check the header tank sight glass. It should be low or empty. (iii) Check for any visible coolant leaks. If there are leaks, fail the locomotive. (iv) If there are no leaks, contact maintenance personnel for advice. If this is not possible, fail the locomotive.

Contd. over...

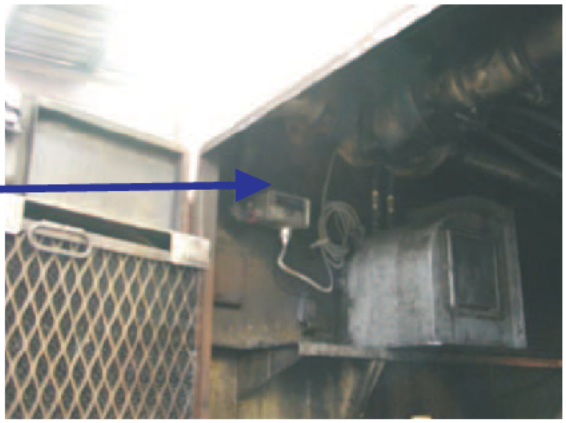
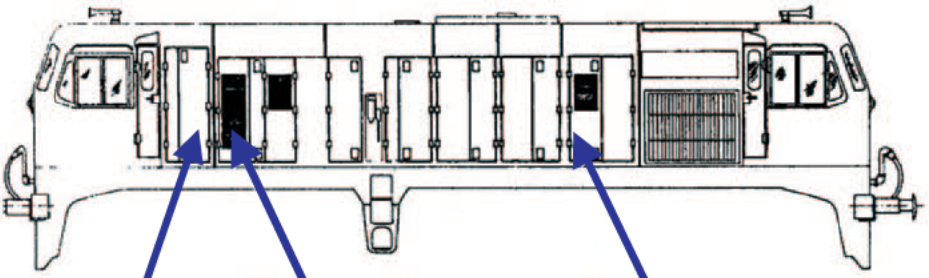


Fig. 11 - Temperature switches 141 class

Fig. 12 - Temperature switches 181 class

TABLE 17 LOCATION OF EQUIPMENT REQUIRED IN FAULT FINDING



NO. 1 END **NO. 2 END**

LEFT HAND SIDE

Deadman's compartment

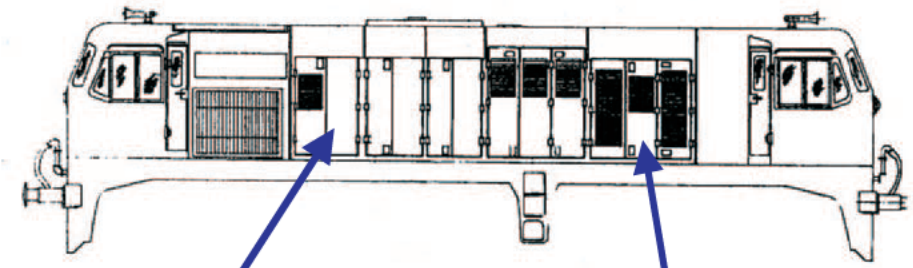
Battery charging socket

compressor/exhauster rack

Overspeed lever

Fuel sight glasses

Governor plug



NO. 2 END **NO. 1 END**

RIGHT HAND SIDE

Governor layshaft

Crankcase detector

Low oil button

Engine temperature switch

Compressor unloader

NOTES

121 CLASS LOCOMOTIVES

SECTION 4 FAULT FINDING 121 CLASS LOCOMOTIVES

Introduction

This section contains step by step instructions as to how you can overcome the effects of faults on the 121 class locomotive. The instructions are everything that can possibly be done without tools. This section has been laid out in an easy to follow and effective manner. To aid in fault finding, you should familiarise yourself with the contents of this section, so that you can refer quickly when that fault occurs.

As the section deals with the effects of faults, it does not cover problems due to incorrect set up of the locomotive. Also, it assumes that all MCB's are on. Please check that your locomotive has been correctly prepared for service.

Using The Section

When you are satisfied that your locomotive is correctly set up and that all MCB's are on, find the fault description that best describes the problem you are experiencing, from the contents list.

Under the fault description there will be one or more tables. Look first at the what happens row on the table or tables and find the description that best matches what you are experiencing. Follow the step by step instructions in this table, starting with what you do. Finally, a highlighted panel indicates important considerations in relation to dealing with the fault.

IMPORTANT

- **Before engaging in fault finding, make sure that your locomotive is correctly prepared.**
- **When performing fault finding, where it is necessary for testing purposes to release the brakes, the security of the train is of paramount importance e.g. considerable gradients, points etc. Where doubt exists, brakes should not be released and the locomotive failed.**
- **When performing fault finding, where it is necessary for testing purposes to take power in reverse direction, always comply with the provisions of the Rule Book.**
- **If you are bringing your locomotive to a stop because of a fault developing, always try to stop within the protection of station or interlocking signals.**
- **Always keep the signalman informed in accordance with the Rule Book.**

NOTES

CONTENTS

NOTES

TABLE 1 ENGINE WILL NOT START - ENGINE DOES NOT ROTATE

What happens	You press engine start button and nothing happens!
What you do	(i) Switch on cab lamps and see if they light. If there is no light or they are extremely dim, fail the locomotive. (ii) If they light brightly, prime and try for a start again and observe the lamps. If the lamps go out while in start and the engine does not rotate, fail the locomotive.
The cab lamps remain bright while in engine start	(i) Switch off and then on the control & fuel pump switch. (ii) Try for a start.
Still no response	(i) Test the starting fuse using the fuse test facility. If blown, fail the locomotive.
Starting fuse is OK	(i) Check that the battery charging socket lid is fully closed on the rear wall of the electrical cabinet, behind the cab (fig.1). Open the lid and close it again to be sure. (ii) Try for a start.
Still no response	There is no further check. Fail the locomotive.

OR

What happens	You press engine start button and engine rotates extremely slowly.
What you do	Fail the locomotive.

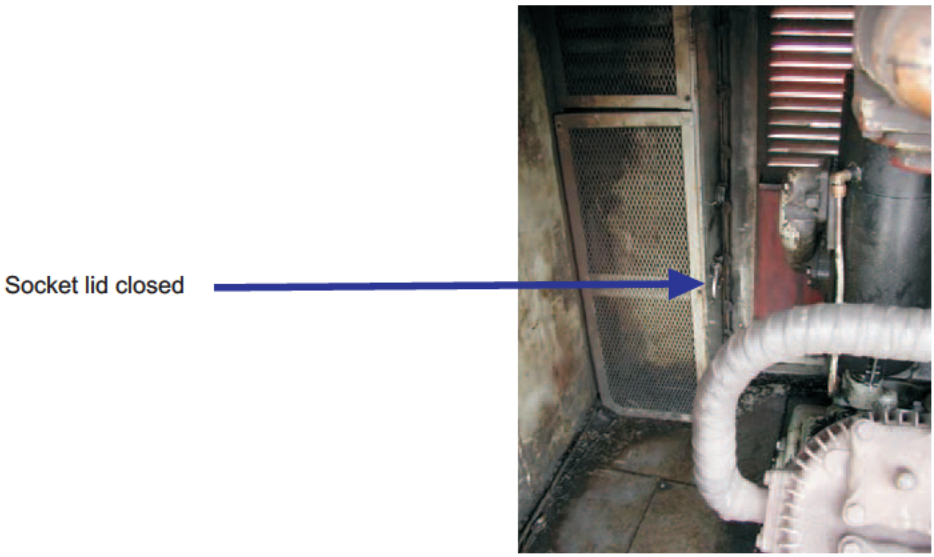


Fig. 1 - Battery charging socket

NOTES

TABLE 2 ENGINE WILL NOT START - ENGINE ROTATES BUT WILL NOT FIRE

What happens	You press engine start button, engine begins to rotate and then stalls.
What you do	(i) Release the start button immediately. (ii) Check the starting fuse using the fuse test facility. If it has blown, fail the locomotive.
Starting fuse is OK	(i) Try to start the engine. If it stalls again, release the start button immediately and fail the locomotive.

OR

What happens	You press engine start button, engine rotates but does not fire.
What you do	(i) Check that both notch control handles are in the idle position. Move each controller to notch 8 and back to idle to be sure. (ii) At the governor end of the engine, check for presence of governor oil in the sight glass. If there is no oil visible, fail the locomotive. (iii) If governor oil is visible, check if any of the following protective devices are tripped 1. Governor button 2. Low Water button 3. Crankcase button 4. Overspeed lever. If any are found tripped, reset and try for a start. If a protective device trips again, fail the locomotive.
Governor oil level is OK and no protective device is tripped	(i) With a cab door or droplight open try and hear if the fuel pump is running. You might need to turn the control & fuel pump switch on and off to identify it. (ii) Check also that the fuel return sight glass is full. (iii) If the fuel pump is not running and both sight glasses are empty fail the locomotive.
Fuel pump is running and both sight glasses are empty	The locomotive may have run out of fuel. (i) If fuel is required, ensure that there are no fuel leaks on the locomotive.

Contd. over....

Fuel pump is running, fuel sight glass is full and engine will not fire	(i) Find an assistant to operate the governor layshaft (fig.2). (ii) Instruct this person to start gently pushing in the layshaft when the engine starts rotating. (iii) When the engine starts, the layshaft should be released gradually. Do not push the layshaft in fully, as the engine will trip the overspeed lever if it starts. (iv) Report in the logbook, or direct to maintenance personnel, if it was necessary for you to start the engine in this manner.
Engine will not fire with layshaft operated manually	There is no further check. Fail the locomotive.

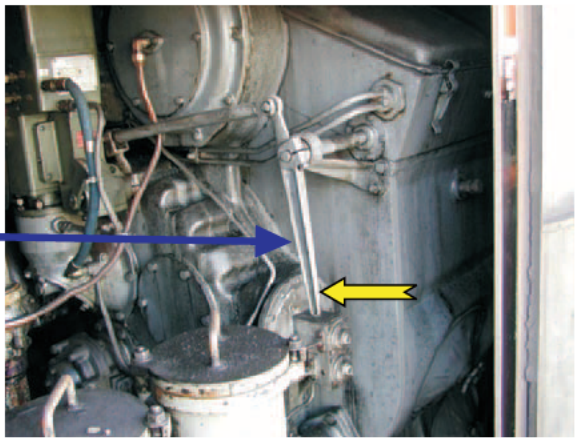


Fig. 2 - Governor layshaft

TABLE 3 ENGINE SHUTTING DOWN - TRIPPING LOW OIL BUTTON

What happens	Trainline alarm bell rings, low oil lamp lights on console and engine shuts down smartly.
What you do	(i) Notch off and bring the locomotive to a stop. (ii) Switch the start/run switch to isolate. (iii) At the governor end of the engine, check for presence of governor oil in the sight glass. If there is no oil visible, fail the locomotive. (iv) If governor oil is visible, reset the tripped governor button. Check if any of the following protective devices are also tripped and reset as described 1. Low water button Check the header tank sight glass. If water level is low, look for any visible water leaks. If there are leaks, fail the locomotive. If there are no leaks, or the header tank level is normal, reset the button. 2. Crankcase button Reset. 3. Overspeed lever Reset. (v) Check also that the crankcase detector test cock is in the normal position, (fig.3). If not, correct its position. (vi) Try for a start.
Governor button and/or protective device trips again	There is no further check. Fail the locomotive.

IMPORTANT

> **You should never attempt to open any inspection cover, or remove the dipstick on an engine when the crankcase button has tripped. A crankcase explosion may occur, the results of which could be FATAL.**

> **When a 121 class engine shuts down, always apply the handbrake on the locomotive and use scotches if necessary before fault finding. This protects against brake cylinder leak off. Remember to remove any scotches and release the handbrake before proceeding.**

Contd. over...

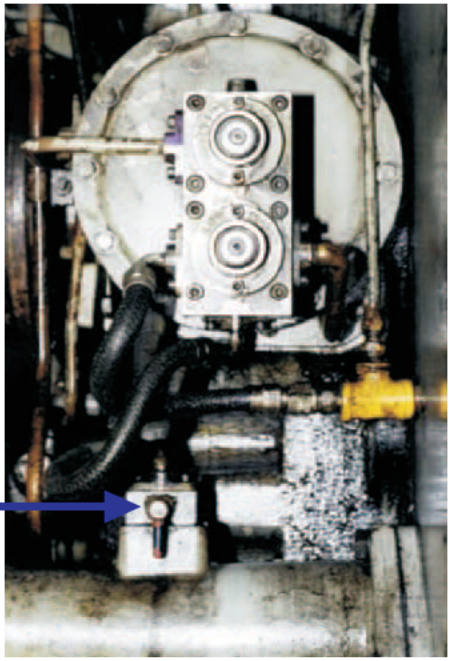


Fig. 3 - Crankcase detector test cock

TABLE 4 ENGINE SHUTTING DOWN - NO PROTECTIVE DEVICES TRIPPED

What happens	Engine shuts down smartly. No warning lamps light on console.
What you do	(i) Notch off and bring the locomotive to a stop. (ii) Switch the start/run switch to isolate. (iii) At the governor end of the engine, check for presence of governor oil in the sight glass. If there is no oil visible, fail the locomotive.
Governor oil is visible and no protective devices tripped	(i) Try for a start. (ii) If the engine will not start, go to fault finding table 1 Engine Will Not Start Engine Does Not Rotate or table 2 Engine Will Not Start Engine Rotates But Will Not Fire.
Engine starts	(i) Return the start/run switch to run. (ii) Switch off gen field switch on the console and notch up progressively to notch 8. Observe that the engine revs up normally with a clean exhaust. (iii) Notch off progressively and observe that the engine returns to normal idle revs with no smoke. (iv) Take power and proceed.
Engine shuts down in notch 5 or higher	(i) Switch the start/run switch to isolate. (ii) Move the notch control handle briskly over its full range several times. (iii) Try for a start. (iv) Return the start/run switch to run. (v) Switch off gen field switch on the console and notch up progressively to notch 8. Observe that the engine revs up normally with a clean exhaust. Notch off progressively and observe that the engine returns to normal idle revs with no smoke. (vi) Take power and proceed.
Engine still shuts down in notch 5 or higher	(i) Open the electrical cubicle doors and look behind the notch control handle. If you can see the microswitches (fig.4), tap them gently. (ii) Try for a start. (iii) Return the start/run switch to run. (iv) Switch off gen field switch on the console and notch up progressively to notch 8. Observe that the engine revs up normally with a clean exhaust. Notch off progressively and observe that the engine returns to normal idle revs with no smoke. (v) Take power and proceed.

Contd. over....

Fault remains	(i)	Try for a start.
	(ii)	Take power and proceed avoiding notch 5 or higher. The locomotive will not suffer damage.
	(iii)	Alternatively, drive as normal from the opposite driving position. If you feel you can work your train safely and without difficulty, proceed. If not, fail the locomotive.

IMPORTANT

> **When a 121 class engine shuts down, always apply the handbrake on the locomotive and use scotches if necessary before fault finding. This protects against brake cylinder leak off. Remember to remove any scotches and release the handbrake before proceeding.**

> **It may not always be possible to observe the engine exhaust.**

Microswitches viewed from behind cab electrical cubicle doors

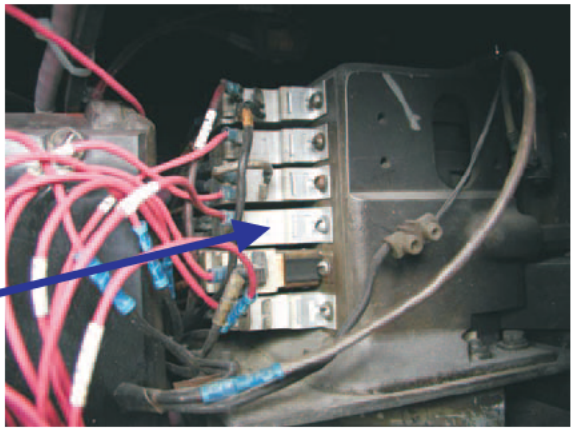


Fig. 4 - Controller microswitches

TABLE 5 ENGINE SHUTTING DOWN - SLOW DEATH (NO SMOKE)

What happens	Engine revs start to drop (bogs down) and engine dies slowly with a missing or rough sound from the exhaust. When engine stops low oil lamp may light on console and trainline alarm bell may ring depending on governor button tripping or not.
What you do	(i) Notch off and bring the locomotive to a stop. (ii) Switch the start/run switch to isolate. (iii) If the low oil lamp is lit, reset the governor button. (iv) Try for a start.
Engine will not start	(i) Go to fault finding table 1 Engine Will Not Start Does Not Rotate or table 2 Engine Will Not Start Engine Rotates But Will Not Fire.
Engine starts	(i) Return the start/run switch to run. (ii) Push the engine layshaft gently and increase engine revs for several seconds. Release the layshaft gently and allow engine return to idle. (iii) If engine remains running, take power and proceed.
Engine shuts down with a slow death again	There is no further check. Fail the locomotive.

IMPORTANT

> **When a 121 class engine shuts down, always apply the handbrake on the locomotive and use scotches if necessary before fault finding. This protects against brake cylinder leak off. Remember to remove any scotches and release the handbrake before proceeding.**

NOTES

TABLE 6 ENGINE SHUTTING DOWN - SLOW DEATH (SMOKE FROM EXHAUST)

What happens	Engine revs start to drop (bogs down) and engine dies slowly with a rattling or rough sound. Dense black smoke pours from the engine exhaust. When engine stops (which may take some time) low oil lamp may light on console and trainline alarm bell may ring depending on governor button tripping or not.
What you do	(i) Notch off and bring the locomotive to a stop. (ii) Move the notch control handle to the emergency stop position. (iii) When the engine stops, switch the start/run switch to isolate. (iv) Wait for the smoke to clear. Check the engine inspection covers. If you find one loose or blown off, fail the locomotive.
Engine inspection covers are in place	(i) If the low oil lamp is lit, reset the governor button. (ii) Return the notch control handle to idle. (iii) Try for a start.
Engine will not start	(i) Fail the locomotive.
Engine starts	(i) Return the start/run switch to run. (ii) Switch off gen field switch on the console and notch up progressively to notch 8. Observe that the engine revs up normally with a clean exhaust. Notch off progressively and observe that the engine returns to normal idle revs with no smoke. (iii) Take power and proceed.
Engine revs start to drop again with dense black smoke pouring from the exhaust	(i) Notch off and bring the locomotive to a stop. (ii) Move the notch control handle to the emergency stop position. (iii) Fail the locomotive.

IMPORTANT

> **When a 121 class engine shuts down, always apply the handbrake on the locomotive and use scotches if necessary before fault finding. This protects against brake cylinder leak off. Remember to remove any scotches and release the handbrake before proceeding.**

> **It may not always be possible to observe the engine exhaust.**

NOTES

TABLE 7 UNABLE TO BUILD MAIN RESERVOIR PRESSURE

What happens	On starting the locomotive, main res will not build.
What you do	(i) Check that the main res air cocks, supplying the main res hoses not in use, are closed. If any are open, close them and observe main res building.
Main res will still not build	(i) If the locomotive is coupled to an air braked train, isolate the locomotive main res air hose from its train. If air pressure builds, there is a fault on the locomotive main res pipe hose (hose or washer) or on the train.
Main res does not build when locomotive isolated from a train or locomotive is light	(i) Close the cut out cock supplying the compressor unloader above the compressor (fig.5). If main res starts to build, return the cut out cock to its normal position.
Main res does not build	There is no further check. Fail the locomotive.

OR

What happens	Main res stabilises at 70 psi and will not build.
What you do	(i) Check that the compressor unloader 3 way valve handle (fig.5) is pointing vertically downwards. If it is not, move it to this position and observe if main res builds.
Main res still remains at 70 psi	(i) Turn the compressor unloader 3 way valve handle (fig 5) to the horizontal position and back to the vertical position several times. Make sure to return the handle pointing vertically downwards. Observe if main res builds.
Fault remains	(i) Blow down the main res tanks by opening the drain cocks. (ii) Close the cut out cock at the auxiliary air filter beside the compressor (fig.5). (iii) Close the main res tank drain cocks. If main res builds, it will now be controlled by the main res tank safety valve, which will lift occasionally to regulate pressure. Please report to maintenance personnel, if this isolation of the compressor unloader was carried out to achieve main res pressure.
Fault remains	There are no further checks. Fail the locomotive.

Contd. over...

IMPORTANT

- **When experiencing low main res on a 121 class, always apply the handbrake on the locomotive and use scotches if necessary, before fault finding. This protects against brake cylinder leak off. Remember to remove any scotches and release the handbrake before proceeding.**
- **When fault finding low main res, if you have the cab cut in, ensure that the train brake handle is in the emergency position. Keep it there until normal main res pressure is achieved.**

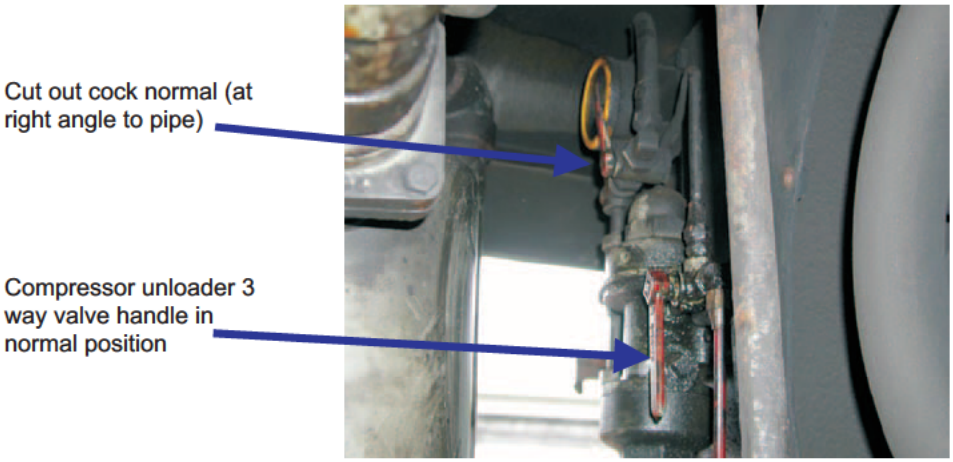


Fig. 5 - Compressor unloader

TABLE 8 BRAKE TROUBLE - UNABLE TO BUILD AIR BRAKE

What happens	Air brake pipe will not build to 68 72 psi with train brake handle in release position.
What you do	(i) Apply the train brake handle to the emergency position. (ii) Ensure that the main res gauge builds to and stabilises between 100 130 psi. If the main res gauge settles below this, go to fault finding table 7 Unable To Build Main Reservoir Pressure.
Main res gauge achieves between 100 130 psi	(i) Release the train brake handle. (ii) If the brake pipe sits at 0 psi, main res does not change and application remains at 70 psi or less, cut out and cut in the MU2 valve. Try for brake release. (iii) If fault remains, isolate the deadman's valve and try for brake release. If no response, fail the locomotive.
Brake pipe attempts to rise but main res and application starts falling with train brake handle in release	You are looking for a leak in the train brake pipe. (i) Isolate locomotive brake pipe and main res hoses from its air braked train, if attached, by closing the isolation cocks. (ii) Try for brake release. If the fault clears, the fault is on the locomotive brake pipe hose (hose or washer) or on the train.
Fault remains on locomotive	(i) Check each of the following <u>Driving cab</u> : • Emergency brake valve flap is closed and no sound of air. <u>On the ground</u> : • Brake pipe cock is closed on the front of the locomotive. (ii) If any of these items needed to be adjusted, try for brake release.
Fault remains	There is no further check. Fail the locomotive.

Contd. over...

IMPORTANT

- **You isolate the locomotive brake pipe from the train and you are successful in clearing the fault! When reconnecting the locomotive hoses to its train you will need to carry out a brake continuity test in accordance with General Appendix instructions.**
- **If during checks you discover a leaking or broken pipe in the deadman's compartment or cab, DO NOT attempt to blank the pipe. You could leave yourself without brakes!**
- **Before releasing the train brake, ensure you have full main res pressure. If main res is building and the cab is cut in, place the train brake handle in the emergency position until main res stabilises. This will assist rapid brake release.**

TABLE 9 BRAKE TROUBLE - UNABLE TO BUILD VACUUM

What happens	Vacuum brake pipe will not build to the minimum 18 ins with train brake handle in release.
What you do	(i) Check the brake pipe gauge. This should be reading 70 72 psi. If it is not, go to fault finding table 8 Brake Trouble Unable To Build Air Brake.
Brake pipe gauge is at 70 72 psi	(i) Apply the train brake handle to emergency. (ii) Check the vac main res gauge. This should be reading greater than 21ins, normally as high as 28ins. If it is reading zero or low, check the exhauster filter casing end cap (fig.6) for security. If the vac main res does not rise, fail the locomotive.
Vac main res is normal with train brake handle in emergency	(i) Release the train brake handle and check if vac main res falls and does not recover with vac brake pipe steady. If it does not recover, you are looking for a leak in the train pipe. (ii) Isolate the locomotive vacuum pipe from its vacuum braked train, if attached, placing the locomotive hose on its dummy bracket. (iii) Try for brake release. If the fault clears, the problem is on the train.
Fault remains on locomotive	(i) Check that the vacuum hose washers are intact and the hoses are sealing on the dummy brackets. (ii) Try for brake release. If the fault remains, fail the locomotive.
Vac main res is normal with train brake handle in release position	(i) If the vac main res stabilises to its normal level, but vac brake pipe settles below 18ins minimum, there is a control valve fault. (ii) Try tapping the HS4 valve (fig.7), the VA1 valve (fig.7) and VA1 release valve (fig.6). (iii) Try for vacuum brake release.
Fault remains	There is no further check. Fail the locomotive.

IMPORTANT

> **You disconnect the locomotive vacuum hose from the train and you are successful in clearing the fault! When reconnecting the locomotive vacuum hose to its train you will need to carry out a brake continuity test in accordance with General Appendix instructions.**

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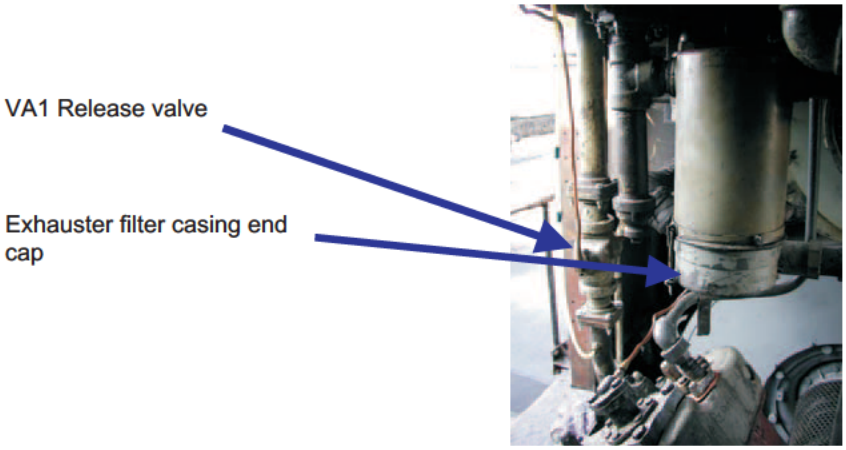


Fig. 6 - Compressor/exhauster

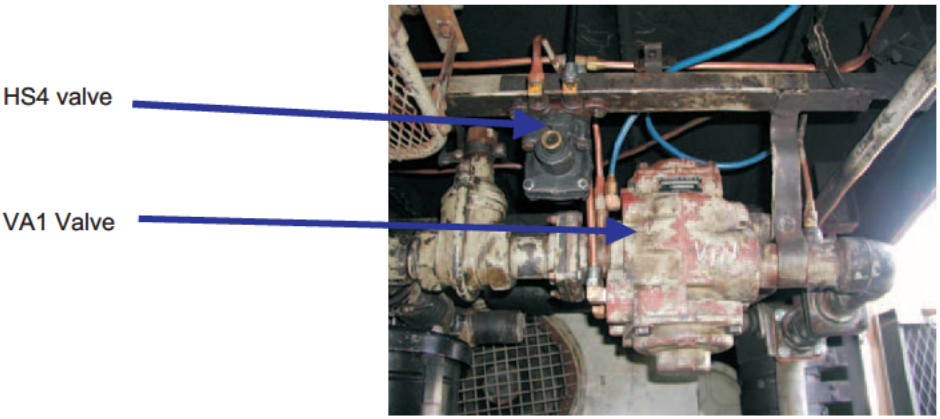


Fig. 7 - Compressor/exhauster

TABLE 10 BRAKE TROUBLE - LOCO BRAKE WILL NOT RELEASE

What happens	With train and locomotive brake handles released and brake gauge readings correct 1. Main res gauge 100 130 psi 2. Brake pipe gauge 68 72 psi 3. Vac brk pipe gauge 18 21ins. Brake cylinder pressure fails to release completely and locomotive brake cylinders are applied.
What you do	(i) Notch off and bring the locomotive to a stop. (ii) Apply the locomotive brake handle to full service and apply the train brake handle to emergency position. (iii) Apply the handbrake and use scotches if necessary. (iv) In the brake rack, prise open the relief valve on the 27A control valve reservoir (fig.8) and blow down the air pressure. (v) Return to the cab. Release both brake handles and verify that the brake cylinder gauge shows 0, indicating full release. Keep both brake handles released for one minute. (vi) Apply the train brake handle to full service and verify brake cylinder pressure rising. (vii) Release the train brake handle and verify brake cylinder release. (viii) Remove any scotches, release the handbrake, take power and proceed.
Brake cylinder pressure fails to release again after applying and releasing the train brake	There are no further checks. Fail the locomotive.

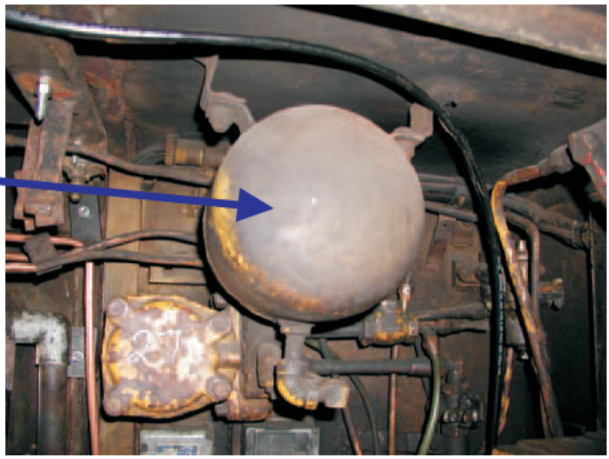


Fig. 8 - 27A Control valve reservoir

NOTES

TABLE 11 PC LAMP WILL NOT CLEAR

What happens	PC lamp lights on console, gen field is cut and engine revs drop to idle in power.
What you do	(i) Notch off and bring the locomotive to a stop. (ii) With the locomotive brake applied, select forward and release the train brake handle. If the engine revs to notch 3 and the PC lamp remains lighting, check : 1. Main res gauge 100 130 psi 2. Brake pipe gauge 68 72 psi 3. Vac brk pipe gauge 18 21ins. If any are not reading as above, follow the steps in fault finding table 9 Brake Trouble Unable To Build Vacuum. If they are OK, in the brake rack, try tapping the vacuum brake switch (VBS) (fig.9). Check if the PC lamp will clear. If it does, take power and proceed. If the PC lamp remains lit, fail the locomotive.
The engine remains at idle with forward selected, notch control handle at idle, train brake released and PC lamp lighting	(i) Move the notch control handle smartly out of and back to idle several times. Release the train and locomotive brake handles and see if the PC lamp clears. If it clears, take power and proceed.
PC lamp remains lighting	(i) Change to the opposite driving position and see if the PC lamp clears from this side. If it remains lighting, move the notch control handle smartly out of and back to idle. Release the train and locomotive brake handles again and see if the PC lamp clears. If it clears, change to the desired driving position and attempt to take power.
PC lamp still remains lighting	(i) Open the electrical cubicle doors and look behind the controller on each side. If you can see the microswitches (fig.4), tap them gently. Release the train and locomotive brake handles again and see if the PC lamp clears. If it clears, change to the desired driving position and attempt to take power.
PC lamp still remains lighting	(i) In the brake rack, try tapping the pressure brake switch (PBS) (fig.9) and in the deadman's compartment, the power cut off switch (PCS) (fig.10). Check if the PC lamp will clear. If it does, take power and proceed. If the PC lamp remains lit, there are no further checks. Fail the locomotive.

Contd. over...

Fig. 9 - Brake rack

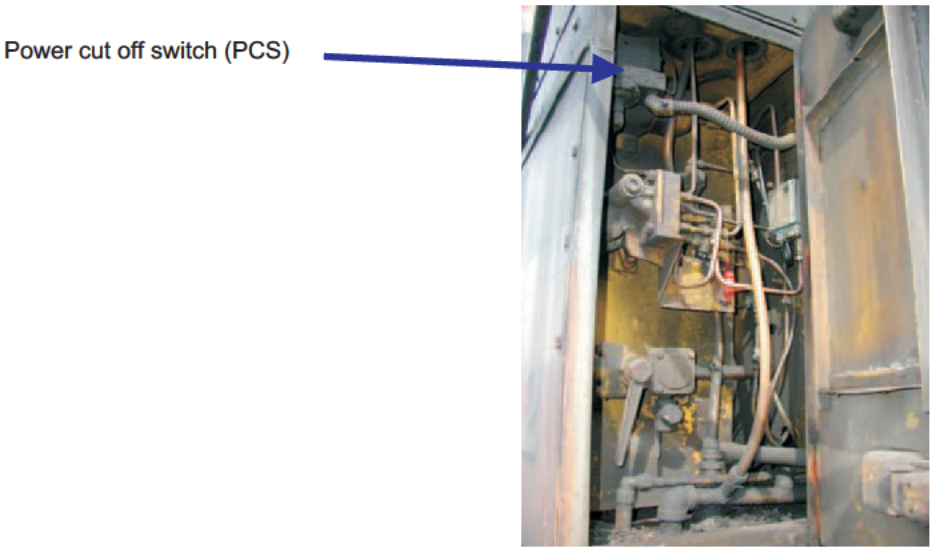


Fig. 10 - Deadman's compartment

TABLE 12 PARKING BRAKE WILL NOT RELEASE ON AIR BRAKED COACHING

What happens	Main res is normal (100 130 psi), but parking brake gauges on coaching stock are indicating in the white zone (partial release).
What you do	(i) Apply the train brake handle to emergency. (ii) Blow down the main res tanks by opening the drain cocks. (iii) Close the drain cocks and allow main res to build. (iv) Confirm parking brake release on the train.
Parking brake gauges remain in the white zone	There are no further checks. Fail the locomotive.

IMPORTANT

> **When carrying out the above procedure always apply the handbrake on the locomotive and use scotches if necessary before fault finding. This protects against brake cylinder leak off. Remember to remove any scotches and release the handbrake before proceeding.**

NOTES

TABLE 13 NO POWER/DOWN IN POWER

What happens	You notch up but engine revs remain at idle, trainline alarm bell does not ring and no warning lamps light.
What you do	(i) With the locomotive in forward and the notch control handle in idle, apply a full service brake. If the locomotive revs up to notch 3 and the PC lamp does not light, the PC lamp may be blown. Go to fault finding table 11 PC Lamp Will Not Clear.
The engine does not rev up when the PC lamp lights	(i) Check that the governor plug is secure on the governor.
The governor plug is secure	(i) Shut down the engine and open the battery switch for 30 seconds. (ii) Close the battery switch. (iii) Restart the engine. Try for power.
No response	There is no further check. Fail the locomotive.

OR

What happens	You notch up, engine responds to the notches, trainline alarm bell does not ring, no warning lamps light, but traction power extremely weak or non existent.
What you do	(i) Notch off and bring the locomotive to a stop. (ii) Select reverse direction and attempt to take power. Bring the train to an immediate halt after ascertaining that it has taken power. (iii) Move the forward/reverse handle backwards and forwards smartly several times. (iv) Try for power in the desired direction. If power is still not available, change to the opposite driving position and repeat the procedure. (v) If power is regained in the desired direction from the opposite position, change position, take power and proceed. (vi) If there is still no power in the desired direction, shut down the engine and open the battery switch for 30 seconds. (vii) Close the battery switch again and restart the engine. Try for power in the desired direction again. If the fault has not cleared, alternatively, drive as normal from the opposite driving position. If you feel you can work your train safely and without difficulty, proceed. If not, fail the locomotive.

Contd. over...

There is no power in forward or reverse direction	(i) Move the notch control handle smartly out of and back to idle several times and switch the gen field switch off and on several times. Try for power. If power is still not available, change to the opposite driving position and test for power in both directions. If power is available, drive as normal from the opposite driving position. If you feel you can work your train safely and without difficulty, proceed. If not, fail the locomotive.
There is no power from the opposite driving position	There are no further checks. Fail the locomotive.

OR

What happens	Engine loses revs in particular notches or revs will not increase over certain notches.
What you do	(i) Notch off and bring the locomotive to a stop. (ii) Apply train brake handle to light the PC lamp. (iii) Move the notch control handle smartly through its full range several times. (iv) Clear the PC lamp and with gen field switch off, notch up progressively and see that the engine revs increase with each notch. Notch off and take power.
Fault remains	(i) Open the electrical cubicle doors and look behind the controller. If you can see the microswitches (fig.4), tap them gently. (ii) Clear the PC lamp and with gen field switch off, notch up progressively and see that the engine revs increase with each notch. Notch off and take power.
Fault remains	(i) Take power and proceed avoiding the problem notches. The locomotive will not suffer damage. (ii) Alternatively, drive as normal from the opposite driving position. If you feel you can work your train safely and without difficulty, proceed. If not, fail the locomotive.

OR

Contd. over...

What happens	Engine loses revs (bogs down) or hunts in the higher notches and no exhaust smoke.
What you do	(i) Keep the locomotive in the lower notches where the engine revs sound normal. The locomotive will not suffer damage. If you feel you can work your train safely and without difficulty, proceed. If not, fail the locomotive.

NOTES

TABLE 14 GROUND RELAY

What happens	Trainline alarm bell rings, ground relay lamp lights on console, gen field is cut and engine revs drop to idle. After about 6 10 secs the ground relay will reset automatically. The alarm bell will silence and the ground relay lamp will go out.
What you do	(i) Notch off immediately (before the ground relay resets). Allow the locomotive to coast or bring it to a stop depending on running circumstances (signals, gradient). (ii) When the ground relay resets, notch up slowly giving the locomotive time to recover. If the ground relay does not reactivate, proceed as normal.
Ground relay still activates	(i) If 3 ground relay activations occur inside of a 12 min interval the ground relay will reset, but you should proceed in the lowest notch possible to the next location where you can clear the section and fail the locomotive. (ii) If the ground relay activates 4 times within 12 mins it will lock out and will not reset. Fail the locomotive.

IMPORTANT

- **When you proceed after the ground relay has reset ALWAYS look out and check that, axles are rotating freely and there is no smoke or smell of burning from bogies. If you do observe trouble STOP and immediately seek advice from maintenance personnel.**
- **When taking power after a ground relay reset, if the running circumstances permit, try to notch up the locomotive gradually.**
- **Ground relay lockout can in some circumstances be cleared. Maintenance personnel must be contacted to do this.**
- **CARELESS TREATMENT OF THE GROUND RELAY SYSTEM COULD CAUSE FIRE!**

NOTES

TABLE 15 CONTINUOUS WHEELSLIP LAMP

What happens	Wheelslip lamp on console lights continuously when notch control handle is in notch 1 or higher. Engine responds but severely reduced or no power and no wheel slip experienced.
What you do	(i) Notch off immediately and bring the locomotive to a stop. (ii) Move the forward/reverse handle backwards and forwards smartly several times. (iii) Attempt to take power. If the fault has cleared, proceed.
What you do if wheelslip lamp remains on when attempting to take power	(i) Shut down the engine. (ii) Open the battery switch for 30 seconds. (iii) Close the battery switch again. (iv) Restart the engine. If the wheelslip lamp lights when attempting to take power, fail the locomotive.

IMPORTANT

> **If the fault clears and you proceed, look out and check that, axles are rotating freely and there is no smoke or smell of burning from bogies. If you do observe trouble, STOP and immediately seek advice from maintenance personnel.**

NOTES

TABLE 16 HOT ENGINE

What happens	Trainline alarm bell rings, hot engine lamp lights on console, engine revs drop to idle and no power.
What you do	(i) Notch off and allow the locomotive to coast or bring it to a stop depending on running circumstances (signals, gradient). (ii) Allow the engine to cool and when the hot engine alarm clears, take power and proceed.
What you do if the alarm clears and repeats or does not clear	(i) Notch off and bring the locomotive to a stop. (ii) Check the header tank sight glass. If it is low or empty, look for any visible coolant leaks. If there are leaks, fail the locomotive. (iii) If there are no leaks, contact maintenance personnel for advice. If this is not possible, fail the locomotive.
Header tank sight glass is full	(i) If the hot engine alarm clears, take power and proceed. If you feel you can work your train safely and without difficulty, proceed. If not, fail the locomotive. (ii) If the hot engine alarm does not clear, press and release the test button on the engine temperature switch (fig.11) and see if the alarm cancels. If not, fail the locomotive. If it cancels, regain power and proceed.

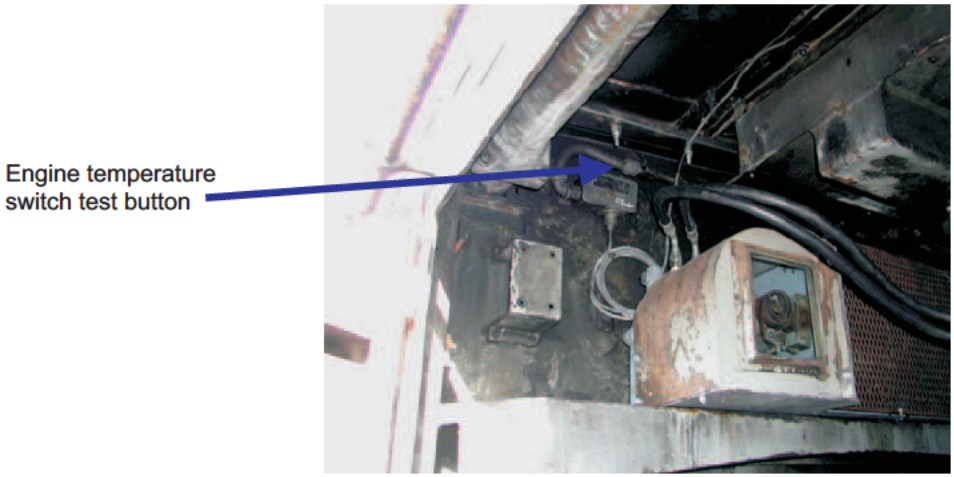
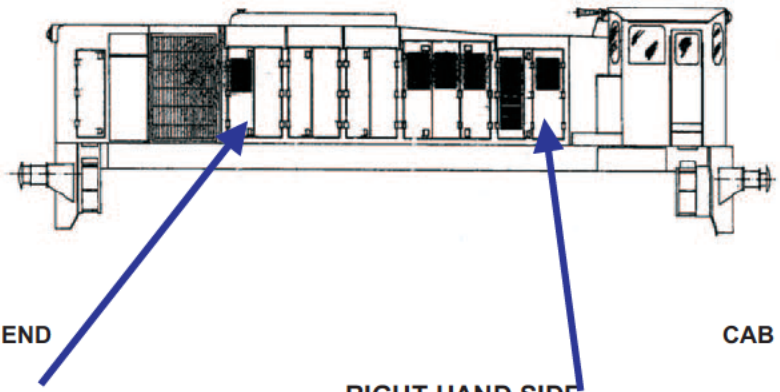


Fig. 11 - Temperature switch

NOTES

TABLE 17 LOCATION OF EQUIPMENT REQUIRED IN FAULT FINDING

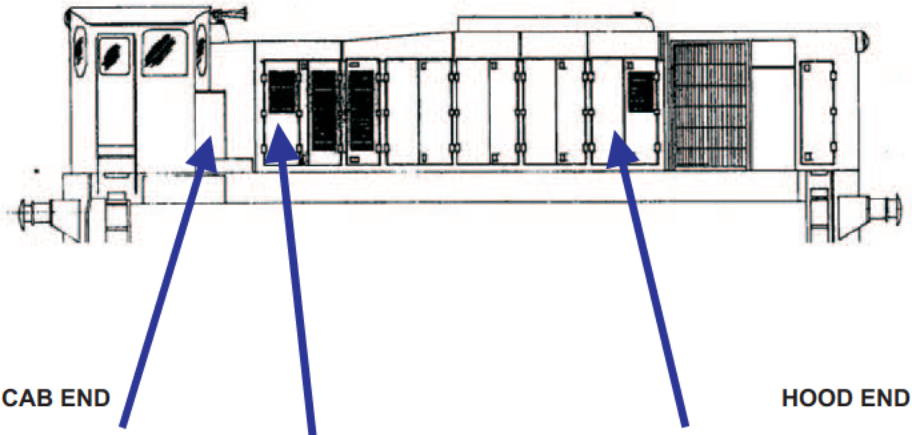


HOOD END **CAB END**

RIGHT HAND SIDE

Governor layshaft
Crankcase detector
Low oil button
Engine temperature switch

Compressor unloader
Battery charging socket



CAB END **HOOD END**

LEFT HAND SIDE

Deadman's compartment

Brake rack

Overspeed lever
Fuel sight glasses
Governor plug

NOTES

2 X BGM CLASS LOCOMOTIVES

SECTION 5 FAULT FINDING 2 x BGM CONSISTS

Introduction

Sections 3 and 4 for each of the BGM classes covers fault finding on the individual locomotives. This section contains additional instructions to help you identify the source of faults on a 2 x BGM consist. In addition it indicates alternative courses of action that are available to you with the advantage of two locomotives, which would not be available with a single locomotive. The instructions are everything that can possibly be done without tools. This section contains a series of pointers and is laid out in an easy to follow and effective manner. To aid in fault finding, you should familiarise yourself with the contents of this section, so that you can refer quickly when that fault occurs.

As the section deals with the effects of faults, it does not cover problems due to incorrect set up of the locomotives. Also, it assumes that all MCB's are on. Please check that your locomotives have been correctly prepared for service.

IMPORTANT

- **Before engaging in fault finding, make sure that your locomotives are correctly prepared.**
- **When performing fault finding, where it is necessary for testing purposes to release the brakes, the security of the train is of paramount importance e.g. considerable gradients, points etc. Where doubt exists, brakes should not be released and the locomotives failed.**
- **When performing fault finding, where it is necessary for testing purposes to take power in reverse direction, always comply with the provisions of the Rule Book.**
- **If you are bringing your locomotives to a stop because of a fault developing, always try to stop within the protection of station or interlocking signals.**
- **Always keep the signalman informed in accordance with the Rule Book.**
- **In a 2 x BGM consist, situations arise where you can take the defective locomotive off the line and drive with the remaining locomotive. If you feel you can work your train safely and without difficulty, proceed. If not, fail the locomotives.**

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CONTENTS

NOTES

1. CONTROL AND FUEL PUMP SWITCH

(i) Only one control and fuel pump switch should be on in a consist.

(ii) If both locomotives will not run without a control and fuel pump switch on in each locomotive, try another jumper cable if possible. If the fault persists, continue operation, but report the fault to maintenance personnel.

IMPORTANT

> **When disconnecting the jumper cable from a consist, remember to switch on the control and fuel pump switch in the locomotive where no switch was on, to prevent the locomotive shutting down from fuel starvation.**

2. OFF THE LINE

(i) Where a fault cannot be rectified on one locomotive of a consist, it must be taken off the line before proceeding.

(ii) When a leading locomotive is taken off the line, control of the deadman is lost. Therefore the deadman seal must be broken and the deadman isolation cock isolated to enable the brakes to be released and the PC cleared to take power. In this case the trailing locomotive will drive from the leading locomotive.

IMPORTANT

> **At least one locomotive in a consist must be on the line for the consist to drive.**

> **The leading locomotive of a consist must always have its engine running to allow full driving control. If this is not possible, even with the locomotive off the line, the consist may only be driven from the trailing locomotive.**

> **It is permissible to clear the section driving from the rear locomotive provided a brakesman is available to travel in the leading cab of the leading locomotive in accordance with General Appendix instructions.**

3. TRAINLINE ALARM BELL

(i) The trainline alarm bell will ring in all cabs of a consist when a single locomotive activates the bell. The trainline alarm bell will activate for the following -

(a) Hot engine

(b) Ground relay – until ground relay automatically resets

(c) Engine run relay failure

(d) Fuel pump contactor failure (141/181)

(e) Tripped low oil button.

The relevant warning lamp will light in the cab(s) of the affected locomotive for (a), (b) and (e). Therefore, if no warning lamps light in the leading locomotive, it can be assumed that the trailing locomotive has developed the fault. In addition, if the leading locomotive continues to operate normally with the trainline alarm bell activated, the trailing locomotive is at fault.

(ii) When attending to the defective locomotive, use the fault finding section for that class of locomotive. If the fault cannot be overcome, the trainline alarm bell can be cancelled for –

(a) Hot engine

(b) Ground relay

(c) Engine run relay failure

(d) Fuel pump contactor failure

Take the defective locomotive off the line for any of the above conditions.

(e) Tripped Low Oil Button

Reset the tripped button and take the defective locomotive off the line.

IMPORTANT

> **The trainline alarm bell only rings for the 5 faults listed. It will not ring if a locomotive loses power due to a loose governor plug or shuts down due to fuel starvation for example. Therefore, if you experience a drop in performance of your consist and the leading locomotive is unaffected, check the trailing locomotive as soon as is practicable.**

4. JUMPER CABLE

(i) When fault finding a consist always make sure, initially, that the jumper cable is properly inserted in the jumper receptacle of each locomotive and that the receptacle lid is engaged on the cable plug.

5. TRIPPING CONTROL BREAKER

(i) If the control breaker trips on either locomotive of a consist and will not reset -

(a) Take both locomotives off the line.

(b) Reset the circuit breaker and switch the locomotives on the line.

(c) If the breaker trips again and will not reset, take the locomotives off the line.

(d) Reset the control circuit breaker.

(e) Disconnect the jumper cable from the locomotives.

(f) Try another jumper cable. If the fault persists, the locomotives will not work in consist.

6. DOWN IN POWER

(i) When you fault find for down in power, an additional check for a consist to qualify the jumper cable and the jumper receptacles is as follows -

(a) On one locomotive, carefully disconnect the governor plug from the governor, by rotating the locking collar on the plug and pulling it out of the socket. Secure the cable.

(b) In the driving cab of this locomotive, clear the PC lamp and with engine run switch on and gen field switch off, notch up progressively from idle to notch 8 and back to idle. Observe that the second locomotive responds to all notches.

(c) Reconnect the governor plug.

Now repeat this test completely from the other locomotive.

(ii) If either locomotive fails to perform this test exactly, try another jumper cable. If this does not work and the locomotives behave normally on their own, there is a fault on the trainline wiring of one of the locomotives. If the consist is 2 x 141, 2 x 181 or 141/181 and if practical, run around, couple the opposite ends of the locomotives and repeat the test.

IMPORTANT

> **This down in power test instruction is provided to assist only at a location, where no maintenance personnel are present and prior to locomotives being taken into service, where a doubt exists as to their suitability for operation of the service.**

> **Disconnecting the governor plug on the locomotive you are testing from allows you to easily observe the reactions of the second locomotive.**

> **If any consist fails this test, please seek further advice from maintenance personnel.**

7. CONTINUOUS WHEELSLIP

(i) The wheelslip lamp will light in all cabs of a consist when a wheelslip relay activates on a locomotive. Therefore the wheelslip lamp will not identify which locomotive is generating the indication.

(ii) In the case of continuous wheelslip, both locomotives will respond to the notch control handle but the defective locomotive will not take power.

(iii) When you experience continuous wheelslip, the unaffected locomotive will continue to develop power. Therefore, if you decide to continue to a location where fault finding is more practicable , always look out and check that, axles are rotating freely and there is no smoke or smell of burning from bogies. If you do observe trouble, stop and immediately seek advice from maintenance personnel.

(iv) When fault finding, take the trailing locomotive off the line and take power from the leading locomotive -

(a) If the wheelslip lamp lights, the leading locomotive is at fault.

(b) If the wheelslip lamp does not light, the trailing locomotive is at fault.

(v) Fault find the defective locomotive for continuous wheelslip.

(vi) If the fault will not clear, try another jumper cable if possible. Otherwise take the defective locomotive off the line and proceed remembering to look out and check that, axles are rotating freely and there is no smoke or smell of burning from bogies. If you do observe trouble, stop and immediately seek advice from maintenance personnel.

FOR INFORMATION OF COMPANY'S EMPLOYEES ONLY

IARNRÓD ÉIREANN

Iarnród Éireann

DRIVERS' MANUAL

VOLUME 9 - PART 1

Assisting Failed 121, 071 & 201 Class Locomotives

To operate on and from 31/05/2005

NOTES

VOLUME 9 ASSISTING FAILED 121, 071 & 201 CLASS LOCOMOTIVES

Introduction

This section contains all the movements that are permitted to assist a failed 121 class or 2 x 121 class locomotives in consist, a failed 071 class locomotive or a failed 201 class locomotive. It is divided into three main parts governed by how the assistance is being given – by attaching to the failed locomotive, by attaching to an air braked train in rear of the failed locomotive, or by attaching to a vacuum braked train in rear of the failed locomotive. Within these divisions, block diagrams detail the assistance possible by the various types of motive power. There are also step by step preparation instructions for the movements, details on brake continuity tests, a full description of the brake control available and the operating conditions governing the movements. Finally, highlighted panels indicate important considerations and tips in relation to the assistance being undertaken.

It is important to note that these instructions are intended for both the driver of the failed locomotive and the assisting motive power unit. You should familiarise yourself with the contents of this section, so that you can refer quickly when you require assistance or are required to give the assistance.

IMPORTANT

- **Except where stated, the term failed locomotive in these instructions refers to both a single 121, 071 or 201 class locomotive, or 2 x 121 in consist. Where 2 x 121 class locomotives have failed, the instructions for the failed locomotive are to be carried out on both locomotives.**
- **Where a 121 class is in consist with a 141 or 181 class, do not use this section. Prepare both locomotives as per the instructions in Assisting Failed 141/181 Class Locomotives.**

Using the section

As the driver of the failed locomotive or the assisting motive power unit, find the permitted movement that you wish to undertake from the contents page by asking the following questions:

1. From where is the assistance being given?

   If the answer is:

   (a) By coupling to the failed locomotive - then you are going to be using **A**.

   (b) By coupling to an air braked train in rear of the failed locomotive - then you are going to be using **B**.

   (c) By coupling to a vacuum braked train in rear of the failed locomotive – then you are going to be using **C**.

2. What is giving the assistance?

   The answer to this will give you what **A**, **B** or **C** tab to look up.

The illustrated block diagrams (which are uniquely numbered for reference to the instructions) indicate the directions that are permitted. The instructions following the block diagrams are only valid for the direction of movement indicated by the arrows. Therefore, before following the instructions given, you must find the exact movement you wish to undertake by referring to all the block diagrams in the relevant tab.

Example 1:

An 071 class with an air braked train attached has failed. The assistance is being provided by a push/pull train consisting of a 6100 class with 201 class motive power. The 201 class is going to be coupling to the 071 class and the failed train is to be removed by hauling or propelling.

How to find the instruction from the contents -

1. From where is the assistance being given?

   Answer - By coupling to the failed locomotive.

   You will be using **A**.

2. What is giving the assistance?

   Answer - A push/pull train - 6100 class with 201 class motive power.

   You will be using **A4**.

When you open A4 there are several parts. Check all the block diagrams in A4 to find the movement you want to carry out. In this case it is shown in Part 1 as movement (14). Hauling is indicated so the movement is permitted. Propelling is not shown for this particular movement so it is not permitted. Therefore you can only haul the failed train. Follow carefully the 3 pages of instruction.

Example 2:

A 201 with a vacuum braked train attached has failed. The assistance is being provided by a push/pull train consisting of a 9000 class with 201 class motive power. The 9000 class is going to be coupling to the 201 class and the failed train is to be removed by hauling or propelling.

How to find the instruction from the contents -

1. From where is the assistance being given?
   Answer - By coupling to the failed locomotive.
   You will be using **A**.
2. What is giving the assistance?
   Answer - A push/pull train - 9000 class with 201 class motive power.
   You will be using **A5**.

When you open A5 there are several parts. By checking all the block diagrams in A5, you will not find the movement you wish to carry out. Therefore the proposed movement is not permitted. (Remember, the 201 class has a vacuum braked train attached and you are coupling the 9000 class to the failed locomotive!).

IMPORTANT

> **In an assistance movement where the brakes on a train in rear of the failed locomotive cannot be controlled by the driver of the assisting motive power unit, the instructions as laid down in paragraph 1.8 and 1.9 page B174 of the General Appendix must be carried out.**

Special note regarding mixed braked trains

1. Locomotives hauling mixed braked trains are permitted to assist where illustrated in the following sections.
2. Failed locomotives hauling mixed braked trains may be assisted directly where the assisting motive power unit couples to the failed locomotive, as detailed in section A.
3. Where a mixed braked train requires to be assisted from the rear, the rear air or vacuum braked portion requires to be removed first. The remaining vacuum or air braked portion, complete with failed locomotive, may then be assisted according to section B or C as appropriate.

GENERAL INSTRUCTIONS

1. Under all circumstances when assistance is being provided, the Company's Rules and Regulations must take priority.

2. A DMU, EMU, Translink DMU and DEMU, mobile on track machine or preserved locomotive cannot be used to assist a failed locomotive or locomotive hauled train.

3. Where a push/pull train is being used to assist and the assistance involves several movements, careful consideration must be given as to how the movement is best performed. The traffic regulator must consider the desirability of using a push/pull train taking into consideration

   (i) the number of movements involved

   (ii) the possibility of detaching and using the push/pull locomotive only

   (iii) the desirability of or requirement for detraining passengers prior to the assistance being given

   (iv) Schedule of Route Availability for Rolling Stock in accordance with the General Appendix.

   The possibility of obtaining some other form of assistance should be considered as an alternative providing it will not cause long delays.

4. Restrictions on the working of diesel locomotives are imposed by the Chief Engineer, Infrastructure. These are to be found in the General Appendix, Section B. Emergency working covers the assistance of a failed locomotive or train to either its destination, or a location where the failed locomotive or train can be disposed of. When this procedure is completed, further movements are restricted under normal working.

5. When assistance is being provided by a single 121 class driving with cab trailing, a second person must accompany the driver of the 121 class to act as lookout on the non driving side.

6. Where a brakesman is specified in these instructions, the driver of the failed train must act in this capacity. The duties of a brakesman include

   (i) agreeing a means of communication with the driver of the assisting motive power unit, to be used during the movement.

   (ii) keeping a sharp lookout

   (iii) using the horn, if available

   (iv) applying an emergency brake should the need arise

   Where a driver is not available to act as brakesman, a guard may act in this capacity. In this case the driver of the assisting motive power unit must instruct the guard in the above duties. In addition, where deadman and CAWS would normally be required to be operated on the failed motive power unit, these should be isolated by the driver of the assisting motive power unit. The guard should be made aware that this has been done.

7. In these instructions, hauling movements may be specified as

   Normal direction - same direction as the original route set for the failed train prior to its failure.

   Wrong direction - opposite direction to the original route set for the failed train prior to its failure.

   This includes all lines whether single, double, bi-directional etc.

8. When disposing of a failed motive power unit, this must be carried out according to the disposal instructions for that unit as required by this manual.

SUPPORTING DOCUMENTATION

GENERAL APPENDIX SECTION B

Restrictions on the working of Diesel Locomotives – Requirements Of Chief Engineer, Infrastructure

Operation of 121 class locomotives, cab leading/cab trailing

General instructions for working the automatic brake

Special instructions for trains with automatic vacuum brake

Special instructions for freight trains with automatic air brake

Special instructions for passenger trains with automatic air brake

Trains stopped by accident, failure, obstruction or other exceptional cause

Schedule of route availability for rolling stock

CURRENT WORKING TIMETABLE

Maximum speeds

WEEKLY CIRCULAR -

Special instructions that appear from time to time

CONTENTS

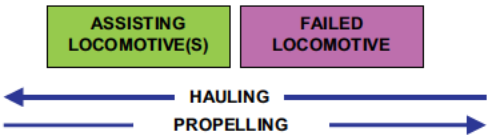
NOTES

A. ASSISTING MOTIVE POWER UNIT COUPLING TO FAILED LOCOMOTIVE

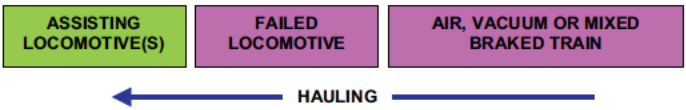
A1. ASSISTANCE FROM BGM (121,141, OR 181), 2 X BGM, OR 071 CLASS.

Permitted movements

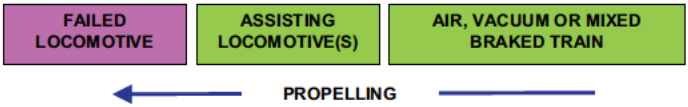
(1)



(2)



(3)



Preparation of failed locomotive

1. Secure locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2.
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full service and leave the locomotive brake handle applied.
8. **For failed 201 class** - Turn the normal/remote valve in no.1 cab to remote.

Coupling and preparation of assisting locomotive(s)

1. Ease up to failed locomotive.
2. In the cab, from which the assisting manoeuvre will be made, apply the train brake handle to emergency.
3. Attach and screw up shackle.

   For failed 121 or 071 class - Couple brake (red), main res (yellow) and independent equalising (green) hoses between the locomotives and open the air cocks for these hoses. Couple vacuum hoses.

   For failed 201 class - Couple brake (red) and main res (yellow) hoses between the locomotives and open the air cocks for these hoses. Couple vacuum hoses.
4. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
5. Release train brake handle. Observe brake pipe gauge building to 68 – 72 psi and vacuum gauge building to 18ins minimum.

IMPORTANT

> **If the brake pipe fails to build and main res falls continuously, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed locomotive. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**

> **If the brake cylinders on the failed locomotive do not release when the brake pipe builds to 68 – 72 psi, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed locomotive. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle. Observe that the brake cylinders are releasing.**

> **The brakes on a failed 201 class will react to activation of the train brake handle on the assisting locomotive(s), similar to an air braked coach or wagon. The assisting locomotive(s) locomotive brake handle does not control the brakes on the failed 201 class.**

Brake continuity test

The brake continuity test must be carried out between the driving cab of the assisting locomotive(s) and

(i) the furthest cab of the failed locomotive if light engine

(ii) the rearmost vehicle of an air or vacuum braked train attached to the failed locomotive

(iii) the rearmost vehicle of each of the air and vacuum portions of a mixed braked train attached to the failed locomotive.

Before proceeding, ensure that brake cylinders are releasing on the failed locomotive, all scotches are removed and all handbrakes are released.

Parking brake cylinders remain applied on failed 201 class – request the assisting driver to apply the train brake to emergency. Cut in the MU2 in one cab of the failed 201 class and press parking brake off button. Observe that the park brake applied lamp goes out. Cut out the MU2. Assisting driver should now release the train brake. Ensure that brake cylinders are releasing.

Resultant brake control available

ON DRIVING CAB OF ASSISTING LOCOMOTIVE(S) -

Full braking control of all vehicles.

ON OTHER CAB(S) OF ASSISTING LOCOMOTIVE(S) -

Brakes applied on all vehicles by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting locomotive(s).

ON FAILED LOCOMOTIVE -

Brakes applied on all vehicles by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting locomotive(s).

ON AIR BRAKED PASSENGER TRAIN ATTACHED TO FAILED LOCOMOTIVE OR ASSISTING LOCOMOTIVES -

The passenger communication valves and guard's brake valves will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting locomotive(s).

ON VACUUM BRAKED PASSENGER TRAIN ATTACHED TO FAILED LOCOMOTIVE OR ASSISTING LOCOMOTIVES -

The passenger communication valves and guard's brake valves will apply the brakes on the vacuum braked vehicles only. The guard's brake valve, only, will cut power and light PC lamp on the assisting locomotive(s) provided vacuum is dropped to 0 ins. Brakes will not apply automatically on the assisting locomotive(s) or failed locomotive.

DIVIDE OF VEHICLES -

Divide of brake pipe hoses will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting locomotive(s).

Divide of vacuum hoses will apply the brakes on the vacuum braked vehicles only. Power will be cut and PC lamp will light on assisting locomotive(s). Brakes will not apply automatically on the assisting locomotive(s) or failed locomotive.

A1

Conditions governing the assisting movement

PREPARATION

(i) Assisting driver must drive from the leading cab.

HAULING MOVEMENT

(i) **Normal direction** - speed must not exceed the maximum permitted for any vehicle on the train or portion of line, whichever is the more restrictive.

(ii) **Wrong direction** – speed must not exceed 32km/h (20 mph).

PROPELLING MOVEMENT

(i) Brakesman must travel in the leading cab of the failed locomotive.

(ii) Speed of movement must not exceed 32km/h (20 mph) when the brakesman is a driver.

Speed of movement must not exceed 16km/h (10 mph) when the brakesman is other than a driver.

(iii) Movement is permitted only to the next interlocking or station where the failed locomotive can be disposed of or the movement changed to an allowed hauling movement.

Unable to release brakes on the failed locomotive due to damage

Where for example air brake pipes are broken due to collision etc., the following now applies:

(i) In movement (1) and (3) the failed locomotive can only be moved as a loose coupled vehicle.

(ii) In movement (2) it is permitted to proceed with the failed locomotive unbraked provided a continuous brake is available on its train in rear. If this is not possible the failed locomotive must be removed as a loose coupled vehicle separately.

Where for example the vacuum pipe only is broken due to collision etc., do not connect vacuum hoses between the assisting locomotive(s) and failed locomotive. The following now applies:

(i) In movement (1) and (3) proceed.

(ii) In movement (2) where the train in rear is air braked proceed.

(iii) In movement (2) where the train in rear is vacuum braked, remove the failed locomotive separately as per movement (1).

IMPORTANT FOR FAILED 201 CLASS

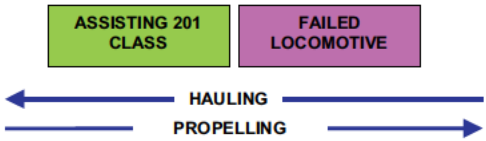
> **If the failed 201 class brakes can only be released by blowing down and isolating main res air, the parking brakes will have to be manually released.**

A. ASSISTING MOTIVE POWER UNIT COUPLING TO FAILED LOCOMOTIVE

A2. ASSISTANCE FROM 201 CLASS.

Permitted movements

(4)



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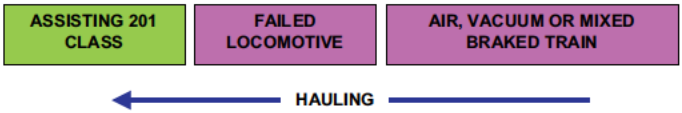

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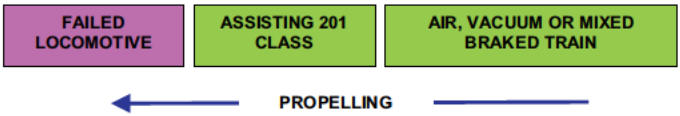


Preparation of failed locomotive

1. Secure the locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2.
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full service and leave the locomotive brake handle applied.
8. **For failed 121 class** - Turn the push/pull valve to push/pull.

   For failed 201 class - Turn the normal/remote valve in no.1 cab to remote.

Coupling and preparation of assisting 201 class

1. Ease up to failed locomotive.
2. In the cab, from which the assisting manoeuvre will be made, apply the train brake handle to emergency.
3. Attach and screw up shackle.

   For failed 121 or 201 class - Couple brake (red) and main res (yellow) hoses between the locomotives and open the air cocks for these hoses. Couple vacuum hoses.

   For failed 071 class - Couple brake (red) and main res (yellow) hoses between the locomotives and open the air cocks for these hoses. Couple vacuum hoses. Open one of the independent equalising (green) hose cocks on the failed 071 class.
4. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
5. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi and vacuum gauge building to 18ins minimum.

IMPORTANT

> **If the brake pipe fails to build and main res falls continuously, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed locomotive. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**

> **If the brake cylinders on the failed locomotive do not release when the brake pipe builds to 68 - 72 psi, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed locomotive. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle. Observe that the brake cylinders are releasing.**

> **The brakes on the failed locomotive will react to activation of the train brake handle on the 201 class, similar to an air braked coach or wagon. The 201 class locomotive brake does not control the brakes on the failed locomotive.**

Brake continuity test

The brake continuity test must be carried out between the driving cab of the assisting 201 class and

(i) the furthest cab of the failed locomotive if light engine

(ii) the rearmost vehicle of an air or vacuum braked train attached to the failed locomotive

(iii) the rearmost vehicle of each of the air and vacuum portions of a mixed braked train attached to the failed locomotive.

Before proceeding, ensure that brake cylinders are releasing on the failed locomotive, all scotches are removed and all handbrakes are released.

Parking brake cylinders remain applied on failed 201 class – request the assisting driver to apply the train brake to emergency. Cut in the MU2 in one cab of the failed 201 class and press parking brake off button. Observe that the park brake applied lamp goes out. Cut out the MU2. Assisting driver should now release the train brake. Ensure that brake cylinders are releasing.

Resultant brake control available

ON DRIVING CAB OF ASSISTING 201 CLASS -

Full braking control of all vehicles.

ON OTHER CAB OF ASSISTING 201 CLASS -

Brakes applied on all vehicles by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting 201 class.

ON FAILED LOCOMOTIVE -

Brakes applied on all vehicles by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting 201 class.

ON AIR BRAKED PASSENGER TRAIN ATTACHED TO FAILED LOCOMOTIVE OR ASSISTING 201 CLASS -

The passenger communication valves and guard's brake valves will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting 201 class.

ON VACUUM BRAKED PASSENGER TRAIN ATTACHED TO FAILED LOCOMOTIVE OR ASSISTING 201 CLASS -

The passenger communication valves and guard's brake valves will apply the brakes on the vacuum braked vehicles only. The guard's brake valve, only, will cut power and light the PC lamp on the assisting 201 class provided vacuum is dropped to 0 ins. Brakes will not apply automatically on the assisting 201 class or failed locomotive.

DIVIDE OF VEHICLES -

Divide of brake pipe hoses will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting 201 class.

Divide of vacuum hoses will apply the brakes on the vacuum braked vehicles only. Power will be cut and PC lamp will light on assisting 201 class. Brakes will not apply automatically on the assisting 201 class or failed locomotive.

Conditions governing the assisting movement

PREPARATION

(i) Assisting driver must drive from the leading cab.

HAULING MOVEMENT

(i) **Normal direction** - speed must not exceed the maximum permitted for any vehicle on the train or portion of line, whichever is the more restrictive.

(ii) **Wrong direction** – speed must not exceed 32km/h (20 mph).

PROPELLING MOVEMENT

(i) Brakesman must travel in the leading cab of the failed locomotive.

(ii) Speed of movement must not exceed 32km/h (20 mph) when the brakesman is a driver.

Speed of movement must not exceed 16km/h (10 mph) when the brakesman is other than a driver.

(iii) Movement is permitted only to the next interlocking or station where the failed locomotive can be disposed of or the movement changed to an allowed hauling movement subject to Chief Engineer, Infrastructure restrictions.

Unable to release brakes on the failed locomotive due to damage

Where for example air brake pipes are broken due to collision etc. the following now applies:

(i) In movement (4) and (6) the failed locomotive can only be moved as a loose coupled vehicle.

(ii) In movement (5) it is permitted to proceed with the failed locomotive unbraked provided a continuous brake is available on its train in rear. If this is not possible the failed locomotive must be removed as a loose coupled vehicle separately.

Where for example the vacuum pipe only is broken due to collision etc., do not connect vacuum hoses between the assisting locomotive(s) and failed locomotive. The following now applies:

(i) In movement (4) and (6) proceed.

(ii) In movement (5) where the train in rear is air braked proceed.

(iii) In movement (5) where the train in rear is vacuum braked, remove the failed locomotive separately as per movement (1).

IMPORTANT FOR FAILED 201 CLASS

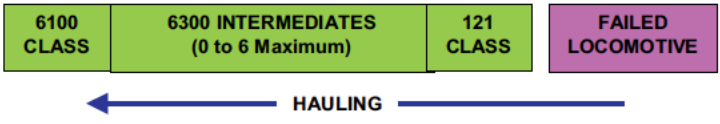
> **If the failed 201 class brakes can only be released by blowing down and isolating main res air, the parking brakes will have to be manually released.**

A. ASSISTING MOTIVE POWER UNIT COUPLING TO FAILED LOCOMOTIVE

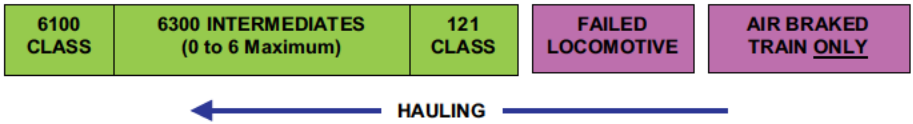
A3. ASSISTANCE FROM PUSH/PULL TRAIN - 6100 CLASS WITH 121 CLASS MOTIVE POWER, PART 1.

Permitted movements

(7)



(8)



Preparation of failed locomotive

1. Secure the locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2.
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full service and leave the locomotive brake handle applied.
8. **For failed 121 class** - Turn the push/pull valve to push/pull.

   For failed 201 class - Turn the normal/remote valve in no.1 cab to remote.

Coupling and preparation of assisting 121 class

1. Ease up to failed locomotive.
2. In the cab, from which the assisting manoeuvre will be made, apply the train brake handle to emergency.
3. Attach and screw up shackle.

   For failed 121 or 201 class - Couple brake (red) and main res (yellow) hoses between the locomotives and open the air cocks for these hoses.

   For failed 071 class - Couple brake (red) and main res (yellow) hoses between the locomotives and open the air cocks for these hoses. Couple vacuum hoses. Open one of the independent equalising (green) hose cocks on the failed 071 class.

Assisting conducted from the 6100 class (hauling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi.

IMPORTANT

> **If the brake pipe fails to build and main res falls continuously, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed locomotive. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**

> **If the brake cylinders on the failed locomotive do not release when the brake pipe builds to 68 - 72 psi, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed locomotive. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle. Observe that the brake cylinders are releasing.**

> **The brakes on the failed locomotive will react to activation of the train brake handle on the 6100 class, similar to an air braked coach or wagon. The 6100 class locomotive brake does not control the brakes on the failed locomotive.**

Brake continuity test

The brake continuity test must be carried out between the driving cab of the 6100 class and the furthest cab of the failed locomotive if light engine, or the rearmost vehicle of the train attached to the failed locomotive.

Before proceeding, ensure that brake cylinders are releasing on the failed locomotive, all scotches are removed and all handbrakes are released.

Parking brake cylinders remain applied on failed 201 class - request the assisting driver to apply the train brake to emergency. Cut in the MU2 in one cab of the failed 201 class and press parking brake off button. Observe that the park brake applied lamp goes out. Cut out the MU2. Assisting driver should now release the train brake. Ensure that brake cylinders are releasing.

Resultant brake control available

ON DRIVING CAB OF ASSISTING PUSH/PULL TRAIN -

Full braking control of all vehicles.

ON OTHER CAB OF ASSISTING PUSH/PULL TRAIN -

Brakes applied on all vehicles by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train.

ON PASSENGER SALOONS OF PUSH/PULL TRAIN -

The passenger communication valves will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

ON FAILED LOCOMOTIVE -

Brakes applied on all vehicles by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train.

ON AIR BRAKED PASSENGER TRAIN ATTACHED TO FAILED LOCOMOTIVE -

The passenger communication valves and guard's brake valves will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

DIVIDE OF VEHICLES -

Divide of brake pipe hoses will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

Conditions governing the assisting movement

PREPARATION

(i) Assisting driver must drive from the cab of the 6100 class.

HAULING MOVEMENT

(i) Passengers must be detrained from the push/pull train prior to carrying out the movement.

(ii) **Normal direction** - speed must not exceed the maximum permitted for any vehicle on the train or portion of line, whichever is the more restrictive.

(iii) **Wrong direction** – speed must not exceed 32km/h (20 mph).

(iv) Driver of the failed locomotive should remain on the failed locomotive.

(v) Movement is permitted only to the next interlocking or station where the failed locomotive and its train, if attached, can be disposed of.

Unable to release brakes on the failed locomotive due to damage

Where for example air brake pipes are broken due to collision etc. the following now applies:

(i) In movement (7) the failed locomotive can only be moved as a loose coupled vehicle.

(ii) In movement (8) it is permitted to proceed with the failed locomotive unbraked provided a continuous brake is available on its train in rear. If this is not possible the failed locomotive must be removed as a loose coupled vehicle separately.

Where for example the vacuum pipe only is broken due to collision etc., do not connect vacuum hoses between the assisting 121 class and failed locomotive. The following now applies:

(i) In movement (7) and (8) proceed.

IMPORTANT FOR FAILED 201 CLASS

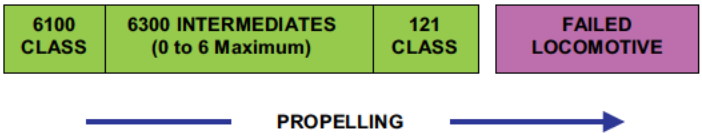
> **If the failed 201 class brakes can only be released by blowing down and isolating main res air, the parking brakes will have to be manually released.**

A. ASSISTING MOTIVE POWER UNIT COUPLING TO FAILED LOCOMOTIVE

A3. ASSISTANCE FROM PUSH/PULL TRAIN - 6100 CLASS WITH 121 CLASS MOTIVE POWER, PART 2.

Permitted movements

(9)



Preparation of failed locomotive

1. Secure the locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2.
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full service and leave the locomotive brake handle applied.
8. **For failed 201 class** - Turn the normal/remote valve in no.1 cab to remote.

Coupling and preparation of assisting 121 class

1. Ease up to failed locomotive.
2. In the cab, from which the assisting manoeuvre will be made, apply the train brake handle to emergency.
3. Attach and screw up shackle.

   For failed 121 or 071 class - Couple brake (red), main res (yellow) and independent equalising (green) hoses between the locomotives and open the air cocks for these hoses.

   For failed 201 class - Couple brake (red) and main res (yellow) hoses between the locomotives and open the air cocks for these hoses.

Assistance conducted from the 121 class (propelling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 – 72 psi and vacuum gauge building to 18ins minimum.

IMPORTANT

- **If the brake pipe fails to build and main res falls continuously, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed locomotive. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**
- **If the brake cylinders on the failed locomotive do not release when the brake pipe builds to 68 - 72 psi, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed locomotive. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle. Observe that the brake cylinders are releasing.**
- **The brakes on a failed 201 class react to activation of the train brake handle on the assisting 121 class, similar to an air braked coach or wagon. The assisting 121 class brake handle does not control the brakes on the failed 201 class.**

Brake continuity test

The brake continuity test must be carried out between the driving cab of the assisting 121 class and the furthest cab of the failed locomotive.

Before proceeding, ensure that brake cylinders are releasing on the failed locomotive, all scotches are removed and all handbrakes are released.

Parking brake cylinders remain applied on failed 201 class – request the assisting driver to apply the train brake to emergency. Cut in the MU2 in one cab of the failed 201 class and press parking brake off button. Observe that the park brake applied lamp goes out. Cut out the MU2. Assisting driver should now release the train brake. Ensure that brake cylinders are releasing.

Resultant brake control available

ON DRIVING CAB OF ASSISTING PUSH/PULL TRAIN -

Full braking control of all vehicles.

ON OTHER CAB OF ASSISTING PUSH/PULL TRAIN -

Brakes applied on all vehicles by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train.

ON PASSENGER SALOONS OF PUSH/PULL TRAIN -

The passenger communication valves will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

ON FAILED LOCOMOTIVE -

Brakes applied on all vehicles by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train.

DIVIDE OF VEHICLES -

Divide of brake pipe hoses will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

Divide of vacuum hoses will cut power and light PC lamp on assisting push/pull train. Brakes will not apply automatically on the assisting push/pull train or failed locomotive.

Conditions governing the assisting movement

PREPARATION

(i) Assisting driver must drive from the cab of the assisting 121 class.

PROPELLING MOVEMENT

(i) Brakesman must travel in the leading cab of the failed locomotive.

(ii) Speed of movement must not exceed 32km/h (20 mph) when the brakesman is a driver.

Speed of movement must not exceed 16km/h (10 mph) when the brakesman is other than a driver.

(iii) Movement is permitted only to the next interlocking or station where the failed locomotive can be disposed of.

Unable to release brakes on the failed locomotive due to damage

Where for example air brake pipes are broken due to collision etc. the following now applies:

(i) In the movement the failed locomotive can only be moved as a loose coupled vehicle.

Where for example the vacuum pipe only is broken due to collision etc., do not connect vacuum hoses between the assisting 121 class and failed locomotive and proceed.

IMPORTANT FOR FAILED 201 CLASS

> **If the failed 201 class brakes can only be released by blowing down and isolating main res air, the parking brakes will have to be manually released.**

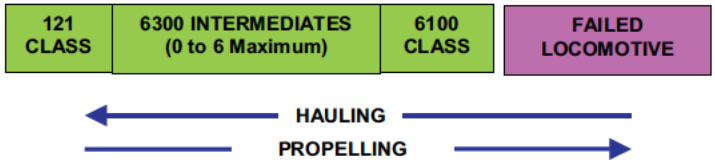
NOTES

A. ASSISTING MOTIVE POWER UNIT COUPLING TO FAILED LOCOMOTIVE

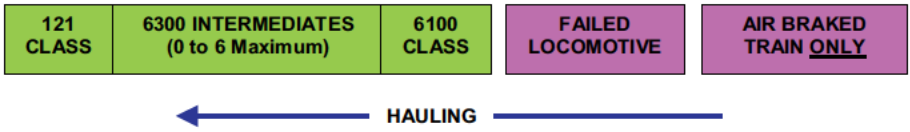
A3. ASSISTANCE FROM PUSH/PULL TRAIN - 6100 CLASS WITH 121 CLASS MOTIVE POWER, PART 3.

Permitted movements

(10)



(11)



Preparation of failed locomotive

1. Secure the locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2.
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full service and leave the locomotive brake handle applied.
8. **For failed 121 class** - Turn the push/pull valve to push/pull.

   For failed 201 class - Turn the normal/remote valve in no.1 cab to remote.

Coupling and preparation of assisting 6100 class

1. Ease up to failed locomotive.
2. In the cab, from which the assisting manoeuvre will be made (i.e. the assisting 121 or 6100 class), apply the train brake handle to emergency.
3. Attach and screw up shackle.

   For failed 121 or 201 class - Couple brake (red) and main res (yellow) hoses between the 6100 class and the failed locomotive and open the air cocks for these hoses.

   For failed 071 class - Couple brake (red) and main res (yellow) hoses between the 6100 class and the failed locomotive and open the air cocks for these hoses. Open one of the independent equalising (green) hose cocks on the failed 071 class.

Assistance conducted from the 121 class (hauling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi and vacuum gauge building to 18ins minimum.

Assistance conducted from the 6100 class (propelling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi.

IMPORTANT

> **If the brake pipe fails to build and main res falls continuously, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed locomotive. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**

> **If the brake cylinders on the failed locomotive do not release when the brake pipe builds to 68 - 72 psi, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed locomotive. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle. Observe that the brake cylinders are releasing.**

> **The brakes on the failed locomotive will react to activation of the train brake handle on the push/pull train, similar to an air braked coach or wagon. The assisting 6100/121 class locomotive brake handle does not control the brakes on the failed locomotive.**

Brake continuity test

The brake continuity test must be carried out between the driving cab of the push/pull train and the furthest cab of the failed locomotive if light engine, or the rearmost vehicle of the train attached to the failed locomotive.

Before proceeding, ensure that brake cylinders are releasing on the failed locomotive, all scotches are removed and all handbrakes are released.

Parking brake cylinders remain applied on failed 201 class – request the assisting driver to apply the train brake to emergency. Cut in the MU2 in one cab of the failed 201 class and press parking brake off button. Observe that the park brake applied lamp goes out. Cut out the MU2. Assisting driver should now release the train brake. Ensure that brake cylinders are releasing.

Resultant brake control available

ON DRIVING CAB OF ASSISTING PUSH/PULL TRAIN -

Full braking control of all vehicles.

ON OTHER CAB OF ASSISTING PUSH/PULL TRAIN -

Brakes applied on all vehicles by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train.

ON PASSENGER SALOONS OF PUSH/PULL TRAIN -

The passenger communication valves will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

ON FAILED LOCOMOTIVE -

Brakes applied on all vehicles by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train.

ON AIR BRAKED PASSENGER TRAIN ATTACHED TO FAILED LOCOMOTIVE -

The passenger communication valves and guard's brake valves will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

DIVIDE OF VEHICLES -

Divide of brake pipe hoses will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

Conditions governing the assisting movement

PREPARATION

(i) Assisting driver must drive from the leading cab of the push/pull train.

HAULING MOVEMENT

(i) Passengers must be detrained from the push/pull train prior to carrying out the movement.

(ii) **Normal direction** - speed must not exceed the maximum permitted for any vehicle on the train or portion of line, whichever is the more restrictive.

(iii) **Wrong direction** – speed must not exceed 32km/h (20 mph).

(iv) Driver of the failed locomotive should remain on the failed locomotive.

(v) Movement is permitted only to the next interlocking or station where the failed locomotive and its train, if attached, can be disposed of.

PROPELLING MOVEMENT

(i) Brakesman must travel in the leading cab of the failed locomotive.

(ii) Speed of movement must not exceed 32km/h (20 mph) when the brakesman is a driver.

Speed of movement must not exceed 16km/h (10 mph) when the brakesman is other than a driver.

(iii) Movement is permitted only to the next interlocking or station where the failed locomotive can be disposed of.

Unable to release brakes on the failed locomotive due to damage

Where for example air brake pipes are broken due to collision etc. the following now applies:

(i) In movement (10) the failed locomotive can only be moved as a loose coupled vehicle.

(ii) In movement (11) it is permitted to proceed with the failed locomotive unbraked provided a continuous brake is available on its train in rear. If this is not possible the failed locomotive must be removed as a loose coupled vehicle separately.

IMPORTANT FOR FAILED 201 CLASS

> **If the failed 201 class brakes can only be released by blowing down and isolating main res air, the parking brakes will have to be manually released.**

A. ASSISTING MOTIVE POWER UNIT COUPLING TO FAILED LOCOMOTIVE

A3. ASSISTANCE FROM PUSH/PULL TRAIN - 6100 CLASS WITH 121 CLASS MOTIVE POWER, PART 4.

Permitted movements

(12)

Preparation of failed locomotive

1. Secure the locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2.
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full service and leave the locomotive brake handle applied.
8. **For failed 201 class** - Turn the normal/remote valve in no.1 cab to remote.

Coupling and preparation of assisting 121 class

1. Ease up to failed locomotive.
2. In the 121 cab, from which the assisting manoeuvre will be made, apply the train brake handle to emergency.
3. Attach and screw up shackle.

   For failed 121 or 071 class - Couple brake (red), main res (yellow) and independent equalising (green) hoses between the locomotives and open the air cocks for these hoses. Couple vacuum hoses.

   For failed 201 class - Couple brake (red) and main res (yellow) hoses between the locomotives and open the air cocks for these hoses. Couple vacuum hoses.

Assistance conducted from the 121 class (hauling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi and vacuum gauge building to 18ins minimum.

IMPORTANT

> **If the brake pipe fails to build and main res falls continuously, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed locomotive. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**

> **If the brake cylinders on the failed locomotive do not release when the brake pipe builds to 68 - 72 psi, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed locomotive. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle. Observe that the brake cylinders are releasing.**

> **The brakes on a failed 201 class will react to activation of the train brake handle on the assisting 121 class, similar to an air braked coach or wagon. The assisting 121 class locomotive brake handle does not control the brakes on the failed locomotive.**

Brake continuity test

The brake continuity test must be carried out between the driving cab of the assisting 121 class and

(i) the rearmost vehicle of a vacuum braked train attached to the failed locomotive

(ii) the rearmost vehicle of each of the air and vacuum portions of a mixed braked train attached to the failed locomotive.

Before proceeding, ensure that brake cylinders are releasing on the failed locomotive, all scotches are removed and all handbrakes are released.

Parking brake cylinders remain applied on failed 201 class – request the assisting driver to apply the train brake to emergency. Cut in the MU2 in one cab of the failed 201 class and press parking brake off button. Observe that the park brake applied lamp goes out. Cut out the MU2. Assisting driver should now release the train brake. Ensure that brake cylinders are releasing.

Resultant brake control available

ON DRIVING CAB OF ASSISTING PUSH/PULL TRAIN -

Full braking control of all vehicles.

ON OTHER CAB OF ASSISTING PUSH/PULL TRAIN -

Brakes applied on all vehicles by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train.

ON PASSENGER SALOONS OF PUSH/PULL TRAIN -

The passenger communication valves will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

ON FAILED LOCOMOTIVE -

Brakes applied on all vehicles by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train.

ON VACUUM BRAKED PASSENGER TRAIN ATTACHED TO FAILED LOCOMOTIVE -

The passenger communication valves and guard's brake valves will apply the brakes on the vacuum braked vehicles only. The guard's brake valve, only, will cut power and light the PC lamp on the assisting push/pull train provided vacuum is dropped to 0 ins. Brakes will not apply automatically on the assisting push/pull train or failed locomotive.

DIVIDE OF VEHICLES -

Divide of brake pipe hoses will apply brakes on all vehicles. Power will be cut on assisting push/pull train.

Divide of vacuum hoses will apply the brakes on the vacuum braked vehicles only. Power will be cut and PC lamp will light on assisting push/pull train. Brakes will not apply automatically on the assisting push/pull train or failed locomotive.

Conditions governing the assisting movement

PREPARATION

(i) Assisting driver must drive from the cab of the assisting 121 class.

HAULING MOVEMENT

(i) Passengers must be detrained from the push/pull train prior to carrying out the movement.

(ii) Brakesman must travel in the cab of the 6100 class.

(iii) Speed of movement must not exceed 32km/h (20 mph) when the brakesman is a driver.

Speed of movement must not exceed 16km/h (10 mph) when the brakesman is other than a driver.

(iv) Movement is permitted only to the next interlocking or station where the failed locomotive and its train can be disposed of.

Unable to release brakes on the failed locomotive due to damage

Where for example air brake pipes are broken due to collision etc. the following now applies:

(i) In this movement it is permitted to proceed with the failed locomotive unbraked provided a continuous brake is available on its train in rear. If this is not possible the failed locomotive must be removed as a loose coupled vehicle separately.

Where for example the vacuum pipe only is broken due to collision etc., do not connect vacuum hoses between the assisting 121 class and failed locomotive. The following now applies:

(i) In this movement the failed locomotive must be removed separately from its train (see permitted movement (7) in this subsection A3).

IMPORTANT FOR FAILED 201 CLASS

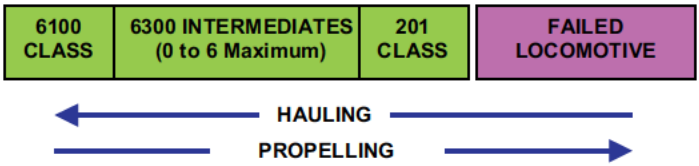
> **If the failed 201 class brakes can only be released by blowing down and isolating main res air, the parking brakes will have to be manually released.**

A ASSISTING MOTIVE POWER UNIT COUPLING TO FAILED LOCOMOTIVE

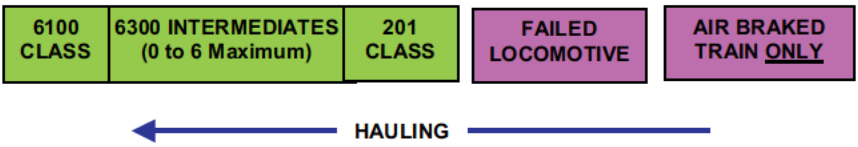
A4. ASSISTANCE FROM PUSH/PULL TRAIN - 6100 CLASS WITH 201 CLASS MOTIVE POWER, PART 1.

Permitted movements

(13)



(14)



Preparation of failed locomotive

1. Secure the locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2.
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full service and leave the locomotive brake handle applied.
8. **For failed 121 class** - Turn the push/pull valve to push/pull.

   For failed 201 class - Turn the normal/remote valve in no.1 cab to remote.

Coupling and preparation of assisting 201 class

1. Ease up to failed locomotive.
2. In the cab, from which the assisting manoeuvre will be made (i.e. the 201 or 6100 class), apply the train brake handle to emergency.
3. Attach and screw up shackle.

   For failed 121 or 201 class - Couple brake (red) and main res (yellow) hoses between the locomotives and open the air cocks for these hoses.

   For failed 071 class - Couple brake (red) and main res (yellow) hoses between the locomotives and open the air cocks for these hoses. Open one of the independent equalising (green) hose cocks on the failed 071 class.

Assistance conducted from the 201 class (propelling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi and vacuum gauge building to 18ins minimum.

Assistance conducted from the 6100 class (hauling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi.

IMPORTANT

> **If the brake pipe fails to build and main res falls continuously, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed locomotive. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**

> **If the brake cylinders on the failed locomotive do not release when the brake pipe builds to 68 - 72 psi, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed locomotive. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle. Observe that the brake cylinders are releasing.**

> **The brakes on the failed locomotive will react to activation of the train brake handle on the push/pull train, similar to an air braked coach or wagon. The assisting 6100/201 class locomotive brake handle does not control the brakes on the failed locomotive.**

Brake continuity test

The brake continuity test must be carried out between the driving cab of the push/pull train and the furthest cab of the failed locomotive if light engine, or the rearmost vehicle of the train attached to the failed locomotive.

Before proceeding, ensure that brake cylinders are releasing on the failed locomotive, all scotches are removed and all handbrakes are released.

Parking brake cylinders remain applied on failed 201 class – request the assisting driver to apply the train brake to emergency. Cut in the MU2 in one cab of the failed 201 class and press parking brake off button. Observe that the park brake applied lamp goes out. Cut out the MU2. Assisting driver should now release the train brake. Ensure that brake cylinders are releasing.

Resultant brake control available

ON DRIVING CAB OF ASSISTING PUSH/PULL TRAIN -

Full braking control of all vehicles.

ON OTHER CABS OF ASSISTING PUSH/PULL TRAIN -

Brakes applied on all vehicles by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train.

ON PASSENGER SALOONS OF PUSH/PULL TRAIN -

The passenger communication valves will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

ON FAILED LOCOMOTIVE -

Brakes applied on all vehicles by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train.

ON AIR BRAKED PASSENGER TRAIN ATTACHED TO FAILED LOCOMOTIVE -

The passenger communication valves and guard's brake valves will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

DIVIDE OF VEHICLES -

Divide of brake pipe hoses will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

Conditions governing the assisting movement

PREPARATION

(i) Assisting driver must drive from the leading cab of the push/pull train.

HAULING MOVEMENT

(i) Passengers must be detrained from the push/pull train prior to carrying out the movement.

(ii) **Normal direction** - speed must not exceed the maximum permitted for any vehicle on the train or portion of line, whichever is the more restrictive.

(iii) **Wrong direction** – speed must not exceed 32km/h (20 mph).

(iv) Driver of the failed locomotive should remain on the failed locomotive.

(v) Movement is permitted only to the next interlocking or station where the failed locomotive and its train, if attached, can be disposed of.

PROPELLING MOVEMENT

(i) Brakesman must travel in the leading cab of the failed locomotive.

(ii) Speed of movement must not exceed 32km/h (20 mph) when the brakesman is a driver.

Speed of movement must not exceed 16km/h (10 mph) when the brakesman is other than a driver.

(iii) Movement is permitted only to the next interlocking or station where the failed locomotive and its train can be disposed of.

Unable to release brakes on the failed locomotive due to damage

Where for example air brake pipes are broken due to collision etc. the following now applies:

(i) In movement (13) the failed locomotive can only be moved as a loose coupled vehicle.

(ii) In movement (14) it is permitted to proceed with the failed locomotive unbraked provided a continuous brake is available on its train in rear. If this is not possible the failed locomotive must be removed as a loose coupled vehicle separately.

Where for example the vacuum pipe only is broken due to collision etc., do not connect vacuum hoses between the 201 class and failed locomotive. The following now applies:

(i) In movement (13) and (14) proceed.

IMPORTANT FOR FAILED 201 CLASS

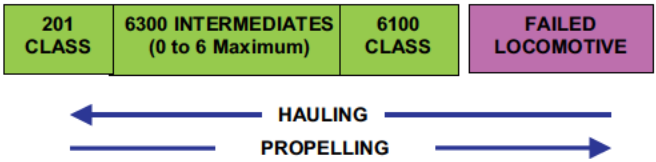
> **If the failed 201 class brakes can only be released by blowing down and isolating main res air, the parking brakes will have to be manually released.**

A. ASSISTING MOTIVE POWER UNIT COUPLING TO FAILED LOCOMOTIVE

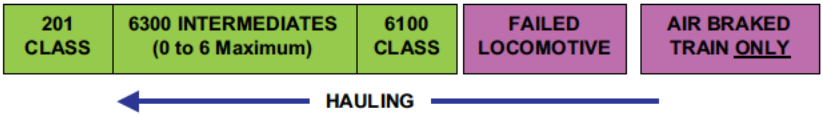
A4. ASSISTANCE FROM PUSH/PULL TRAIN - 6100 CLASS WITH 201 CLASS MOTIVE POWER, PART 2.

Permitted movements

(15)



(16)



Preparation of failed locomotive

1. Secure the locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2.
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full service and leave the locomotive brake handle applied.
8. **For failed 121 class** - Turn the push/pull valve to push/pull.

   For failed 201 class - Turn the normal/remote valve in no.1 cab to remote.

Coupling and preparation of assisting 6100 class

1. Ease up to failed locomotive.
2. In the cab, from which the assisting manoeuvre will be made (i.e. the 201 or 6100 class), apply the train brake handle to emergency.
3. Attach and screw up shackle.

   For failed 121 or 201 class - Couple brake (red) and main res (yellow) hoses between the 6100 class and the failed locomotive and open the air cocks for these hoses.

   For failed 071 class - Couple brake (red) and main res (yellow) hoses between the 6100 class and the failed locomotive and open the air cocks for these hoses. Open one of the independent equalising (green) hose cocks on the failed 071 class.

Assistance conducted from the 201 class (hauling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi and vacuum gauge building to 18ins minimum.

Assistance conducted from the 6100 class (propelling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi.

IMPORTANT

> **If the brake pipe fails to build and main res falls continuously, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed locomotive. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**

> **If the brake cylinders on the failed locomotive do not release when the brake pipe builds to 68 - 72 psi, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed locomotive. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle. Observe that the brake cylinders are releasing.**

> **The brakes on the failed locomotive will react to activation of the train brake handle on the push/pull train, similar to an air braked coach or wagon. The assisting 6100/201 class locomotive brake handle does not control the brakes on the failed locomotive.**

Brake continuity test

The brake continuity test must be carried out between the driving cab of the push/pull train and the furthest cab of the failed locomotive if light engine, or the rearmost vehicle of the train attached to the failed locomotive.

Before proceeding, ensure that brake cylinders are releasing on the failed locomotive, all scotches are removed and all handbrakes are released.

Parking brake cylinders remain applied on failed 201 class – request the assisting driver to apply the train brake to emergency. Cut in the MU2 in one cab of the failed 201 class and press parking brake off button. Observe that the park brake applied lamp goes out. Cut out the MU2. Assisting driver should now release the train brake. Ensure that brake cylinders are releasing.

Resultant brake control available

ON DRIVING CAB OF ASSISTING PUSH/PULL TRAIN -

Full braking control of all vehicles.

ON OTHER CABS OF ASSISTING PUSH/PULL TRAIN -

Brakes applied on all vehicles by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train.

ON PASSENGER SALOONS OF PUSH/PULL TRAIN -

The passenger communication valves will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

ON FAILED LOCOMOTIVE -

Brakes applied on all vehicles by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train.

ON AIR BRAKED PASSENGER TRAIN ATTACHED TO FAILED LOCOMOTIVE -

The passenger communication valves and guard's brake valves will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

DIVIDE OF VEHICLES -

Divide of brake pipe hoses will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

Conditions governing the assisting movement

PREPARATION

(i) Assisting driver must drive from the leading cab of the push/pull train.

HAULING MOVEMENT

(i) Passengers must be detrained from the push/pull train prior to carrying out the movement.

(ii) **Normal direction** - speed must not exceed the maximum permitted for any vehicle on the train or portion of line, whichever is the more restrictive.

(iii) **Wrong direction** – speed must not exceed 32km/h (20 mph).

(iv) Driver of the failed locomotive should remain on the failed locomotive

(v) Movement is permitted only to the next interlocking or station where the failed locomotive and its train, if attached, can be disposed of.

PROPELLING MOVEMENT

(i) Brakesman must travel in the leading cab of the failed locomotive.

(ii) Speed of movement must not exceed 32km/h (20 mph) when the brakesman is a driver.

Speed of movement must not exceed 16km/h (10 mph) when the brakesman is other than a driver.

(iii) Movement is permitted only to the next interlocking or station where the failed locomotive can be disposed of.

Unable to release brakes on the failed locomotive due to damage

Where for example air brake pipes are broken due to collision etc. the following now applies:

(i) In movement (15) the failed locomotive can only be moved as a loose coupled vehicle.

(ii) In movement (16) it is permitted to proceed with the failed locomotive unbraked provided a continuous brake is available on its train in rear. If this is not possible the failed locomotive must be removed as a loose coupled vehicle separately.

IMPORTANT FOR FAILED 201 CLASS

> **If the failed 201 class brakes can only be released by blowing down and isolating main res air, the parking brakes will have to be manually released.**

A. ASSISTING MOTIVE POWER UNIT COUPLING TO FAILED LOCOMOTIVE

A4. ASSISTANCE FROM PUSH/PULL TRAIN - 6100 CLASS WITH 201 CLASS MOTIVE POWER, PART 3.

Permitted movements

(17)

Preparation of failed locomotive

1. Secure the locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2.
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full service and leave the locomotive brake handle applied.
8. **For failed 121 class** - Turn the push/pull valve to push/pull.

   For failed 201 class - Turn the normal/remote valve in no.1 cab to remote.

Coupling and preparation of assisting 201 class

1. Ease up to failed locomotive.
2. In the 201 cab, from which the assisting manoeuvre will be made, apply the train brake handle to emergency.
3. Attach and screw up shackle.

   For failed 121 or 201 class - Couple brake (red) and main res (yellow) hoses between the locomotives and open the air cocks for these hoses. Couple vacuum hoses.

   For failed 071 class - Couple brake (red) and main res (yellow) hoses between the locomotives and open the air cocks for these hoses. Couple vacuum hoses. Open one of the independent equalising (green) hose cocks on the failed 071 class.

Assistance conducted from the 201 class (hauling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi and vacuum gauge building to 18ins minimum.

IMPORTANT

> **If the brake pipe fails to build and main res falls continuously, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed locomotive. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**

> **If the brake cylinders on the failed locomotive do not release when the brake pipe builds to 68 - 72 psi, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed locomotive. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle. Observe that the brake cylinders are releasing.**

> **The brakes on the failed locomotive will react to activation of the train brake handle on the push/pull train, similar to an air braked coach or wagon. The assisting 6100/201 class locomotive brake handle does not control the brakes on the failed locomotive.**

Brake continuity test

The brake continuity test must be carried out between the driving cab of the assisting 201 class and

(i) the rearmost vehicle of a vacuum braked train attached to the failed locomotive

(ii) the rearmost vehicle of each of the air and vacuum portions of a mixed braked train attached to the failed locomotive.

Before proceeding, ensure that brake cylinders are releasing on the failed locomotive, all scotches are removed and all handbrakes are released.

Parking brake cylinders remain applied on failed 201 class – request the assisting driver to apply the train brake to emergency. Cut in the MU2 in one cab of the failed 201 class and press parking brake off button. Observe that the park brake applied lamp goes out. Cut out the MU2. Assisting driver should now release the train brake. Ensure that brake cylinders are releasing.

Resultant brake control available

ON DRIVING CAB OF ASSISTING PUSH/PULL TRAIN -

Full braking control of all vehicles.

ON OTHER CABS OF ASSISTING PUSH/PULL TRAIN -

Brakes applied on all vehicles by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train.

ON PASSENGER SALOONS OF PUSH/PULL TRAIN -

The passenger communication valves will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

ON FAILED LOCOMOTIVE -

Brakes applied on all vehicles by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train.

ON VACUUM BRAKED PASSENGER TRAIN ATTACHED TO FAILED LOCOMOTIVE -

The passenger communication valves and guard's brake valves will apply the brakes on the vacuum braked vehicles only. The guard's brake valve, only, will cut power and light the PC lamp on the assisting push/pull train provided vacuum is dropped to 0 ins. Brakes will not apply automatically on the assisting push/pull train or failed locomotive.

DIVIDE OF VEHICLES -

Divide of brake pipe hoses will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

Divide of vacuum hoses will apply the brakes on the vacuum braked vehicles only. Power will be cut and PC lamp will light on assisting push/pull train. Brakes will not apply automatically on the assisting push/pull train or failed locomotive.

Conditions governing the assisting movement

PREPARATION

(i) Assisting driver must drive from the cab of the assisting 201 class.

HAULING MOVEMENT

(i) Passengers must be detrained from the push/pull train prior to carrying out the movement.

(ii) Brakesman must travel in the 6100 class.

(iii) Speed of movement must not exceed 32km/h (20 mph) when the brakesman is a driver.

Speed of movement must not exceed 16km/h (10 mph) when the brakesman is other than a driver.

(iv) Movement is permitted only to the next interlocking or station where the failed locomotive and its train can be disposed of.

Unable to release brakes on the failed locomotive due to damage

Where for example air brake pipes are broken due to collision etc. the following now applies:

(i) In this movement it is permitted to proceed with the failed locomotive unbraked provided a continuous brake is available on its train in rear. If this is not possible the failed locomotive must be removed as a loose coupled vehicle separately.

Where for example the vacuum pipe only is broken due to collision etc., do not connect vacuum hoses between the 201 class and failed locomotive. The following now applies:

(i) In this movement the failed locomotive must be removed separately from its train (see permitted movement (13) in this subsection A4).

IMPORTANT FOR FAILED 201 CLASS

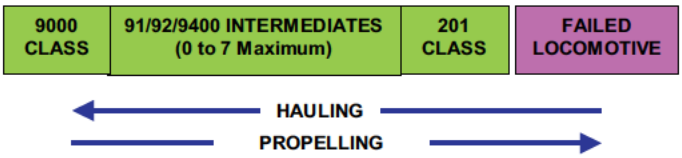
> **If the failed 201 class brakes can only be released by blowing down and isolating main res air, the parking brakes will have to be manually released.**

A. ASSISTING MOTIVE POWER UNIT COUPLING TO FAILED LOCOMOTIVE

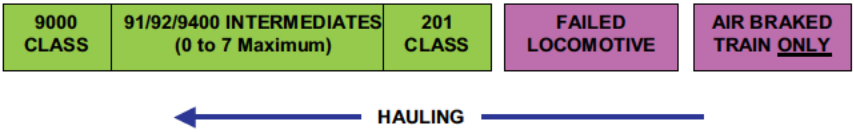
A5. ASSISTANCE FROM PUSH/PULL TRAIN - 9000 CLASS WITH 201 CLASS MOTIVE POWER, PART 1.

Permitted consists

(18)



(19)



Preparation of failed locomotive

1. Secure the locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2.
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full service and leave the locomotive brake handle applied.
8. **For failed 121 class** - Turn the push/pull valve to push/pull.

   For failed 201 class - Turn the normal/remote valve in no.1 cab to remote.

Coupling and preparation of assisting 201 class

1. Ease up to failed locomotive.
2. In the cab, from which the assisting manoeuvre will be made (i.e. the 201 or 9000 class), apply the train brake handle to emergency.
3. Attach and screw up shackle.

   For failed 121 or 201 class - Couple brake (red) and main res (yellow) hoses between the locomotives and open the air cocks for these hoses.

   For failed 071 class - Couple brake (red) and main res (yellow) hoses between the locomotives and open the air cocks for these hoses. Open one of the independent equalising (green) hose cocks on the failed 071 class.

Assistance conducted from the 201 class (propelling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi and vacuum gauge building to 18ins minimum.

Assistance conducted from the 9000 class (hauling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi.

IMPORTANT

> **If the brake pipe fails to build and main res falls continuously, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed locomotive. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**

> **If the brake cylinders on the failed locomotive do not release when the brake pipe builds to 68 - 72 psi, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed locomotive. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle. Observe that the brake cylinders are releasing.**

> **The brakes on the failed locomotive will react to activation of the train brake handle on the push/pull train, similar to an air braked coach or wagon. The 9000/201 class locomotive brake handle does not control the brakes on the failed locomotive.**

Brake continuity test

The brake continuity test must be carried out between the driving cab of the push/pull train and the furthest cab of the failed locomotive if light engine, or the rearmost vehicle of the train attached to the failed locomotive.

Before proceeding, ensure that brake cylinders are releasing on the failed locomotive, all scotches are removed and all handbrakes are released.

Parking brake cylinders remain applied on failed 201 class – request the assisting driver to apply the train brake to emergency. Cut in the MU2 in one cab of the failed 201 class and press parking brake off button. Observe that the park brake applied lamp goes out. Cut out the MU2. Assisting driver should now release the train brake. Ensure that brake cylinders are releasing.

Resultant brake control available

ON DRIVING CAB OF ASSISTING PUSH/PULL TRAIN -

Full braking control of all vehicles.

ON OTHER CABS OF ASSISTING PUSH/PULL TRAIN -

Brakes applied on all vehicles by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train.

ON PASSENGER SALOONS OF PUSH/PULL TRAIN -

The emergency passenger door release pushbuttons will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

ON FAILED LOCOMOTIVE -

Brakes applied on all vehicles by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train.

ON AIR BRAKED PASSENGER TRAIN ATTACHED TO FAILED LOCOMOTIVE -

The passenger communication valves and guard's brake valves will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

DIVIDE OF VEHICLES

Divide of brake pipe hoses will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

Conditions governing the assisting movement

PREPARATION

(i) Assisting driver must drive from the leading cab of the push/pull train.

HAULING MOVEMENT

(i) Passengers must be detrained from the push/pull train prior to carrying out the movement.

(ii) **Normal direction** - speed must not exceed the maximum permitted for any vehicle on the train or portion of line, whichever is the more restrictive.

(iii) **Wrong direction** – speed must not exceed 32km/h (20 mph).

(iv) Driver of the failed locomotive should remain on the failed locomotive.

(v) Movement is permitted only to the next interlocking or station where the failed locomotive and its train, if attached, can be disposed of.

PROPELLING MOVEMENT

(i) Brakesman must travel in the leading cab of the failed locomotive.

(ii) Speed of movement must not exceed 32km/h (20 mph) when the brakesman is a driver.

Speed of movement must not exceed 16km/h (10 mph) when the brakesman is other than a driver.

(iii) Movement is permitted only to the next interlocking or station where the failed locomotive can be disposed of.

Unable to release brakes on the failed locomotive due to damage

Where for example air brake pipes are broken due to collision etc. the following now applies:

(i) In movement (18) the failed locomotive can only be moved as a loose coupled vehicle.

(ii) In movement (19) it is permitted to proceed with the failed locomotive unbraked provided a continuous brake is available on its train in rear. If this is not possible the failed locomotive must be removed as a loose coupled vehicle separately.

Where for example the vacuum pipe only is broken due to collision etc., do not connect vacuum hoses between the assisting 201 class and failed locomotive. The following now applies:

(i) In movement (18) and (19) proceed.

IMPORTANT FOR FAILED 201 CLASS

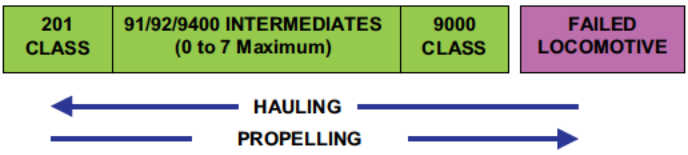
> **If the failed 201 class brakes can only be released by blowing down and isolating main res air, the parking brakes will have to be manually released.**

A. ASSISTING MOTIVE POWER UNIT COUPLING TO FAILED LOCOMOTIVE

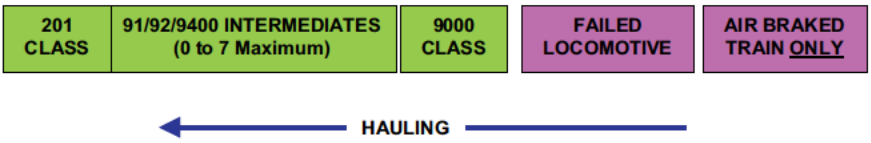
A5. ASSISTANCE FROM PUSH/PULL TRAIN - 9000 CLASS WITH 201 CLASS MOTIVE POWER, PART 2.

Permitted consists

(20)



(21)



Preparation of failed locomotive

1. Secure the locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2.
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full service and leave the locomotive brake handle applied.
8. **For failed 121 class** - Turn the push/pull valve to push/pull.

   For failed 201 class - Turn the normal/remote valve in no.1 cab to remote.

Coupling and preparation of assisting 9000 class

1. Ease up to failed locomotive.
2. In the cab, from which the assisting manoeuvre will be made (i.e. the 201 or 9000 class), apply the train brake handle to emergency.
3. Attach and screw up shackle.

   For failed 121 or 201 class - Couple brake (red) and main res (yellow) hoses between the 9000 class and the failed locomotive and open the air cocks for these hoses.

   For failed 071 class - Couple brake (red) and main res (yellow) hoses between the 9000 class and the failed locomotive(s) and open the air cocks for these hoses. Open one of the independent equalising (green) hose cocks on the failed 071 class.

Assistance conducted from the 201 class (hauling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi and vacuum gauge building to 18ins minimum.

Assistance conducted from the 9000 class (propelling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi.

IMPORTANT

> **If the brake pipe fails to build and main res falls continuously, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed locomotive. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**

> **If the brake cylinders on the failed locomotive do not release when the brake pipe builds to 68 - 72 psi, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed locomotive. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle. Observe that the brake cylinders are releasing.**

> **The brakes on the failed locomotive will react to activation of the train brake handle on the push/pull train, similar to an air braked coach or wagon. The 9000/201 class locomotive brake handle does not control the brakes on the failed locomotive.**

Brake continuity test

The brake continuity test must be carried out between the driving cab of the push/pull train and the furthest cab of the failed locomotive if light engine, or the rearmost vehicle of the train attached to the failed locomotive.

Before proceeding, ensure that brake cylinders are releasing on the failed locomotive, all scotches are removed and all handbrakes are released.

Parking brake cylinders remain applied on failed 201 class – request the assisting driver to apply the train brake to emergency. Cut in the MU2 in one cab of the failed 201 class and press parking brake off button. Observe that the park brake applied lamp goes out. Cut out the MU2. Assisting driver should now release the train brake. Ensure that brake cylinders are releasing.

Resultant brake control available

ON DRIVING CAB OF ASSISTING PUSH/PULL TRAIN -

Full braking control of all vehicles.

ON OTHER CABS OF ASSISTING PUSH/PULL TRAIN -

Brakes applied on all vehicles by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train.

ON PASSENGER SALOONS OF PUSH/PULL TRAIN -

The emergency passenger door release pushbuttons will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

ON FAILED LOCOMOTIVE -

Brakes applied on all vehicles by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train.

ON AIR BRAKED PASSENGER TRAIN ATTACHED TO FAILED LOCOMOTIVE -

The passenger communication valves and guard's brake valves will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

DIVIDE OF VEHICLES -

Divide of brake pipe hoses will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

Conditions governing the assisting movement

PREPARATION

(i) Assisting driver must drive from the leading cab of the push/pull train.

HAULING MOVEMENT

(i) Passengers must be detrained from the push/pull train prior to carrying out the movement.

(ii) **Normal direction** - speed must not exceed the maximum permitted for any vehicle on the train or portion of line, whichever is the more restrictive.

(iii) **Wrong direction** – speed must not exceed 32km/h (20 mph).

(iv) Driver of the failed locomotive should remain on the failed locomotive.

(v) Movement is permitted only to the next interlocking or station where the failed locomotive and its train, if attached, can be disposed of.

PROPELLING MOVEMENT

(i) Brakesman must travel in the leading cab of the failed locomotive.

(ii) Speed of movement must not exceed 32km/h (20 mph) when the brakesman is a driver.

Speed of movement must not exceed 16km/h (10 mph) when the brakesman is other than a driver.

(iii) Movement is permitted only to the next interlocking or station where the failed locomotive can be disposed of.

Unable to release brakes on the failed locomotive due to damage

Where for example air brake pipes are broken due to collision etc. the following now applies :

(i) In movement (20) the failed locomotive can only be moved as a loose coupled vehicle.

(ii) In movement (21) it is permitted to proceed with the failed locomotive unbraked provided a continuous brake is available on its train in rear. If this is not possible the failed locomotive must be removed as a loose coupled vehicle separately.

IMPORTANT FOR FAILED 201 CLASS

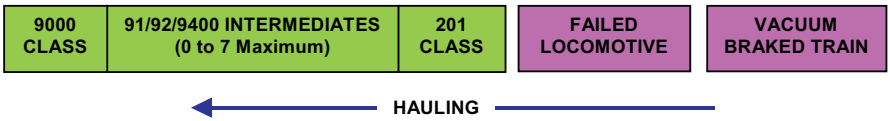
> **If the failed 201 class brakes can only be released by blowing down and isolating main res air, the parking brakes will have to be manually released.**

A. ASSISTING MOTIVE POWER UNIT COUPLING TO FAILED LOCOMOTIVE

A5. ASSISTANCE FROM PUSH/PULL TRAIN - 9000 CLASS WITH 201 CLASS MOTIVE POWER, PART 3.

Permitted movements

(22)



Preparation of failed locomotive

1. Secure the locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2.
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full service and leave the locomotive brake handle applied.
8. **For failed 121 class** - Turn the push/pull valve to push/pull.

   For failed 201 class - Turn the normal/remote valve in no.1 cab to remote.

Coupling and preparation of assisting 201 class

1. Ease up to failed locomotive.
2. In the 201 cab, from which the assisting manoeuvre will be made, apply the train brake handle to emergency.
3. Attach and screw up shackle.

   For failed 121 or 201 class - Couple brake (red) and main res (yellow) hoses between the locomotives and open the air cocks for these hoses. Couple vacuum hoses.

   For failed 071 class - Couple brake (red) and main res (yellow) hoses between the locomotives and open the air cocks for these hoses. Couple vacuum hoses. Open one of the independent equalising (green) hose cocks on the failed 071 class.

Assistance conducted from the 201 class (hauling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi and vacuum gauge building to 18ins minimum.

IMPORTANT

> **If the brake pipe fails to build and main res falls continuously, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed locomotive. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**

> **If the brake cylinders on the failed locomotive do not release when the brake pipe builds to 68 - 72 psi, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed locomotive. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle. Observe that the brake cylinders are releasing.**

> **The brakes on the failed locomotive will react to activation of the train brake handle on the push/pull train, similar to an air braked coach or wagon. The 201 class locomotive brake handle does not control the brakes on the failed locomotive.**

Brake continuity test

The brake continuity test must be carried out between the driving cab of the assisting 201 class and

(i) the rearmost vehicle of a vacuum braked train attached to the failed locomotive

(ii) the rearmost vehicle of each of the air and vacuum portions of a mixed braked train attached to the failed locomotive.

Before proceeding, ensure that brake cylinders are releasing on the failed locomotive, all scotches are removed and all handbrakes are released.

Parking brake cylinders remain applied on failed 201 class – request the assisting driver to apply the train brake to emergency. Cut in the MU2 in one cab of the failed 201 class and press parking brake off button. Observe that the park brake applied lamp goes out. Cut out the MU2. Assisting driver should now release the train brake. Ensure that brake cylinders are releasing.

Resultant brake control available

ON DRIVING CAB OF ASSISTING PUSH/PULL TRAIN -

Full braking control of all vehicles.

ON OTHER CABS OF ASSISTING PUSH/PULL TRAIN -

Brakes applied on all vehicles by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train.

ON PASSENGER SALOONS OF PUSH/PULL TRAIN -

The emergency passenger door release pushbuttons will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

ON FAILED LOCOMOTIVE -

Brakes applied on all vehicles by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train.

ON VACUUM BRAKED PASSENGER TRAIN ATTACHED TO FAILED LOCOMOTIVE -

The passenger communication valves and guard's brake valves will apply the brakes on the vacuum braked vehicles only. The guard's brake valve, only, will cut power and light the PC lamp on the assisting push/pull train provided vacuum is dropped to 0 ins. Brakes will not apply automatically on the assisting push/pull train or failed locomotive.

DIVIDE OF VEHICLES -

Divide of brake pipe hoses will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

Divide of vacuum hoses will apply the brakes on the vacuum braked vehicles only. Power will be cut and PC lamp will light on assisting push/pull train. Brakes will not apply automatically on the assisting push/pull train or failed locomotive.

Conditions governing the assisting movement

PREPARATION

(i) Assisting driver must drive from the cab of the assisting 201 class.

HAULING MOVEMENT

(i) Passengers must be detrained from the push/pull train prior to carrying out the movement.

(ii) Brakesman must travel in the cab of the 9000 class.

(iii) Speed of movement must not exceed 32km/h (20 mph) when the brakesman is a driver.

Speed of movement must not exceed 16km/h (10 mph) when the brakesman is other than a driver.

(iv) Movement is permitted only to the next interlocking or station where the failed locomotive and its train can be disposed of.

Unable to release brakes on the failed locomotive due to damage

Where for example air brake pipes are broken due to collision etc. the following now applies :

(i) In this movement it is permitted to proceed with the failed locomotive unbraked provided a continuous brake is available on its train in rear. If this is not possible the failed locomotive must be removed as a loose coupled vehicle separately.

Where for example the vacuum pipe only is broken due to collision etc., do not connect vacuum hoses between the 201 class and failed locomotive. The following now applies:

(i) In this movement the failed locomotive must be removed separately from its train (see permitted movement (18) in this subsection A5).

IMPORTANT FOR FAILED 201 CLASS

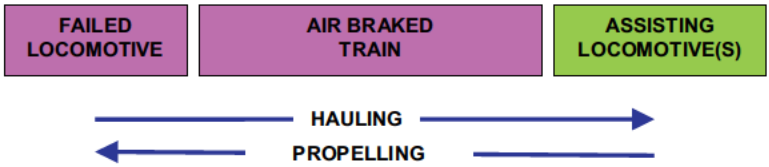
> **If the failed 201 class brakes can only be released by blowing down and isolating main res air, the parking brakes will have to be manually released.**

B. ASSISTING MOTIVE POWER UNIT COUPLING TO AIR BRAKED TRAIN IN REAR OF FAILED LOCOMOTIVE

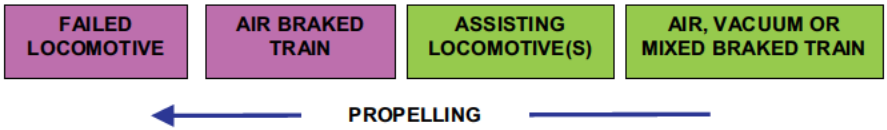
B1. ASSISTANCE FROM BGM (121,141 OR 181), 2 X BGM, 071 OR 201 CLASS.

Permitted movements

(23)



(24)



Preparation of failed locomotive

1. Secure the locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2.
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full service and leave the locomotive brake handle applied.
8. **For failed 121 class** - Turn the push/pull valve to push/pull.

   For failed 201 class - Turn the normal/remote valve in no.1 cab to remote.

Coupling and preparation of assisting locomotive(s)

1. Ease up to air braked train in rear of failed locomotive.
2. In the cab, from which the assisting manoeuvre will be made, apply the train brake handle to emergency.
3. Attach and screw up shackle. Couple brake (red) and main res (yellow) hoses between the locomotive(s) and the train and open the air cocks for these hoses.

   For failed 071 class - Open one of the independent equalising (green) hose cocks on the failed 071 class.
4. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
5. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi and vacuum gauge building to 18ins minimum.

IMPORTANT

- **If the brake pipe fails to build and main res falls continuously, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed locomotive. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**
- **If the brake cylinders on the failed locomotive do not release when the brake pipe builds to 68 - 72 psi, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed locomotive. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle. Observe that the brake cylinders are releasing.**
- **The brakes on the failed locomotive will react to activation of the train brake handle on the push/pull train, similar to an air braked coach or wagon. The assisting locomotive(s) locomotive brake handle does not control the brakes on the failed locomotive.**

Brake continuity test

The brake continuity test must be carried out between the driving cab of the assisting locomotive(s) and the furthest cab of the failed locomotive.

Before proceeding, ensure that brake cylinders are releasing on the failed locomotive, all scotches are removed and all handbrakes are released.

Parking brake cylinders remain applied on failed 201 class – request the assisting driver to apply the train brake to emergency. Cut in the MU2 in one cab of the failed 201 class and press parking brake off button. Observe that the park brake applied lamp goes out. Cut out the MU2. Assisting driver should now release the train brake. Ensure that brake cylinders are releasing.

Resultant brake control available

ON DRIVING CAB OF ASSISTING LOCOMOTIVE(S) -

Full braking control of all vehicles.

ON OTHER CAB(S) OF ASSISTING LOCOMOTIVE(S) -

Brakes applied on all vehicles by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting locomotive(s).

ON FAILED LOCOMOTIVE -

Brakes applied on all vehicles by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting locomotive(s).

ON AIR BRAKED PASSENGER TRAIN ATTACHED TO FAILED LOCOMOTIVE AND AIR BRAKED PASSENGER TRAIN ATTACHED TO ASSISTING LOCOMOTIVE(S) -

The passenger communication valves and guard's brake valves will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting locomotive(s).

ON VACUUM BRAKED PASSENGER TRAIN ATTACHED TO ASSISTING LOCOMOTIVE(S) -

The passenger communication valves and guard's brake valves will apply the brakes on the vacuum braked vehicles only. The guard's brake valve, only, will cut power and light the PC lamp on the assisting locomotive(s), provided vacuum is dropped to 0 ins. Brakes will not apply automatically on the assisting locomotive(s) or failed locomotive and its air braked train.

DIVIDE OF VEHICLES -

Divide of brake pipe hoses will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting locomotive(s).

Divide of vacuum hoses will apply the brakes on the vacuum braked vehicles only. Power will be cut and PC lamp will light on assisting locomotive(s). Brakes will not apply automatically on the assisting locomotive(s) or failed locomotive and its air braked train.

Conditions governing the assisting movement

PREPARATION

(i) Assisting driver must drive from the leading cab.

HAULING MOVEMENT

(i) **Wrong direction** – speed must not exceed 32km/h (20 mph).

(ii) Driver of the failed locomotive should remain on the failed locomotive.

(iii) Movement (23) is permitted only to the next interlocking or station where the failed locomotive can be disposed of or the movement changed to an allowed hauling movement.

PROPELLING MOVEMENT

(i) Brakesman must travel in the leading cab of the failed locomotive.

(ii) Speed of movement must not exceed 32km/h (20 mph) when the brakesman is a driver.

Speed of movement must not exceed 16km/h (10 mph) when the brakesman is other than a driver.

(iii) Movement (23) is permitted only to the next interlocking or station where the failed locomotive can be disposed of or the movement changed to an allowed hauling movement.

(iv) Movement (24) is permitted only to the next interlocking or station where the failed locomotive and its train can be disposed of.

Unable to release brakes on the failed locomotive due to damage

Where for example air brake pipes are broken on the failed locomotive due to collision etc. the following now applies:

(i) In movement (23) & (24) the failed locomotive can only be moved as a loose coupled vehicle. The train and failed locomotive can be removed complete under the following conditions:

(a) In movement (23) by hauling if station or interlocking in rear is within one mile of the failure location and there is no rising gradient greater than 1 in 200.

(b) In movement (23) & (24) by propelling if station or interlocking ahead is within one mile of the failure location and there is no falling gradient greater than 1 in 200.

If these conditions cannot be met

(a) In movement (23) the failed locomotive must be removed as a loose coupled vehicle separately.

(b) Movement (24) is not permitted. Assistance can only be provided by an assisting motive power unit coupling to failed locomotive.

IMPORTANT FOR FAILED 201 CLASS

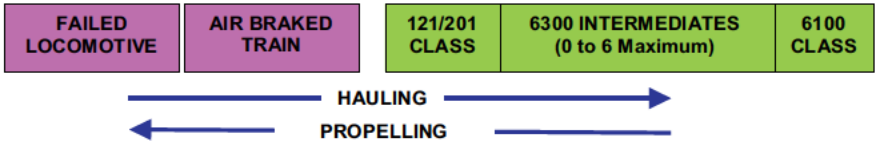
> **If the failed 201 class brakes can only be released by blowing down and isolating main res air, the parking brakes will remain applied. DO NOT release the parking brakes. Haul or propel, if permitted as above, observing a speed limit of 16 km/h (10mph).**

B. ASSISTING MOTIVE POWER UNIT COUPLING TO AIR BRAKED TRAIN IN REAR OF FAILED LOCOMOTIVE

B2. ASSISTANCE FROM PUSH/PULL TRAIN - 6100 CLASS WITH 121 OR 201 CLASS MOTIVE POWER, PART 1.

Permitted movements

(25)



Preparation of failed locomotive

1. Secure the locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2.
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full service and leave the locomotive brake handle applied.
8. **For failed 121 class** - Turn the push/pull valve to push/pull.

   For failed 201 class - Turn the normal/remote valve in no.1 cab to remote.

Coupling and preparation of assisting 121/201 class

1. Ease up to air braked train in rear of failed locomotive.
2. In the cab, from which the assisting manoeuvre will be made (i.e. the assisting 121/201 or 6100 class), apply the train brake handle to emergency.
3. Attach and screw up shackle. Couple brake (red) and main res (yellow) hoses between the 121/201 class and the train and open the air cocks for these hoses.

   For failed 071 class - Open one of the independent equalising (green) hose cocks on the failed 071 class.

Assistance conducted from the 121/201 class (propelling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi and vacuum gauge building to 18ins minimum.

Assistance conducted from the 6100 class (hauling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi.

IMPORTANT

> **If the brake pipe fails to build and main res falls continuously, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed locomotive. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**

> **If the brake cylinders on the failed locomotive do not release when the brake pipe builds to 68 - 72 psi, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed locomotive. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle. Observe that the brake cylinders are releasing.**

> **The brakes on the failed locomotive will react to activation of the train brake handle on the push/pull train, similar to an air braked coach or wagon. The 6100/121/201 class locomotive brake handle does not control the brakes on the failed locomotive.**

Brake continuity test

The brake continuity test must be carried out between the driving cab of the push/pull train and the furthest cab of the failed locomotive.

Before proceeding, ensure that brake cylinders are releasing on the failed locomotive, all scotches are removed and all handbrakes are released.

Parking brake cylinders remain applied on failed 201 class – request the assisting driver to apply the train brake to emergency. Cut in the MU2 in one cab of the failed 201 class and press parking brake off button. Observe that the park brake applied lamp goes out. Cut out the MU2. Assisting driver should now release the train brake. Ensure that brake cylinders are releasing.

Resultant brake control available

ON DRIVING CAB OF ASSISTING PUSH/PULL TRAIN -

Full braking control of all vehicles.

ON OTHER CABS OF ASSISTING PUSH/PULL TRAIN -

Brakes applied on all vehicles by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train.

ON PASSENGER SALOONS OF PUSH/PULL TRAIN -

The passenger communication valves will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

ON FAILED LOCOMOTIVE -

Brakes applied on all vehicles by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train.

ON AIR BRAKED PASSENGER TRAIN ATTACHED TO FAILED LOCOMOTIVE -

The passenger communication valves and guard's brake valves will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

DIVIDE OF VEHICLES -

Divide of brake pipe hoses will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

Conditions governing the assisting movement

PREPARATION

(i) Assisting driver must drive from the leading cab.

HAULING MOVEMENT

(i) Passengers must be detrained from the push/pull train prior to carrying out the movement.

(ii) **Wrong direction** – speed must not exceed 32km/h (20 mph).

(iii) Driver of the failed locomotive should remain on the failed locomotive.

(iv) This movement is permitted only to the next interlocking or station where the failed locomotive and its train can be disposed of.

PROPELLING MOVEMENT

(i) Brakesman must travel in the leading cab of the failed locomotive.

(ii) Speed of movement must not exceed 32km/h (20 mph) when the brakesman is a driver.

Speed of movement must not exceed 16km/h (10 mph) when the brakesman is other than a driver.

(iii) This movement is permitted only to the next interlocking or station where the failed locomotive and its train can be disposed of.

Unable to release brakes on the failed locomotive due to damage

Where for example air brake pipes are broken on the failed locomotive due to collision etc. the following now applies:

(i) In this movement the failed locomotive can only be moved as a loose coupled vehicle. The train and failed locomotive can be removed complete under the following conditions:

a) By hauling if station or interlocking in rear is within one mile of the failure location and there is no rising gradient greater than 1 in 200.

b) By propelling if station or interlocking ahead is within one mile of the failure location and there is no falling gradient greater than 1 in 200.

If these conditions cannot be met

(a) The failed locomotive must be removed as a loose coupled vehicle separately.

IMPORTANT FOR FAILED 201 CLASS

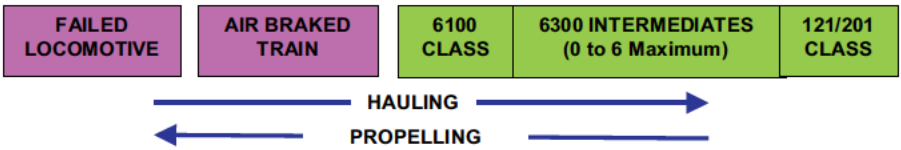
> **If the failed 201 class brakes can only be released by blowing down and isolating main res air, the parking brakes will remain applied. DO NOT release the parking brakes. Haul or propel, if permitted as above, observing a speed limit of 16 km/h (10mph).**

B. ASSISTING MOTIVE POWER UNIT COUPLING TO AIR BRAKED TRAIN IN REAR OF FAILED LOCOMOTIVE

B2. ASSISTANCE FROM PUSH/PULL TRAIN - 6100 CLASS WITH 121 OR 201 CLASS MOTIVE POWER, PART 2.

Permitted movements

(26)



Preparation of failed locomotive

1. Secure the locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2.
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full service and leave the locomotive brake handle applied.
8. **For failed 121 class** - Turn the push/pull valve to push/pull.

   For failed 201 class - Turn the normal/remote valve in no.1 cab to remote.

Coupling and preparation of assisting 6100 class

1. Ease up to air braked train in rear of failed locomotive.
2. In the cab, from which the assisting manoeuvre will be made (i.e. the assisting 121/201 or 6100 class), apply the train brake handle to emergency.
3. Attach and screw up shackle. Couple brake (red) and main res (yellow) hoses between the 6100 class and the train and open the air cocks for these hoses.

   For failed 071 class - Open one of the independent equalising (green) hose cocks on the failed 071 class.

Assistance conducted from the 121/201 class (hauling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi and vacuum gauge building to 18ins minimum.

Assistance conducted from the 6100 class (propelling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi.

IMPORTANT

> **If the brake pipe fails to build and main res falls continuously, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed locomotive. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**

> **If the brake cylinders on the failed locomotive do not release when the brake pipe builds to 68 - 72 psi, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed locomotive. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle. Observe that the brake cylinders are releasing.**

> **The brakes on the failed locomotive will react to activation of the train brake handle on the push/pull train, similar to an air braked coach or wagon. The 6100/121/201 class locomotive brake handle does not control the brakes on the failed locomotive.**

Brake continuity test

The brake continuity test must be carried out between the driving cab of the push/pull train and one cab of the failed locomotive.

Before proceeding, ensure that brake cylinders are releasing on the failed locomotive, all scotches are removed and all handbrakes are released.

Parking brake cylinders remain applied on failed 201 class – request the assisting driver to apply the train brake to emergency. Cut in the MU2 in one cab of the failed 201 class and press parking brake off button. Observe that the park brake applied lamp goes out. Cut out the MU2. Assisting driver should now release the train brake. Ensure that brake cylinders are releasing.

Resultant brake control available

ON DRIVING CAB OF ASSISTING PUSH/PULL TRAIN -

Full braking control of all vehicles.

ON OTHER CABS OF ASSISTING PUSH/PULL TRAIN -

Brakes applied on all vehicles by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train.

ON PASSENGER SALOONS OF PUSH/PULL TRAIN -

The passenger communication valves will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

ON FAILED LOCOMOTIVE -

Brakes applied on all vehicles by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train.

ON AIR BRAKED PASSENGER TRAIN ATTACHED TO FAILED LOCOMOTIVE -

The passenger communication valves and guard's brake valves will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

DIVIDE OF VEHICLES -

Divide of brake pipe hoses will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

Conditions governing the assisting movement

PREPARATION

(i) Assisting driver must drive from the leading cab.

HAULING MOVEMENT

(i) Passengers must be detrained from the push/pull train prior to carrying out the movement.

(ii) **Wrong direction** – speed must not exceed 32km/h (20 mph).

(iii) Driver of the failed locomotive should remain on the failed locomotive.

(iv) This movement is permitted only to the next interlocking or station where the failed locomotive and its train can be disposed of.

PROPELLING MOVEMENT

(i) Brakesman must travel in the leading cab of the failed locomotive.

(ii) Speed of movement must not exceed 32km/h (20 mph) when the brakesman is a driver.

Speed of movement must not exceed 16km/h (10 mph) when the brakesman is other than a driver.

(iii) This movement is permitted only to the next interlocking or station where the failed locomotive and its train can be disposed of.

Unable to release brakes on the failed locomotive due to damage

Where for example air brake pipes are broken on the failed locomotive due to collision etc. the following now applies:

(i) In this movement the failed locomotive can only be moved as a loose coupled vehicle. The train and failed locomotive can be removed complete under the following conditions:

a) By hauling if station or interlocking in rear is within one mile of the failure location and there is no rising gradient greater than 1 in 200.

b) By propelling if station or interlocking ahead is within one mile of the failure location and there is no falling gradient greater than 1 in 200.

If these conditions cannot be met

(a) The failed locomotive must be removed as a loose coupled vehicle separately.

IMPORTANT FOR FAILED 201 CLASS

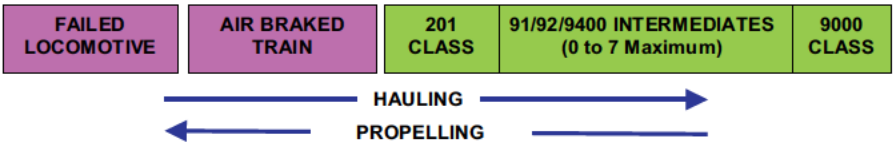
> **If the failed 201 class brakes can only be released by blowing down and isolating main res air, the parking brakes will remain applied. DO NOT release the parking brakes. Haul or propel, if permitted as above, observing a speed limit of 16 km/h (10mph).**

B. ASSISTING MOTIVE POWER UNIT COUPLING TO AIR BRAKED TRAIN IN REAR OF FAILED LOCOMOTIVE

B3. ASSISTANCE FROM PUSH/PULL TRAIN - 9000 CLASS WITH 201 CLASS MOTIVE POWER, PART 1.

Permitted movements

(27)



Preparation of failed locomotive

1. Secure the locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2.
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full service and leave the locomotive brake handle applied.
8. **For failed 121 class** - Turn the push/pull valve to push/pull.

   For failed 201 class - Turn the normal/remote valve in no.1 cab to remote.

Coupling and preparation of assisting 201 class

1. Ease up to air braked train in rear of failed locomotive.
2. In the cab, from which the assisting manoeuvre will be made (i.e. the 201 or 9000 class), apply the train brake handle to emergency.
3. Attach and screw up shackle. Couple brake (red) and main res (yellow) hoses between the assisting 201 class and the train and open the air cocks for these hoses.

Assistance conducted from the 201 class (propelling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi and vacuum gauge building to 18ins minimum.

Assistance conducted from the 9000 class (hauling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi.

IMPORTANT

- **If the brake pipe fails to build and main res falls continuously, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed locomotive. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**
- **If the brake cylinders on the failed locomotive do not release when the brake pipe builds to 68 - 72 psi, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed locomotive. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle. Observe that the brake cylinders are releasing.**
- **The brakes on the failed locomotive will react to activation of the train brake handle on the push/pull train, similar to an air braked coach or wagon. The 9000/201 class locomotive brake handle does not control the brakes on the failed locomotive.**

Brake continuity test

The brake continuity test must be carried out between the driving cab of the push/pull train and one cab of the failed locomotive.

Before proceeding, ensure that brake cylinders are releasing on the failed locomotive, all scotches are removed and all handbrakes are released.

Parking brake cylinders remain applied on failed 201 class – request the assisting driver to apply the train brake to emergency. Cut in the MU2 in one cab of the failed 201 class and press parking brake off button. Observe that the park brake applied lamp goes out. Cut out the MU2. Assisting driver should now release the train brake. Ensure that brake cylinders are releasing.

Resultant brake control available

ON DRIVING CAB OF ASSISTING PUSH/PULL TRAIN -

Full braking control of all vehicles.

ON OTHER CABS OF ASSISTING PUSH/PULL TRAIN -

Brakes applied on all vehicles by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train.

ON PASSENGER SALOONS OF PUSH/PULL TRAIN -

The emergency passenger door release pushbutton will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

ON FAILED LOCOMOTIVE -

Brakes applied on all vehicles by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train.

ON AIR BRAKED PASSENGER TRAIN ATTACHED TO FAILED LOCOMOTIVE -

The passenger communication valves and guard's brake valves will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

DIVIDE OF VEHICLES -

Divide of brake pipe hoses will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

Conditions governing the assisting movement

PREPARATION

(i) Assisting driver must drive from the leading cab.

HAULING MOVEMENT

(i) Passengers must be detrained from the push/pull train prior to carrying out the movement.

(ii) **Wrong direction** – speed must not exceed 32km/h (20 mph).

(iii) Driver of the failed locomotive should remain on the failed locomotive.

(iv) This movement is permitted only to the next interlocking or station where the failed locomotive and its train can be disposed of.

PROPELLING MOVEMENT

(i) Brakesman must travel in the leading cab of the failed locomotive.

(ii) Speed of movement must not exceed 32km/h (20 mph) when the brakesman is a driver.

Speed of movement must not exceed 16km/h (10 mph) when the brakesman is other than a driver.

(iii) This movement is permitted only to the next interlocking or station where the failed locomotive and its train can be disposed of.

Unable to release brakes on the failed locomotive due to damage

Where for example air brake pipes are broken on the failed locomotive due to collision etc. the following now applies:

(i) In this movement the failed locomotive can only be moved as a loose coupled vehicle. The train and failed locomotive can be removed complete under the following conditions :

a) By hauling if station or interlocking in rear is within one mile of the failure location and there is no rising gradient greater than 1 in 200.

b) By propelling if station or interlocking ahead is within one mile of the failure location and there is no falling gradient greater than 1 in 200.

If these conditions cannot be met

(a) The failed locomotive must be removed as a loose coupled vehicle separately.

IMPORTANT FOR FAILED 201 CLASS

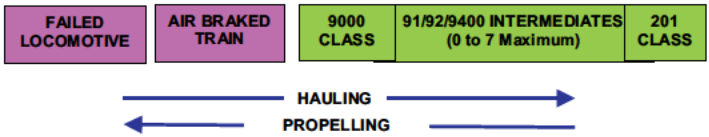
> **If the failed 201 class brakes can only be released by blowing down and isolating main res air, the parking brakes will remain applied. DO NOT release the parking brakes. Haul or propel, if permitted as above, observing a speed limit of 16 km/h (10mph).**

B. ASSISTING MOTIVE POWER UNIT COUPLING TO AIR BRAKED TRAIN IN REAR OF FAILED LOCOMOTIVE

B3. ASSISTANCE FROM PUSH/PULL TRAIN - 9000 CLASS WITH 201 CLASS MOTIVE POWER, PART 2.

Permitted movements

(28)



Preparation of failed locomotive

1. Secure the locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full service and leave the locomotive brake handle applied.
8. **For failed 121 class** - Turn the push/pull valve to push/pull.

   For failed 201 class - Turn the normal/remote valve in no.1 cab to remote.

Coupling and preparation of assisting 9000 class

1. Ease up to air braked train in rear of failed locomotive.
2. In the cab, from which the assisting manoeuvre will be made (i.e. the 201 or 9000 class), apply the train brake handle to emergency.
3. Attach and screw up shackle. Couple brake (red) and main res (yellow) hoses between the 9000 class and the train and open the air cocks for these hoses.

   For failed 071 class - Open one of the independent equalising (green) hose cocks on the failed 071 class.

Assistance conducted from the 201 class (hauling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi and vacuum gauge building to 18ins minimum.

Assistance conducted from the 9000 class (propelling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi.

IMPORTANT

> **If the brake pipe fails to build and main res falls continuously, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed locomotive. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**

> **If the brake cylinders on the failed locomotive do not release when the brake pipe builds to 68 - 72 psi, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed locomotive. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle. Observe that the brake cylinders are releasing.**

> **The brakes on the failed locomotive will react to activation of the train brake handle on the push/pull train, similar to an air braked coach or wagon. The 9000/201 class locomotive brake handle does not control the brakes on the failed locomotive.**

Brake continuity test

The brake continuity test must be carried out between the driving cab of the push/pull train and the furthest cab of the failed locomotive.

Before proceeding, ensure that brake cylinders are releasing on the 121 class, all scotches are removed and all handbrakes are released.

Parking brake cylinders remain applied on failed 201 class – request the assisting driver to apply the train brake to emergency. Cut in the MU2 in one cab of the failed 201 class and press parking brake off button. Observe that the park brake applied lamp goes out. Cut out the MU2. Assisting driver should now release the train brake. Ensure that brake cylinders are releasing.

Resultant brake control available

ON DRIVING CAB OF ASSISTING PUSH/PULL TRAIN -

Full braking control of all vehicles.

ON OTHER CABS OF ASSISTING PUSH/PULL TRAIN -

Brakes applied on all vehicles by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train.

ON PASSENGER SALOONS OF PUSH/PULL TRAIN -

The emergency passenger door release pushbutton will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

ON FAILED LOCOMOTIVE -

Brakes applied on all vehicles by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train.

ON AIR BRAKED PASSENGER TRAIN ATTACHED TO FAILED LOCOMOTIVE -

The passenger communication valves and guard's brake valves will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

DIVIDE OF VEHICLES -

Divide of brake pipe hoses will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

Conditions governing the assisting movement

PREPARATION

(i) Assisting driver must drive from the leading cab.

HAULING MOVEMENT

(i) Passengers must be detrained from the push/pull train prior to carrying out the movement.

(ii) **Wrong direction** – speed must not exceed 32km/h (20 mph).

(iii) Driver of the failed locomotive should remain on the failed locomotive.

(iv) This movement is permitted only to the next interlocking or station where the failed locomotive and its train can be disposed of.

PROPELLING MOVEMENT

(i) Brakesman must travel in the leading cab of the failed locomotive.

(ii) Speed of movement must not exceed 32km/h (20 mph) when the brakesman is a driver.

Speed of movement must not exceed 16km/h (10 mph) when the brakesman is other than a driver.

(iii) This movement is permitted only to the next interlocking or station where the failed locomotive and its train can be disposed of.

Unable to release brakes on the failed locomotive due to damage

Where for example air brake pipes are broken on the failed locomotive due to collision etc. the following now applies:

(i) In this movement the failed locomotive can only be moved as a loose coupled vehicle. The train and failed locomotive can be removed complete under the following conditions :

a) By hauling if station or interlocking in rear is within one mile of the failure location and there is no rising gradient greater than 1 in 200.

b) By propelling if station or interlocking ahead is within one mile of the failure location and there is no falling gradient greater than 1 in 200.

If these conditions cannot be met

(a) The failed locomotive must be removed as a loose coupled vehicle separately.

IMPORTANT FOR FAILED 201 CLASS

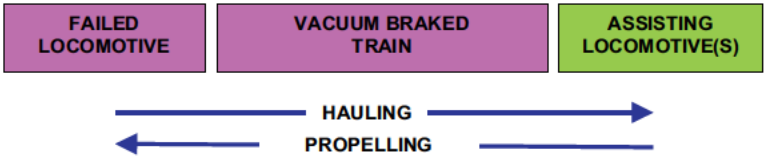
> **If the failed 201 class brakes can only be released by blowing down and isolating main res air, the parking brakes will remain applied. DO NOT release the parking brakes. Haul or propel, if permitted as above, observing a speed limit of 16 km/h (10mph).**

C. ASSISTING MOTIVE POWER UNIT COUPLING TO VACUUM BRAKED TRAIN IN REAR OF FAILED LOCOMOTIVE

C1. ASSISTANCE FROM BGM (121,141 OR 181), 2 X BGM, 071 OR 201 CLASS FAILED LOCOMOTIVE ENGINE IS RUNNING AND NO BRAKE FAULT.

Permitted movements

(29)



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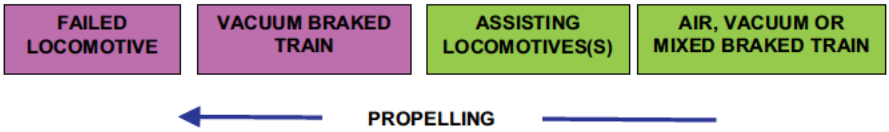


Initial preparation of failed locomotive

1. Secure the locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2.
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full full service and leave the locomotive brake handle applied.

Coupling and preparation of assisting locomotive(s)

1. Ease up to vacuum braked train in rear of failed locomotive.
2. In the cab, from which the assisting manoeuvre will be made, apply the train brake handle to emergency.
3. Attach and screw up shackle. Couple vacuum hoses between the locomotive(s) and the train.

Further preparation of failed locomotive

(In a consist do this on one locomotive only)

1. Switch start/run switch to run.
2. Switch on eng run switch.
3. Cut in MU2.
4. Put forward/reverse handle in the direction of the movement.
5. Reset the deadman and release the train brake handle. Observe brake pipe gauge building to 68 - 72 psi. Vacuum gauge will not build at this stage.
6. Release the locomotive brake handle. Reset the deadman and CAWS as required to prevent brakes applying.

Asistance conducted from the assisting locomotive(s) (hauling/propelling)

1. Keeping the train brake handle in emergency. Allow main res air pressure to build to 100 - 120 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi and vacuum gauge building to 18 ins minimum.

IMPORTANT

> **The fault on the failed locomotive may cause the trainline alarm bell to ring when the start/run switch is switched to run. If this happens, return the start/run switch to isolate to silence the bell. On an 071 or 121 you will then have to isolate the deadman to allow you release the brake on the failed locomotive.**

Brake continuity test

The brake continuity test must be carried out between the driving cab of the assisting locomotive(s) and the furthest cab of the failed locomotive.

Before proceeding, ensure that brake cylinders are releasing on the failed locomotive, all scotches are removed and all handbrakes are released.

Resultant brake control available

ON DRIVING CAB OF ASSISTING LOCOMOTIVE(S) -

Full braking control of assisting locomotive(s), vacuum braked vehicles attached to failed locomotive and air or vacuum braked vehicles attached to assisting locomotive(s). Brakes on failed locomotive will not apply automatically.

ON OTHER CAB(S) OF ASSISTING LOCOMOTIVE(S) -

Brakes applied on vacuum braked vehicles attached to failed locomotive, assisting locomotive(s) and air or vacuum braked vehicles attached to assisting locomotive(s), by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting locomotive(s). Brakes on failed locomotive will not apply automatically.

ON FAILED LOCOMOTIVE -

Brakes applied on failed locomotive and all vacuum braked vehicles only by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting locomotive(s). Brakes will not apply automatically on assisting locomotive(s) or air braked vehicles.

ON AIR BRAKED PASSENGER TRAIN ATTACHED TO ASSISTING LOCOMOTIVE(S) -

The passenger communication valves and guard's brake valves will apply brakes on assisting locomotive(s), air braked vehicles and vacuum braked vehicles. Power will be cut and PC lamp will light on assisting locomotive(s). Brakes will not apply automatically on failed locomotive.

ON VACUUM BRAKED PASSENGER TRAIN ATTACHED TO ASSISTING LOCOMOTIVE(S) OR FAILED LOCOMOTIVE -

The passenger communication valves and guard's brake valves will apply the brakes on the vacuum braked vehicles only. The guard's brake valve, only, will cut power and light the PC lamp on the assisting locomotive(s), provided vacuum is dropped to 0 ins. Brakes will not apply automatically on the assisting locomotive(s), failed locomotive or air braked vehicles.

DIVIDE OF VEHICLES -

Divide of brake pipe hoses will apply brakes on assisting locomotive(s), air braked vehicles and vacuum braked vehicles. Power will be cut and PC lamp will light on assisting locomotive(s). Brakes will not apply automatically on the failed locomotive.

Divide of vacuum hoses will apply the brakes on the vacuum braked vehicles only. Power will be cut and PC lamp will light on assisting locomotive(s). Brakes will not apply automatically on the assisting locomotive(s), failed locomotive, or air braked vehicles.

Conditions governing the assisting movement

PREPARATION

(i) Assisting driver must drive from the leading cab.

HAULING MOVEMENT

(i) **Wrong direction -** Speed of movement must not exceed 16km/h (10mph).

(ii) Brakesman must travel on the failed locomotive.

(iii) Movement (29) is permitted only to the next interlocking or station where the failed locomotive can be disposed of or the movement changed to an allowed hauling movement.

PROPELLING MOVEMENT

(i) Speed of movement must not exceed 16km/h (10mph).

(ii) Brakesman must travel in the leading cab of the failed locomotive.

(iii) Movement (29) is permitted only to the next interlocking or station where the failed locomotive can be disposed of or the movement changed to an allowed hauling movement.

(iv) Movement (30) is permitted only to the next interlocking or station where the failed locomotive and its train can be disposed of.

Unable to release brakes on the failed locomotive due to damage

See next section.

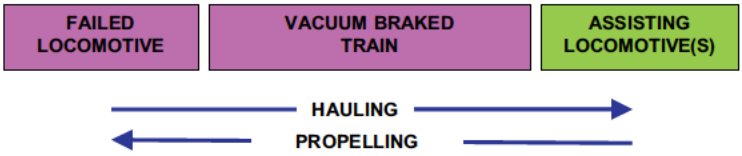
NOTES

C. ASSISTING MOTIVE POWER UNIT COUPLING TO VACUUM BRAKED TRAIN IN REAR OF FAILED LOCOMOTIVE

C2. ASSISTANCE FROM BGM (121,141 OR 181), 2 X BGM, 071 OR 201 CLASS FAILED LOCOMOTIVE ENGINE IS SHUT DOWN OR FAILED LOCOMOTIVE HAS BRAKE FAULT.

Permitted movements

(31)



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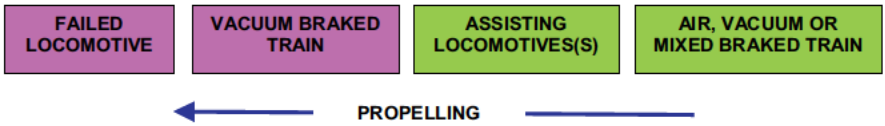


Initial preparation of failed locomotive

1. Secure the locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2.
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full service and leave the locomotive brake handle applied.

Coupling and preparation of assisting locomotive(s)

1. Ease up to vacuum braked train in rear of failed locomotive.
2. In the cab, from which the assisting manoeuvre will be made, apply the train brake handle to emergency.
3. Attach and screw up shackle. Couple vacuum hoses between the locomotive(s) and the train.
4. Keeping the train brake handle in emergency, ensure main res air pressure is at 100 – 130 psi.
5. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi and vacuum gauge building to 18ins minimum.

Further preparation of failed locomotive

1. **For failed 071 & 121 class** - Open the drain cocks and blow down the main res tanks completely on the failed locomotive. Observe that when the main res tanks are blown down completely, the brake cylinders have released.

   For failed 201 class - Open the drain cocks and blow down the main res tanks completely on the failed locomotive. Observe that when the main res tanks are blown down completely, the service brake cylinders have released. The parking brake cylinders will remain applied. **DO NOT** release the parking brakes.

IMPORTANT

> **Having blown down the main res tanks, the service brake on the failed locomotive is now inoperable. The handbrake or parking brake is the only brake available on the locomotive.**

Brake continuity test

The brake continuity test must be carried out between the driving cab of the assisting locomotive(s) and one cab of the failed locomotive.

For failed 071 & 121 class - Before proceeding, ensure that brake cylinders are released on the failed locomotive, all scotches are removed and all handbrakes are released.

For failed 201 class - Before proceeding, ensure that service brake cylinders are released on the failed locomotive and all scotches are removed.

Resultant brake control available

ON DRIVING CAB OF ASSISTING LOCOMOTIVE(S) -

Full braking control of assisting locomotive(s), vacuum braked vehicles attached to failed locomotive and air or vacuum braked vehicles attached to assisting locomotive(s). Brakes on failed locomotive will not apply.

ON OTHER CAB(S) OF ASSISTING LOCOMOTIVE(S) -

Brakes applied on vacuum braked vehicles attached to failed locomotive, assisting locomotive(s) and air or vacuum braked vehicles attached to assisting locomotive(s), by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting locomotive(s). Brakes on failed locomotive will not apply.

ON FAILED LOCOMOTIVE -

Brakes applied on all vacuum braked vehicles only by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting locomotive(s). Brakes will not apply automatically on assisting locomotive(s) or air braked vehicles. Brakes on failed locomotive will not apply.

ON AIR BRAKED PASSENGER TRAIN ATTACHED TO ASSISTING LOCOMOTIVE(S) -

The passenger communication valves and guard's brake valves will apply brakes on assisting locomotive(s), air braked vehicles and vacuum braked vehicles. Power will be cut and PC lamp will light on assisting locomotive(s). Brakes will not apply on failed locomotive.

ON VACUUM BRAKED PASSENGER TRAIN ATTACHED TO ASSISTING LOCOMOTIVE(S) OR FAILED LOCOMOTIVE -

The passenger communication valves and guard's brake valves will apply the brakes on the vacuum braked vehicles only. The guard's brake valve, only, will cut power and light the PC lamp on the assisting locomotive(s), provided vacuum is dropped to 0 ins. Brakes will not apply automatically on the assisting locomotive(s) or air braked vehicles. Brakes will not apply on the failed locomotive.

DIVIDE OF VEHICLES -

Divide of brake pipe hoses will apply brakes on assisting locomotive(s), air braked vehicles and vacuum braked vehicles. Power will be cut and PC lamp will light on assisting locomotive(s). Brakes will not apply on the failed locomotive.

Divide of vacuum hoses will apply the brakes on the vacuum braked vehicles only. Power will be cut and PC lamp will light on assisting locomotive(s). Brakes will not apply automatically on the assisting locomotive(s) or air braked vehicles. Brakes will not apply on the failed locomotive.

Conditions governing the assisting movement

PREPARATION

(i) Assisting driver must drive from the leading cab.

HAULING MOVEMENT

(i) **Wrong direction -** Speed of movement must not exceed 16km/h (10mph).

(ii) Brakesman must travel on the failed locomotive.

(iii) Movement (31) is permitted only if station or interlocking in rear is within one mile of the failure location and there is no rising gradient greater than 1 in 200.

(iv) When the section is cleared the failed locomotive can be disposed of or the movement changed to an allowed hauling movement.

PROPELLING MOVEMENT

(i) Speed of movement must not exceed 16km/h (10mph).

(ii) Brakesman must travel in the leading cab of the failed locomotive.

(iii) Movement (31) and (32) is permitted only if station or interlocking ahead is within one mile of the failure location and there is no falling gradient greater than 1 in 200.

(iv) When the section is cleared, in movement (31), the failed locomotive can be disposed of or the movement changed to an allowed hauling movement.

If these conditions cannot be met

(i) In movement (31) the failed locomotive and train must be removed in two separate movements.

(ii) Movement (32) is not permitted. Assistance can only be provided by an assisting motive power unit coupling to failed locomotive.

Damage to vacuum pipe on the failed locomotive

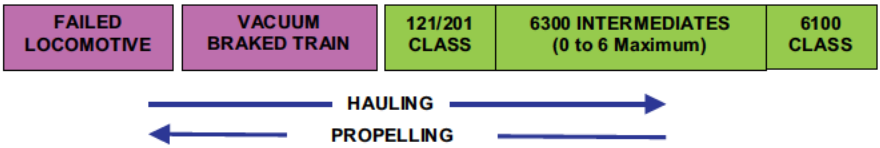
(i) Where for example the vacuum pipe is broken due to collision etc., remove the failed locomotive separately.

C. ASSISTING MOTIVE POWER UNIT COUPLING TO VACUUM BRAKED TRAIN IN REAR OF FAILED LOCOMOTIVE

C3. ASSISTANCE FROM PUSH/PULL TRAIN - 6100 CLASS WITH 121 OR 201 CLASS MOTIVE POWER FAILED LOCOMOTIVE ENGINE IS RUNNING AND NO BRAKE FAULT

Permitted movements

(33)



Initial preparation of failed locomotive

1. Secure the locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2.
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full service and leave the locomotive brake handle applied.

Coupling and preparation of assisting 121/201 class

1. Ease up to vacuum braked train in rear of failed locomotive.
2. In the 121/201 cab, from which the assisting manoeuvre will be made, apply the train brake handle to emergency.
3. Attach and screw up shackle. Couple vacuum hoses between the locomotive and the train.

Further preparation of failed locomotive

(In a consist do this on one locomotive only)

1. Switch start/run switch to run.
2. Switch on eng run switch.
3. Cut in MU2.
4. Put forward/reverse handle in the direction of the movement.
5. Reset the deadman and release the train brake handle. Observe brake pipe gauge building to 68 - 72 psi. Vacuum gauge will not build at this stage.
6. Release the locomotive brake handle. Reset the deadman and CAWS as required to prevent brakes applying.

IMPORTANT

> **The fault on the failed locomotive may cause the trainline alarm bell to ring when the start/run switch is switched to run. If this happens, return the start/run switch to isolate to silence the bell. On an 071 or 121 you will then have to isolate the deadman to allow you release the brake on the failed locomotive.**

Assistance conducted from the 121/201 class (hauling/propelling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi and vacuum gauge building to 18ins minimum.

Brake continuity test

The brake continuity test must be carried out between the driving cab of the 121/201 class and the furthest cab of the failed locomotive.

Before proceeding, ensure that brake cylinders are releasing on the failed locomotive, all scotches are removed and all handbrakes are released.

Resultant brake control available

ON DRIVING CAB OF ASSISTING PUSH/PULL TRAIN -

Full braking control of push/pull train and vacuum braked vehicles attached to failed locomotive. Brakes on failed locomotive will not apply automatically.

ON OTHER CAB(S) OF PUSH/PULL TRAIN -

Brakes applied on assisting push/pull train and vacuum braked vehicles attached to failed locomotive, by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed locomotive will not apply automatically.

ON PASSENGER SALOONS OF PUSH/PULL TRAIN -

The passenger communication valves will apply brakes on assisting push/pull train and vacuum braked vehicles attached to failed locomotive. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed locomotive will not apply automatically.

ON FAILED LOCOMOTIVE -

Brakes applied on failed locomotive and all vacuum braked vehicles only by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train. Brakes will not apply automatically on assisting push/pull train.

ON VACUUM BRAKED PASSENGER TRAIN ATTACHED TO FAILED LOCOMOTIVE -

On passenger vehicles, the passenger communication valves and guard's brake valves will apply the brakes on the vacuum braked vehicles only. The guard's brake valve, only, will cut power and light the PC lamp on the assisting push/pull train, provided vacuum is dropped to 0 ins. Brakes will not apply automatically on the assisting push/pull train or failed locomotive.

DIVIDE OF VEHICLES -

Divide of brake pipe hoses will apply brakes on assisting push/pull train and vacuum braked vehicles. Power will be cut and PC lamp will light on assisting push/pull train. Brakes will not apply automatically on the failed locomotive.

Divide of vacuum hoses will apply the brakes on the vacuum braked vehicles only. Power will be cut and PC lamp will light on assisting push/pull train. Brakes will not apply automatically on the assisting push/pull train or failed locomotive.

Conditions governing the assisting movement

PREPARATION

(i) Assisting driver must drive from the cab of the assisting 121/201 class.

HAULING MOVEMENT

(i) Passengers must be detrained from the push/pull train prior to carrying out the movement.

(ii) **Wrong direction -** Speed of movement must not exceed 16km/h (10mph).

(iii) Brakesman must travel on the failed locomotive.

(iv) Brakesman must travel in the cab of the 6100 class.

(v) This movement is permitted only to the next interlocking or station where the failed locomotive and its train can be disposed of.

PROPELLING MOVEMENT

(i) Speed of movement must not exceed 16km/h (10mph).

(ii) Brakesman must travel in the leading cab of the failed locomotive.

(iii) This movement is permitted only to the next interlocking or station where the failed locomotive and its train can be disposed of.

Unable to release brakes on the failed locomotive due to damage

See next section.

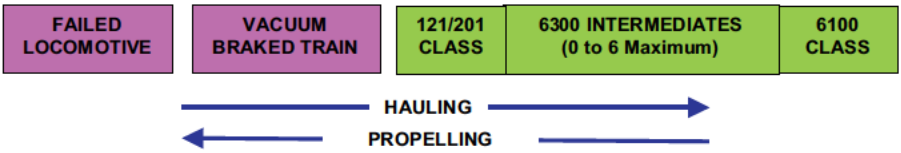
NOTES

C. ASSISTING MOTIVE POWER UNIT COUPLING TO VACUUM BRAKED TRAIN IN REAR OF FAILED LOCOMOTIVE

C4. ASSISTANCE FROM PUSH/PULL TRAIN - 6100 CLASS WITH 121 OR 201 CLASS MOTIVE POWER FAILED LOCOMOTIVE ENGINE IS SHUT DOWN OR FAILED LOCOMOTIVE HAS BRAKE FAULT

Permitted movements

(34)



Preparation of failed locomotive

1. Secure the locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2.
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full service and leave the locomotive brake handle applied.

Coupling and preparation of assisting 121/201 class

1. Ease up to vacuum braked train in rear of failed locomotive.
2. In the 121/201 cab, from which the assisting manoeuvre will be made, apply the train brake handle to emergency.
3. Attach and screw up shackle. Couple vacuum hoses between the locomotive and the train.

Further preparation of failed locomotive

1. **For failed 071 & 121 class** - Open the drain cocks and blow down the main res tanks completely on the failed locomotive. Observe that when the main res tanks are blown down completely, the brake cylinders have released.

   For failed 201 class - Open the drain cocks and blow down the main res tanks completely on the failed locomotive. Observe that when the main res tanks are blown down completely, the service brake cylinders have released. The parking brake cylinders will remain applied. **DO NOT** release the parking brakes.

IMPORTANT

> **Having blown down the main res tanks, the service brake on the failed locomotive is now inoperable. The handbrake or parking brake is the only brake available on the locomotive.**

Assistance conducted from the 121/201 class (hauling & propelling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi and vacuum gauge building to 18ins minimum.

Brake continuity test

The brake continuity test must be carried out between the driving cab of the assisting locomotive(s) and one cab of the failed locomotive.

For failed 071 & 121 class - Before proceeding, ensure that brake cylinders are released on the failed locomotive, all scotches are removed and all handbrakes are released.

For failed 201 class - Before proceeding, ensure that service brake cylinders are released on the failed locomotive and all scotches are removed.

Resultant brake control available

ON DRIVING CAB OF ASSISTING PUSH/PULL TRAIN -

Full braking control of push/pull train and vacuum braked vehicles attached to failed locomotive. Brakes on failed locomotive will not apply.

ON OTHER CAB(S) OF PUSH/PULL TRAIN -

Brakes applied on assisting push/pull train and vacuum braked vehicles attached to failed locomotive, by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed locomotive will not apply.

ON PASSENGER SALOONS OF PUSH/PULL TRAIN -

The passenger communication valves will apply brakes on assisting push/pull train and vacuum braked vehicles attached to failed locomotive. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed locomotive will not apply.

ON FAILED LOCOMOTIVE -

Brakes applied on all vacuum braked vehicles only by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train. Brakes will not apply automatically on assisting push/pull train. Brakes on the failed locomotive will not apply.

ON VACUUM BRAKED PASSENGER TRAIN ATTACHED TO FAILED LOCOMOTIVE -

On passenger vehicles, the passenger communication valves and guard's brake valves will apply the brakes on the vacuum braked vehicles only. The guard's brake valve, only, will cut power and light the PC lamp on the assisting push/pull train, provided vacuum is dropped to 0 ins. Brakes will not apply automatically on the assisting push/pull train. Brakes on the failed locomotive will not apply.

DIVIDE OF VEHICLES -

Divide of brake pipe hoses will apply brakes on assisting push/pull train and vacuum braked vehicles. Power will be cut on assisting push/pull train. Brakes on the failed locomotive will not apply.

Divide of vacuum hoses will apply the brakes on the vacuum braked vehicles only. Power will be cut on assisting push/pull train. Brakes will not apply automatically on the assisting push/pull train. Brakes on the failed locomotive will not apply.

Conditions governing the assisting movement

PREPARATION

(i) Assisting driver must drive from the leading cab.

HAULING MOVEMENT

(i) Passengers must be detrained from the push/pull train prior to carrying out the movement.

(ii) **Wrong direction -** Speed of movement must not exceed 16km/h (10mph).

(iii) Brakesman must travel on the failed locomotive.

(iv) Brakesman must travel in the cab of the 6100 class.

(v) This movement is permitted only if station or interlocking in rear is within one mile of the failure location and there is no rising gradient greater than 1 in 200.

PROPELLING MOVEMENT

(i) Speed of movement must not exceed 16km/h (10mph).

(ii) Brakesman must travel in the leading cab of the failed locomotive.

(iii) This movement is permitted only if station or interlocking ahead is within one mile of the failure location and there is no falling gradient greater than 1 in 200.

If the above conditions cannot be met

(i) This movement is not permitted. Assistance can only be provided by an assisting motive power unit coupling to failed locomotive.

Damage to vacuum pipe on the failed locomotive

Where for example the vacuum pipe is broken due to collision etc., remove the failed locomotive separately.

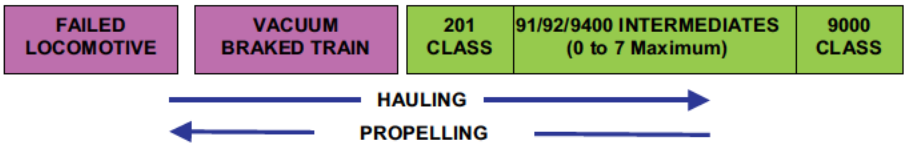
NOTES

C. ASSISTING MOTIVE POWER UNIT COUPLING TO VACUUM BRAKED TRAIN IN REAR OF FAILED LOCOMOTIVE

C5. ASSISTANCE FROM PUSH/PULL TRAIN - 9000 CLASS WITH 201 CLASS MOTIVE POWER FAILED LOCOMOTIVE ENGINE IS RUNNING AND NO BRAKE FAULT

Permitted movements

(35)



Initial preparation of failed locomotive

1. Secure the locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2.
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full service and leave the locomotive brake handle applied.

Coupling and preparation of assisting 201 class

1. Ease up to vacuum braked train in rear of failed locomotive.
2. In the 201 cab, from which the assisting manoeuvre will be made, apply the train brake handle to emergency.
3. Attach and screw up shackle. Couple vacuum hoses between the locomotive and the train.

Further preparation of failed locomotive

(In a consist do this on one locomotive only)

1. Switch start/run switch to run.
2. Switch on eng run switch.
3. Cut in MU2.
4. Put forward/reverse handle in the direction of the movement.
5. Reset the deadman and release the train brake handle. Observe brake pipe gauge building to 68 - 72 psi. Vacuum gauge will not build at this stage.
6. Release the locomotive brake handle. Reset the deadman and CAWS as required to prevent brakes applying.

IMPORTANT

> **The fault on the failed locomotive may cause the trainline alarm bell to ring when the start/run switch is switched to run. If this happens, return the start/run switch to isolate to silence the bell. On an 071 or 121 you will then have to isolate the deadman to allow you release the brake on the failed locomotive.**

Assistance conducted from the 201 class (hauling & propelling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi and vacuum gauge building to 18ins minimum.

Brake continuity test

The brake continuity test must be carried out between the driving cab of the 201 class and the furthest cab of the failed locomotive.

Before proceeding, ensure that brake cylinders are releasing on the failed locomotive, all scotches are removed and all handbrakes are released.

Resultant brake control available

ON DRIVING CAB OF ASSISTING PUSH/PULL TRAIN -

Full braking control of push/pull train and vacuum braked vehicles attached to failed locomotive. Brakes on failed locomotive will not apply automatically.

ON OTHER CAB(S) OF PUSH/PULL TRAIN -

Brakes applied on assisting push/pull train and vacuum braked vehicles attached to failed locomotive, by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed locomotive will not apply automatically.

ON PASSENGER SALOONS OF PUSH/PULL TRAIN -

The emergency passenger door release pushbutton will apply brakes on assisting push/pull train and vacuum braked vehicles attached to failed locomotive. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed locomotive will not apply automatically.

ON FAILED LOCOMOTIVE -

Brakes applied on failed locomotive and all vacuum braked vehicles only by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train. Brakes will not apply automatically on assisting push/pull train.

ON VACUUM BRAKED PASSENGER TRAIN ATTACHED TO FAILED LOCOMOTIVE -

The passenger communication valves and guard's brake valves will apply the brakes on the vacuum braked vehicles only. The guard's brake valve, only, will cut power and light the PC lamp on the assisting push/pull train, provided vacuum is dropped to 0 ins. Brakes will not apply automatically on the assisting push/pull train or failed locomotive.

DIVIDE OF VEHICLES -

Divide of brake pipe hoses will apply brakes on assisting push/pull train and vacuum braked vehicles. Power will be cut and PC lamp will light on assisting push/pull train. Brakes will not apply automatically on the failed locomotive.

Divide of vacuum hoses will apply the brakes on the vacuum braked vehicles only. Power will be cut and PC lamp will light on assisting push/pull train. Brakes will not apply automatically on the assisting push/pull train or failed locomotive.

Conditions governing the assisting movement

PREPARATION

(i) Assisting driver must drive from the cab of the assisting 201 class.

HAULING MOVEMENT

(i) Passengers must be detrained from the push/pull train prior to carrying out the movement.

(ii) **Wrong direction -** Speed of movement must not exceed 16km/h (10mph).

(iii) Brakesman must travel on the failed locomotive.

(iv) Brakesman must travel in the cab of the 9000 class.

(v) This movement is permitted only to the next interlocking or station where the failed locomotive and its train can be disposed of.

PROPELLING MOVEMENT

(i) Speed of movement must not exceed 16km/h (10mph).

(ii) Brakesman must travel in the leading cab of the failed locomotive.

(iii) This movement is permitted only to the next interlocking or station where the failed locomotive and its train can be disposed of.

Unable to release brakes on the failed locomotive due to damage

See next section.

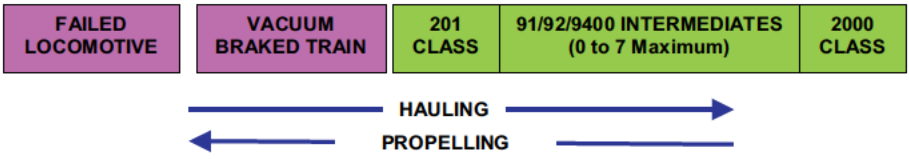
NOTES

C. ASSISTING MOTIVE POWER UNIT COUPLING TO VACUUM BRAKED TRAIN IN REAR OF FAILED LOCOMOTIVE

C6. ASSISTANCE FROM PUSH/PULL TRAIN - 9000 CLASS WITH 201 CLASS MOTIVE POWER FAILED LOCOMOTIVE ENGINE IS SHUT DOWN OR FAILED LOCOMOTIVE HAS BRAKE FAULT

Permitted movements

(36)



Preparation of failed locomotive

1. Secure the locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2.
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full service and leave the locomotive brake handle applied.

Coupling and preparation of assisting 201 class

1. Ease up to vacuum braked train in rear of failed locomotive.
2. In the 201 cab, from which the assisting manoeuvre will be made, apply the train brake handle to emergency.
3. Attach and screw up shackle. Couple vacuum hoses between the locomotive and the train.

Further preparation of failed locomotive

1. **For failed 071 & 121 class** - Open the drain cocks and blow down the main res tanks completely on the failed locomotive. Observe that when the main res tanks are blown down completely, the brake cylinders have released.

   For failed 201 class - Open the drain cocks and blow down the main res tanks completely on the failed locomotive. Observe that when the main res tanks are blown down completely, the service brake cylinders have released. The parking brake cylinders will remain applied. **DO NOT** release the parking brakes.

IMPORTANT

> **Having blown down the main res tanks, the service brake on the failed locomotive is now inoperable. The handbrake or parking brake is the only brake available on the locomotive.**

Assistance conducted from the 201 class (hauling & propelling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi and vacuum gauge building to 18ins minimum.

Brake continuity test

The brake continuity test must be carried out between the driving cab of the assisting push/pull train and one cab of the failed locomotive.

For failed 071 & 121 class - Before proceeding, ensure that brake cylinders are released on the failed locomotive, all scotches are removed and all handbrakes are released.

For failed 201 class - Before proceeding, ensure that service brake cylinders are released on the failed locomotive and all scotches are removed.

Resultant brake control available

ON DRIVING CAB OF ASSISTING PUSH/PULL TRAIN -

Full braking control of push/pull train and vacuum braked vehicles attached to failed locomotive. Brakes on failed locomotive will not apply.

ON OTHER CAB(S) OF PUSH/PULL TRAIN -

Brakes applied on assisting push/pull train and vacuum braked vehicles attached to failed locomotive, by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed locomotive will not apply.

ON PASSENGER SALOONS OF PUSH/PULL TRAIN -

The emergency passenger door release pushbutton will apply brakes on assisting push/pull train and vacuum braked vehicles attached to failed locomotive. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed locomotive will not apply.

ON FAILED LOCOMOTIVE -

Brakes applied on all vacuum braked vehicles only by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train. Brakes will not apply automatically on assisting push/pull train. Brakes on the failed locomotive will not apply.

ON VACUUM BRAKED PASSENGER TRAIN ATTACHED TO FAILED LOCOMOTIVE -

The passenger communication valves and guard's brake valves will apply the brakes on the vacuum braked vehicles only. The guard's brake valve, only, will cut power and light the PC lamp on the assisting push/pull train, provided vacuum is dropped to 0 ins. Brakes will not apply automatically on the assisting push/pull train. Brakes on the failed locomotive will not apply.

DIVIDE OF VEHICLES

Divide of brake pipe hoses will apply brakes on assisting push/pull train and vacuum braked vehicles. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on the failed locomotive will not apply.

Divide of vacuum hoses will apply the brakes on the vacuum braked vehicles only. Power will be cut and PC lamp will light on assisting push/pull train. Brakes will not apply automatically on the assisting push/pull train. Brakes on the failed locomotive will not apply.

Conditions governing the assisting movement

PREPARATION

(i) Assisting driver must drive from the cab of the assisting 201 class.

HAULING MOVEMENT

(i) Passengers must be detrained from the push/pull train prior to carrying out the movement.

(ii) **Wrong direction -** Speed of movement must not exceed 16km/h (10mph).

(iii) Brakesman must travel on the failed locomotive.

(iv) Brakesman must travel in the cab of the 9000 class.

(v) This movement is permitted only if station or interlocking in rear is within one mile of the failure location and there is no rising gradient greater than 1 in 200.

PROPELLING MOVEMENT

(i) Speed of movement must not exceed 16km/h (10mph).

(ii) Brakesman must travel in the leading cab of the failed locomotive.

(iii) This movement is permitted only if station or interlocking ahead is within one mile of the failure location and there is no falling gradient greater than 1 in 200.

If the above conditions cannot be met

(i) This movement is not permitted. Assistance can only be provided by an assisting motive power unit coupling to failed locomotive.

Damage to vacuum pipe on the failed locomotive

Where for example the vacuum pipe is broken due to collision etc., remove the failed locomotive separately.

NOTES

FOR INFORMATION OF COMPANY'S EMPLOYEES ONLY

IARNRÓD ÉIREANN

Iarnród Éireann

DRIVERS' MANUAL

VOLUME 9 - PART 2

Assisting Failed 141/181 Class Locomotives

To operate on and from 31/05/2005

NOTES

ASSISTING FAILED 141/181 CLASS LOCOMOTIVES

Introduction

This section contains all the movements that are permitted to assist a failed 141/181 class locomotive or, 2 x 141/181 class locomotives in consist or, 141/181 class and 121 class locomotives in consist. It is divided into three main parts governed by how the assistance is being given – by attaching to the failed 141 class locomotive, by attaching to an air braked train in rear of the failed locomotive, or by attaching to a vacuum braked train in rear of the failed locomotive. Within these divisions, block diagrams detail the assistance possible by the various types of motive power. There are also step by step preparation instructions for the movements, details on brake continuity tests, a full description of the brake control available and the operating conditions governing the movements. Finally, highlighted panels indicate important considerations and tips in relation to the assistance being undertaken.

It is important to note that these instructions are intended for both the driver of the failed locomotive and the assisting motive power unit. You should familiarise yourself with the contents of this section, so that you can refer quickly when you require assistance or are required to give the assistance.

IMPORTANT

> **Except where stated, the term failed 141 class in these instructions refers to:**

(i) A single 141/181 class locomotive

(ii) 2 x 141/181 class locomotives in consist

(iii) A 141/181 class locomotive and 121 class locomotive in consist.

Where a consist has failed, the instructions for the failed 141 class are to be carried out on both locomotives.

Using The Section

As the driver of the failed 141 class or the assisting motive power unit, find the permitted movement that you wish to undertake from the contents page by asking the following questions:

1. From where is the assistance being given?

   If the answer is:

   (a) By coupling to the failed 141 class - then you are going to be using **A**.

   (b) By coupling to an air braked train in rear of the failed 141 class – then you are going to be using **B**.

   (c) By coupling to a vacuum braked train in rear of the failed 141 class – then you are going to be using **C**.

2. What is giving the assistance?

   The answer to this will give you what **A**, **B** or **C** tab to look up.

The illustrated block diagrams (which are uniquely numbered for reference to the instructions) indicate the directions that are permitted. The instructions following the block diagrams are only valid for the direction of movement indicated by the arrows. Therefore, before following the instructions given, you must find the exact movement you wish to undertake by referring to all the block diagrams in the relevant tab.

Example 1:

A 141 with an air braked train attached has failed. The assistance is being provided by a push/pull train consisting of a 6100 class with 201 class motive power. The 201 class is going to be coupling to the 141 class and the failed train is to be removed by hauling or propelling.

How to find the instruction from the contents -

1. From where is the assistance being given?

   Answer - By coupling to the failed 141 class.

   You will be using **A**.

2. What is giving the assistance?

   Answer - A push/pull train - 6100 class with 201 class motive power.

   You will be using **A4**.

When you open A4 there are several parts. Check all the block diagrams in A4 to find the movement you want to carry out. In this case it is shown in part 1 as movement (14). Hauling is indicated so the movement is permitted. Propelling is not shown for this particular movement so it is not permitted. Therefore you can only haul the failed train. Follow carefully the 3 pages of instruction.

Example 2:

A 141 with a vacuum braked train attached has failed. The assistance is being provided by a push/pull train consisting of a 9000 class with 201 class motive power. The 9000 class is going to be coupling to the 141 class and the failed train is to be removed by hauling or propelling.

How to find the instruction from the contents -

1. From where is the assistance being given?

   Answer - By coupling to the failed 141 class.

   You will be using **A**.

2. What is giving the assistance?

   Answer - A push/pull train - 9000 class with 201 class motive power.

   You will be using **A5**.

   When you open A5 there are several parts. By checking all the block diagrams in A5, you will not find the movement you wish to carry out. Therefore the proposed movement is not permitted. (Remember, the 141 has a vacuum braked train attached and you are coupling the 9000 class to the failed 141 class).

IMPORTANT

> **In an assistance movement where the brakes on a train in rear of the failed 141 class cannot be controlled by the driver of the assisting motive power unit, the instructions as laid down in paragraph 1.8 and 1.9 page B174 of the General Appendix must be carried out.**

Special Note Regarding Mixed Braked Trains

1. Locomotives hauling mixed braked trains are permitted to assist where illustrated in the following sections.
2. Failed locomotives hauling mixed braked trains may be assisted directly where the assisting motive power unit couples to the failed locomotive, as detailed in section A.
3. Where a mixed braked train requires to be assisted from the rear, the rear air or vacuum braked portion requires to be removed first. The remaining vacuum or air braked portion, complete with failed locomotive, may then be assisted according to section B or C as appropriate.

NOTES

GENERAL INSTRUCTIONS

1. Under all circumstances when assistance is being provided, the company's rules and regulations must take priority.

2. A DMU, EMU, Translink DMU and DEMU, mobile on track machine or preserved locomotive cannot be used to assist a failed locomotive or locomotive hauled train.

3. Where a push/pull train is being used to assist and the assistance involves several movements, careful consideration must be given as to how the movement is best performed. The traffic regulator must consider the desirability of using a push/pull train taking into consideration

   (i) the number of movements involved

   (ii) the possibility of detaching and using the push/pull locomotive only

   (iii) the desirability of or requirement for detraining passengers prior to the assistance being given

   (iv) Schedule of Route Availability for Rolling Stock in accordance with the General Appendix.

   The possibility of obtaining some other form of assistance should be considered as an alternative providing it will not cause long delays.

4. Restrictions on the working of diesel locomotives are imposed by the Chief Engineer, Infrastructure. These are to be found in the General Appendix, Section B. Emergency working covers the assistance of a failed locomotive or train to either its destination, or a location where the failed locomotive or train can be disposed of. When this procedure is completed, further movements are restricted under normal working.

5. When assistance is being provided by a single 121 class driving with cab trailing, a second person must accompany the driver of the 121 class to act as lookout on the non driving side.

6. Where a brakesman is specified in these instructions, the driver of the failed train must act in this capacity. The duties of a brakesman include :

   (i) agreeing a means of communication with the driver of the assisting motive power unit, to be used during the movement

   (ii) keeping a sharp lookout

   (iii) using the horn, if available

   (iv) applying an emergency brake should the need arise.

   Where a driver is not available to act as brakesman, a guard may act in this capacity. In this case the driver of the assisting motive power unit must instruct the guard in the above duties. In addition, where deadman and CAWS would normally be required to be operated on the failed motive power unit, these should be isolated by the driver of the assisting motive power unit. The guard should be made aware that this has been done.

7. In these instructions, hauling movements may be specified as

   Normal direction – same direction as the original route set for the failed train prior to its failure.

   Wrong direction – opposite direction to the original route set for the failed train prior to its failure.

   This includes all lines whether single, double, bi-directional etc.

8. When disposing of a failed motive power unit, this must be carried out according to the disposal instructions for that unit as required by the drivers' manual.

SUPPORTING DOCUMENTATION

GENERAL APPENDIX SECTION B

Restrictions on the working of diesel locomotives – requirements of Chief Engineer, Infrastructure

Operation of 121 class locomotives, cab leading/cab trailing

General instructions for working the automatic brake

Special instructions for trains with automatic vacuum brake

Special instructions for freight trains with automatic air brake

Special instructions for passenger trains with automatic air brake

Trains stopped by accident, failure, obstruction or other exceptional cause

Schedule of route availability for rolling stock

CURRENT WORKING TIMETABLE

Maximum Speeds

WEEKLY CIRCULAR -

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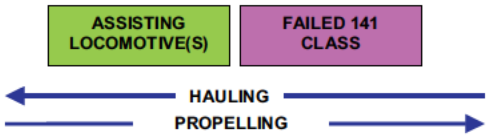
A. ASSISTING MOTIVE POWER UNIT COUPLING TO FAILED 141 CLASS

A1. ASSISTANCE FROM BGM (121,141, OR 181), 2 X BGM, OR 071 CLASS.

Permitted Movements

(1)



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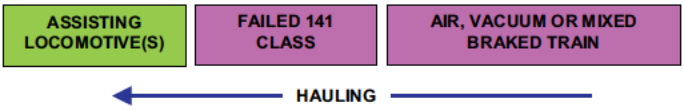

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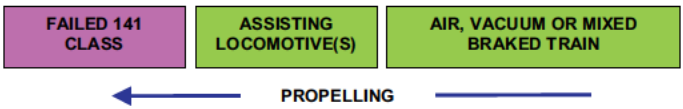


Preparation Of Failed 141 Class

1. Secure locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2.
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full service and leave the locomotive brake handle applied.

Coupling And Preparation Of Assisting Locomotive(s)

1. Ease up to failed 141 class.
2. In the cab, from which the assisting manoeuvre will be made, apply the train brake handle to emergency.
3. Attach and screw up shackle. Couple brake (red), main res (yellow) and independent equalising (green) hoses between the locomotives and open the air cocks for these hoses. Couple vacuum hoses.
4. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
5. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi and vacuum gauge building to 18ins minimum.

IMPORTANT

> **If the brake pipe fails to build and main res falls continuously, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed 141 class. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**

Brake Continuity Test

The brake continuity test must be carried out between the driving cab of the assisting locomotive(s) and

(i) the furthest cab of the failed 141 class if light engine

(ii) the rearmost vehicle of an air or vacuum braked train attached to the failed 141 class

(iii) the rearmost vehicle of each of the air and vacuum portions of a mixed braked train attached to the failed 141 class.

Before proceeding, ensure that brake cylinders are releasing on the failed 141 class, all scotches are removed and all handbrakes are released.

Resultant Brake Control Available

ON DRIVING CAB OF ASSISTING LOCOMOTIVE(S) -

Full braking control of all vehicles.

ON OTHER CAB(S) OF ASSISTING LOCOMOTIVE(S) -

Brakes applied on all vehicles by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting locomotive(s).

ON FAILED 141 CLASS -

Brakes applied on all vehicles by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting locomotive(s).

ON AIR BRAKED PASSENGER TRAIN ATTACHED TO FAILED 141 CLASS OR ASSISTING LOCOMOTIVES -

The passenger communication valves and guard's brake valves will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting locomotive(s).

ON VACUUM BRAKED PASSENGER TRAIN ATTACHED TO FAILED 141 CLASS OR ASSISTING LOCOMOTIVES -

The passenger communication valves and guard's brake valves will apply the brakes on the vacuum braked vehicles only. The guard's brake valve, only, will cut power and light PC lamp on the assisting locomotive(s) provided vacuum is dropped to 0 ins. Brakes will not apply automatically on the assisting locomotive(s) or failed 141 class.

DIVIDE OF VEHICLES

Divide of brake pipe hoses will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting locomotive(s).

Divide of vacuum hoses will apply the brakes on the vacuum braked vehicles only. Power will be cut and PC lamp will light on assisting locomotive(s). Brakes will not apply automatically on the assisting locomotive(s) or failed 141 class.

Conditions Governing The Assisting Movement

PREPARATION

(i) Assisting driver must drive from the leading cab.

HAULING MOVEMENT

(i) **Normal direction** - speed must not exceed the maximum permitted for any vehicle on the train or portion of line, whichever is the more restrictive.

(ii) **Wrong direction** – speed must not exceed 32km/h (20 mph).

PROPELLING MOVEMENT

(i) Speed of movement must not exceed 32km/h (20mph).

(ii) Brakesman must travel in the leading cab of the failed 141 class.

(iii) Speed of movement must not exceed 32km/h (20 mph) when the brakesman is a driver.

Speed of movement must not exceed 16km/h (10 mph) when the brakesman is other than a driver.

(iv) Movement is permitted only to the next interlocking or station where the failed 141 class can be disposed of or the movement changed to an allowed hauling movement.

Unable To Release Brakes On The Failed 141 Class Due To Damage

Where for example air brake pipes are broken due to collision etc., the following now applies:

(i) In movement (1) and (3) the failed 141 class can only be moved as a loose coupled vehicle.

(ii) In movement (2) it is permitted to proceed with the failed 141 class unbraked provided a continuous brake is available on its train in rear. If this is not possible the failed 141 class must be removed as a loose coupled vehicle separately.

Where for example the vacuum pipe only is broken due to collision etc., do not connect vacuum hoses between the assisting locomotive(s) and failed 141 class. The following now applies:

(i) In movement (1) and (3) proceed.

(ii) In movement (2) where the train in rear is air braked proceed.

(iii) In movement (2) where the train in rear is vacuum braked, remove the failed 141 class separately as per movement (1).

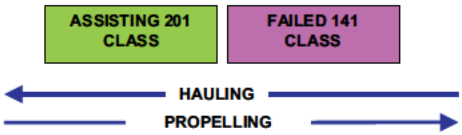
NOTES

A. ASSISTING MOTIVE POWER UNIT COUPLING TO FAILED 141 CLASS

A2. ASSISTANCE FROM 201 CLASS.

Permitted Movements

(4)



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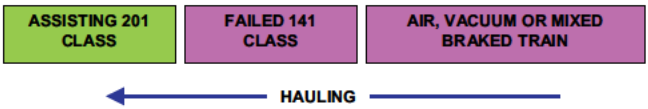

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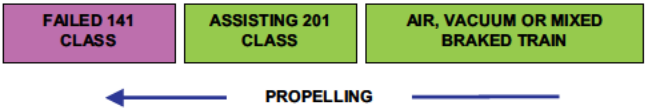


Preparation Of Failed 141 Class

1. Secure the locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2.
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full service and leave the locomotive brake handle applied.

Coupling And Preparation Of Assisting 201 Class

1. Ease up to failed 141 class.
2. In the cab, from which the assisting manoeuvre will be made, apply the train brake handle to emergency.
3. Attach and screw up shackle. Couple brake (red) and main res (yellow) hoses between the locomotives and open the air cocks for these hoses. Couple vacuum hoses. Open one of the independent equalising (green) hose cocks on the failed 141 class.
4. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
5. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi and vacuum gauge building to 18ins minimum.

IMPORTANT

- **If the brake pipe fails to build and main res falls continuously, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed 141 class. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**
- **If the brake cylinders on the failed 141 class do not release when the brake pipe builds to 68 – 72 psi, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed 141 class. Observe that when the main res tanks are blown down completely, the brake cylinders have released. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**
- **The brakes on the failed 141 class will not react to activation of the locomotive or train brake handle on the 201 class. Only in the case of divide of the failed 141 class from the 201 class will the brakes apply.**

Brake Continuity Test

The brake continuity test must be carried out between the driving cab of the 201 class and

(i) the furthest cab of the failed 141 class if light engine

(ii) the rearmost vehicle of an air or vacuum braked train attached to the failed 141 class

(iii) the rearmost vehicle of each of the air and vacuum portions of a mixed braked train attached to the failed 141 class.

Before proceeding, ensure that brake cylinders are released on the failed 141 class, all scotches are removed and all handbrakes are released.

Resultant Brake Control Available

ON DRIVING CAB OF ASSISTING 201 CLASS -

Full braking control of assisting 201 class, air or vacuum braked vehicles attached to assisting 201 class and air or vacuum braked vehicles attached to failed 141 class. Brakes on failed 141 class will not apply.

ON OTHER CAB OF ASSISTING 201 CLASS -

Brakes applied on assisting 201 class, air or vacuum braked vehicles attached to assisting 201 class and air or vacuum braked vehicles attached to failed 141 class, by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting 201 class. Brakes on failed 141 class will not apply.

ON FAILED 141 CLASS -

Brakes applied on assisting 201 class, air or vacuum braked vehicles attached to assisting 201 class and air or vacuum braked vehicles attached to failed 141 class, by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting 201 class. Brakes on failed 141 class will not apply.

ON AIR BRAKED PASSENGER TRAIN ATTACHED TO FAILED 141 CLASS OR ASSISTING 201 CLASS -

The passenger communication valves and guard's brake valves will apply brakes on assisting 201 class, air or vacuum braked vehicles attached to assisting 201 class and air or vacuum braked vehicles attached to failed 141 class. Power will be cut and PC lamp will light on assisting 201 class. Brakes on failed 141 class will not apply.

ON VACUUM BRAKED TRAIN ATTACHED TO FAILED 141 CLASS OR ASSISTING 201 CLASS -

The passenger communication valves and guard's brake valves will apply the brakes on the vacuum braked vehicles only. The guard's brake valve, only, will cut power and light the PC lamp on the assisting 201 class provided vacuum is dropped to 0 ins. Brakes will not apply automatically on the assisting 201 class. Brakes on failed 141 class will not apply.

DIVIDE OF VEHICLES -

Divide of brake pipe hoses will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting 201 class.

Divide of vacuum hoses will apply the brakes on the vacuum braked vehicles only. Power will be cut and PC lamp will light on assisting 201 class. Brakes will not apply automatically on the assisting 201 class. Brakes on failed 141 class will not apply.

Conditions Governing The Assisting Movement

PREPARATION

(i) Assisting driver must drive from the leading cab.

HAULING MOVEMENT

(i) **Normal direction** - speed must not exceed 64km/h (40mph) or the maximum permitted for any vehicle on the train whichever is the more restrictive. If the permitted speed for any portion of line is less than 80 km/h (50 mph), then speed must be reduced by 16km/h (10mph) below this permitted speed subject to a lower limit of 8km/h (5mph).

(ii) **Wrong direction** – speed must not exceed 32km/h (20mph). If the permitted speed for any portion of line is less than 32km/h (20mph), then speed must be reduced to 8 km/h (5mph).

PROPELLING MOVEMENT

(i) Brakesman must travel in the leading cab of the failed 141 class.

(ii) Speed of movement must not exceed 32km/h (20mph) when the brakesman is a driver. If the permitted speed for any portion of line is less than 32km/h (20mph), then speed must be reduced to 8 km/h (5mph).

(iii) Speed of movement must not exceed 16km/h (10mph) when the brakesman is other than a driver. If the permitted speed for any portion of line is less than 16km/h (10mph), then speed must be reduced to 8 km/h (5mph).

(iv) Movement is permitted only to the next interlocking or station where the failed 141 class can be disposed of or the movement changed to an allowed hauling movement subject to Chief Engineer, Infrastructure restrictions.

Unable To Release Brakes On The Failed 141 Class Due To Damage

Where for example air brake pipes are broken due to collision etc. the following now applies:

(i) In movement (4) and (6) the failed 141 class can only be moved as a loose coupled vehicle.

(ii) In movement (5) it is permitted to proceed with the failed 141 class unbraked provided a continuous brake is available on its train in rear. If this is not possible the failed 141 class must be removed as a loose coupled vehicle separately.

Where for example the vacuum pipe only is broken due to collision etc., do not connect vacuum hoses between the assisting locomotive(s) and failed 141 class. The following now applies:

(i) In movement (4) and (6) proceed.

(ii) In movement (5) where the train in rear is air braked proceed.

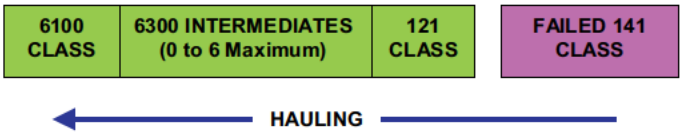
(iii) In movement (5) where the train in rear is vacuum braked, remove the failed 141 class separately as per movement (1).

A. ASSISTING MOTIVE POWER UNIT COUPLING TO FAILED 141 CLASS

A3. ASSISTANCE FROM PUSH/PULL TRAIN - 6100 CLASS WITH 121 CLASS MOTIVE POWER, PART 1.

Permitted Movements

(7)



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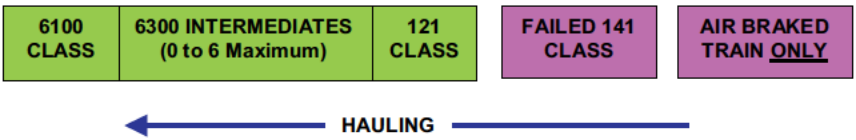


Preparation Of Failed 141 Class

1. Secure the locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2.
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full service and leave the locomotive brake handle applied.

Coupling And Preparation Of Assisting 121 Class

1. Ease up to failed 141 class.
2. In the cab, from which the assisting manoeuvre will be made, apply the train brake handle to emergency.
3. Attach and screw up shackle. Couple brake (red) and main res (yellow) hoses between the locomotives and open the air cocks for these hoses. Open one of the independent equalising (green) hose cocks on the failed 141 class.

Assisting Conducted From The 6100 Class (Hauling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi.

IMPORTANT

- **If the brake pipe fails to build and main res falls continuously, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed 141 class. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**
- **If the brake cylinders on the failed 141 class do not release when the brake pipe builds to 68 – 72 psi, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed 141 class. Observe that when the main res tanks are blown down completely, the brake cylinders have released. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**
- **The brakes on the failed 141 class will not react to activation of the locomotive or train brake handle on the 6100/121 class. Only in the case of divide of the failed 141 class from the push/pull train will the brakes apply.**

Brake Continuity Test

The brake continuity test must be carried out between the driving cab of the 6100 class and one cab of the failed 141 class if light engine, or the rearmost vehicle of the train attached to the failed 141 class.

Before proceeding, ensure that brake cylinders are released on the failed 141 class, all scotches are removed and all handbrakes are released.

Resultant Brake Control Available

ON DRIVING CAB OF ASSISTING PUSH/PULL TRAIN -

Full braking control of assisting push/pull train and air braked train attached to failed 141 class. Brakes on failed 141 class will not apply.

ON OTHER CAB OF ASSISTING PUSH/PULL TRAIN -

Brakes applied on assisting push/pull train and air braked train attached to failed 141 class, by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

ON PASSENGER SALOONS OF PUSH/PULL TRAIN -

The passenger communication valves will apply brakes on assisting push/pull train and air braked train attached to failed 141 class. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

ON FAILED 141 CLASS -

Brakes applied on assisting push/pull train and air braked train attached to failed 141 class by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

ON AIR BRAKED PASSENGER TRAIN ATTACHED TO FAILED 141 CLASS -

The passenger communication valves and guard's brake valves will apply brakes on push/pull train and air braked train attached to failed 141 class. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

DIVIDE OF VEHICLES -

Divide of brake pipe hoses will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

Conditions Governing The Assisting Movement

PREPARATION

(i) Assisting driver must drive from the cab of the 6100 class.

HAULING MOVEMENT

(i) Passengers must be detrained from the push/pull train prior to carrying out the movement.

(ii) Speed must not exceed 64km/h (40mph) or the maximum permitted for any vehicle on the train whichever is the more restrictive. If the permitted speed for any portion of line is less than 80 km/h (50 mph), then speed must be reduced by 16km/h (10mph) below this permitted speed subject to a lower limit of 8km/h (5mph).

(iii) Driver of the failed 141 class should remain on the failed locomotive.

(iv) Movement is permitted only to the next interlocking or station where the failed 141 class and its train, if attached, can be disposed of.

Unable To Release Brakes On The Failed 141 Class Due To Damage

Where for example air brake pipes are broken due to collision etc. the following now applies:

(i) In movement (7) the failed 141 class can only be moved as a loose coupled vehicle.

(ii) In movement (8) it is permitted to proceed with the failed 141 class unbraked provided a continuous brake is available on its train in rear. If this is not possible the failed 141 class must be removed as a loose coupled vehicle separately.

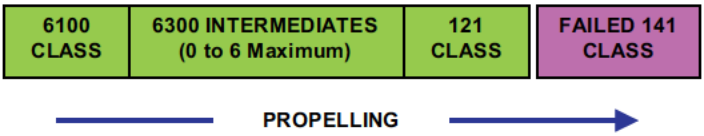
NOTES

A. ASSISTING MOTIVE POWER UNIT COUPLING TO FAILED 141 CLASS

A3. ASSISTANCE FROM PUSH/PULL TRAIN - 6100 CLASS WITH 121 CLASS MOTIVE POWER, PART 2.

Permitted Movements

(9)



Preparation Of Failed 141 Class

1. Secure the locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2.
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full service and leave the locomotive brake handle applied.

Coupling And Preparation Of Assisting 121 Class

1. Ease up to failed 141 class.
2. In the 121 cab, from which the assisting manoeuvre will be made, apply the train brake handle to emergency.
3. Attach and screw up shackle. Couple brake (red), main res (yellow) and independent equalising (green) hoses between the locomotives and open the air cocks for these hoses.

Assistance Conducted From The 121 Class (Propelling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 – 72 psi and vacuum gauge building to 18ins minimum.

IMPORTANT

> **If the brake pipe fails to build and main res falls continuously, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed 141 class. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**

Brake Continuity Test

The brake continuity test must be carried out between the driving cab of the assisting 121 class and one cab of the failed 141 class.

Before proceeding, ensure that brake cylinders are releasing on the failed 141 class, all scotches are removed and all handbrakes are released.

Resultant Brake Control Available

ON DRIVING CAB OF ASSISTING PUSH/PULL TRAIN -

Full braking control of all vehicles.

ON OTHER CAB OF ASSISTING PUSH/PULL TRAIN -

Brakes applied on all vehicles by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train.

ON PASSENGER SALOONS OF PUSH/PULL TRAIN -

The passenger communication valves will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

ON FAILED 141 CLASS -

Brakes applied on all vehicles by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train.

DIVIDE OF VEHICLES -

Divide of brake pipe hoses will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

Conditions Governing The Assisting Movement

PREPARATION

(i) Assisting driver must drive from the cab of the assisting 121 class.

PROPELLING MOVEMENT

(i) Brakesman must travel in the leading cab of the failed 141 class.

(ii) Speed of movement must not exceed 32km/h (20 mph) when the brakesman is a driver.

Speed of movement must not exceed 16km/h (10 mph) when the brakesman is other than a driver.

(iii) Movement is permitted only to the next interlocking or station where the failed 141 class can be disposed of.

Unable To Release Brakes On The Failed 141 Class Due To Damage

Where for example air brake pipes are broken due to collision etc. the following now applies:

(i) In the movement the failed 141 class can only be moved as a loose coupled vehicle.

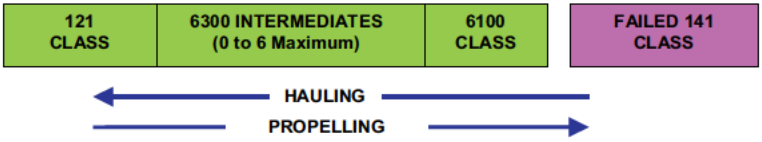
NOTES

A. ASSISTING MOTIVE POWER UNIT COUPLING TO FAILED 141 CLASS

A3. ASSISTANCE FROM PUSH/PULL TRAIN - 6100 CLASS WITH 121 CLASS MOTIVE POWER, PART 3.

Permitted Movements

(10)



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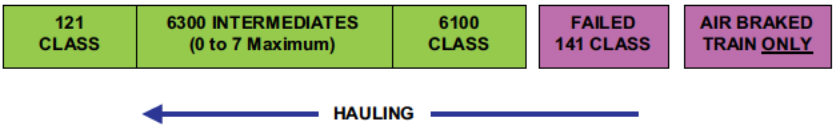


Preparation Of Failed 141 Class

1. Secure the locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2.
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full service and leave the locomotive brake handle applied.

Coupling And Preparation Of Assisting 6100 Class

1. Ease up to failed 141 class.
2. In the cab, from which the assisting manoeuvre will be made (i.e. the assisting 121 or 6100 class), apply the train brake handle to emergency.
3. Attach and screw up shackle. Couple brake (red) and main res (yellow) hoses between the 6100 class and the failed 141 class and open the air cocks for these hoses. Open one of the independent equalising (green) hose cocks on the failed 141 class.

Assistance Conducted From The 121 Class (Hauling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi and vacuum gauge building to 18ins minimum.

Assisting Conducted From The 6100 Class (Propelling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi.

IMPORTANT

- **If the brake pipe fails to build and main res falls continuously, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed 141 class. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**
- **If the brake cylinders on the failed 141 class do not release when the brake pipe builds to 68 – 72 psi, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed 141 class. Observe that when the main res tanks are blown down completely, the brake cylinders have released. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**
- **The brakes on the failed 141 class will not react to activation of the locomotive or train brake handle on the 6100/121 class. Only in the case of divide of the failed 141 class from the push/pull train will the brakes apply.**

Brake Continuity Test

The brake continuity test must be carried out between the driving cab of the push/pull train and one cab of the failed 141 class if light engine, or the rearmost vehicle of the train attached to the failed 141 class.

Before proceeding, ensure that brake cylinders are released on the failed 141 class, all scotches are removed and all handbrakes are released.

Resultant Brake Control Available

ON DRIVING CAB OF ASSISTING PUSH/PULL TRAIN -

Full braking control of assisting push/pull train and air braked train attached to failed 141 class. Brakes on failed 141 class will not apply.

ON OTHER CAB OF ASSISTING PUSH/PULL TRAIN -

Brakes applied on assisting push/pull train and air braked train attached to failed 141 class, by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

ON PASSENGER SALOONS OF PUSH/PULL TRAIN -

The passenger communication valves will apply brakes on assisting push/pull train and air braked train attached to failed 141 class. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

ON FAILED 141 CLASS -

Brakes applied on assisting push/pull train and air braked train attached to failed 141 class by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

ON AIR BRAKED PASSENGER TRAIN ATTACHED TO FAILED 141 CLASS -

The passenger communication valves and guard's brake valves will apply brakes on push/pull train and air braked train attached to failed 141 class. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

DIVIDE OF VEHICLES -

Divide of brake pipe hoses will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

Conditions Governing The Assisting Movement

PREPARATION

(i) Assisting driver must drive from the leading cab of the push/pull train.

HAULING MOVEMENT

(i) Passengers must be detrained from the push/pull train prior to carrying out the movement.

(ii) Speed must not exceed 64km/h (40mph) or the maximum permitted for any vehicle on the train whichever is the more restrictive. If the permitted speed for any portion of line is less than 80 km/h (50 mph), then speed must be reduced by 16km/h (10mph) below this permitted speed subject to a lower limit of 8km/h (5mph).

(iii) Driver of the failed 141 class should remain on the failed locomotive.

(iv) Movement is permitted only to the next interlocking or station where the failed 141 class and its train, if attached, can be disposed of.

Propelling Movement

(i) Brakesman must travel in the leading cab of the failed 141 class.

(ii) Speed of movement must not exceed 32km/h (20mph) when the brakesman is a driver. If the permitted speed for any portion of line is less than 32km/h (20mph), then speed must be reduced to 8 km/h (5mph).

(iii) Speed of movement must not exceed 16km/h (10mph) when the brakesman is other than a driver. If the permitted speed for any portion of line is less than 16km/h (10mph), then speed must be reduced to 8 km/h (5mph).

(iv) Movement is permitted only to the next interlocking or station where the failed 141 class can be disposed of.

Unable To Release Brakes On The Failed 141 Class Due To Damage

Where for example air brake pipes are broken due to collision etc. the following now applies:

(i) In movement (10) the failed 141 class can only be moved as a loose coupled vehicle.

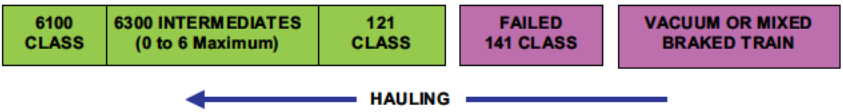
(ii) In movement (11) it is permitted to proceed with the failed 141 class unbraked provided a continuous brake is available on its train in rear. If this is not possible the failed 141 class must be removed as a loose coupled vehicle separately.

A. ASSISTING MOTIVE POWER UNIT COUPLING TO FAILED 141 CLASS

A3. ASSISTANCE FROM PUSH/PULL TRAIN - 6100 CLASS WITH 121 CLASS MOTIVE POWER, PART 4.

Permitted Movements

(12)



Preparation Of Failed 141 Class

1. Secure the locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2.
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full service and leave the locomotive brake handle applied.

Coupling And Preparation Of Assisting 121 Class

1. Ease up to failed 141 class.
2. In the 121 cab, from which the assisting manoeuvre will be made, apply the train brake handle to emergency.
3. Attach and screw up shackle. Couple brake (red), main res (yellow) and independent equalising (green) hoses between the locomotives and open the air cocks for these hoses. Couple vacuum hoses.

Assistance Conducted From The Assisting 121 Class (Hauling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi and vacuum gauge building to 18ins minimum.

IMPORTANT

> **If the brake pipe fails to build and main res falls continuously, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed 141 class. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**

Brake Continuity Test

The brake continuity test must be carried out between the driving cab of the assisting 121 class and

(i) the rearmost vehicle of a vacuum braked train attached to the failed 141 class

(ii) the rearmost vehicle of each of the air and vacuum portions of a mixed braked train attached to the failed 141 class.

Before proceeding, ensure that brake cylinders are releasing on the failed 141 class, all scotches are removed and all handbrakes are released.

Resultant Brake Control Available

ON DRIVING CAB OF ASSISTING PUSH/PULL TRAIN -

Full braking control of all vehicles.

ON OTHER CAB OF ASSISTING PUSH/PULL TRAIN -

Brakes applied on all vehicles by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train.

ON PASSENGER SALOONS OF PUSH/PULL TRAIN -

The passenger communication valves will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

ON FAILED 141 CLASS -

Brakes applied on all vehicles by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train.

ON VACUUM BRAKED PASSENGER TRAIN ATTACHED TO FAILED 141 CLASS -

The passenger communication valves and guard's brake valves will apply the brakes on the vacuum braked vehicles only. The guard's brake valve, only, will cut power and light the PC lamp on the assisting push/pull train provided vacuum is dropped to 0 ins. Brakes will not apply automatically on the assisting push/pull train or failed 141 class.

DIVIDE OF VEHICLES -

Divide of brake pipe hoses will apply brakes on all vehicles. Power will be cut on assisting push/pull train.

Divide of vacuum hoses will apply the brakes on the vacuum braked vehicles only. Power will be cut and PC lamp will light on assisting push/pull train. Brakes will not apply automatically on the assisting push/pull train or failed 141 class.

Conditions Governing The Assisting Movement

PREPARATION

Assisting driver must drive from the cab of the assisting 121 class.

HAULING MOVEMENT

(i) Passengers must be detrained from the push/pull train prior to carrying out the movement.

(ii) Brakesman must travel in the cab of the 6100 class.

(iii) Speed of movement must not exceed 32km/h (20 mph) when the brakesman is a driver.

(iv) Speed of movement must not exceed 16km/h (10 mph) when the brakesman is other than a driver.

(v) Movement is permitted only to the next interlocking or station where the failed 141 class and its train can be disposed of.

Unable To Release Brakes On The Failed 141 Class Due To Damage

Where for example air brake pipes are broken due to collision etc. the following now applies:

(i) In this movement it is permitted to proceed with the failed 141 class unbraked provided a continuous brake is available on its train in rear. If this is not possible the failed 141 class must be removed as a loose coupled vehicle separately.

Where for example the vacuum pipe only is broken due to collision etc., do not connect vacuum hoses between the assisting 121 class and failed 141 class. The following now applies:

(i) In this movement the failed 141 class must be removed separately from its train (see permitted movement (7) in this subsection A3).

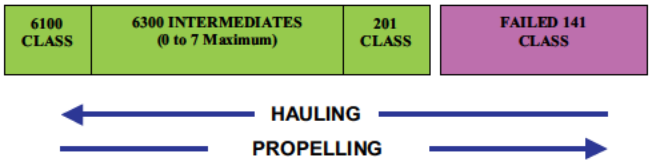
NOTES

A. ASSISTING MOTIVE POWER UNIT COUPLING TO FAILED 141 CLASS

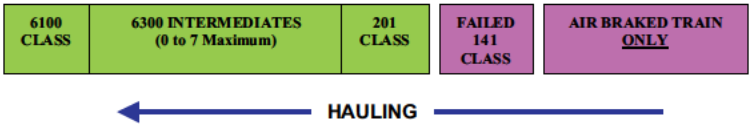
A4. ASSISTANCE FROM PUSH/PULL TRAIN - 6100 CLASS WITH 201 CLASS MOTIVE POWER, PART 1.

Permitted Movements

(13)



(14)



Preparation Of Failed 141 Class

1. Secure the locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2.
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full service and leave the locomotive brake handle applied.

Coupling And Preparation Of Assisting 201 Class

1. Ease up to failed 141 class.
2. In the cab, from which the assisting manoeuvre will be made (i.e. the 201 or 6100 class), apply the train brake handle to emergency.
3. Attach and screw up shackle. Couple brake (red) and main res (yellow) hoses between the locomotives and open the air cocks for these hoses. Open one of the independent equalising (green) hose cocks on the failed 141 class.

Assistance Conducted From The 201 Class (Propelling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 – 72 psi and vacuum gauge building to 18ins minimum.

Assisting Conducted From The 6100 Class (Hauling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi.

IMPORTANT

- **If the brake pipe fails to build and main res falls continuously, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed 141 class. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**
- **If the brake cylinders on the failed 141 class do not release when the brake pipe builds to 68 – 72 psi, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed 141 class. Observe that when the main res tanks are blown down completely, the brake cylinders have released. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**
- **The brakes on the failed 141 class will not react to activation of the locomotive or train brake handle on the 6100/201 class. Only in the case of divide of the failed 141 class from the push/pull train will the brakes apply.**

Brake Continuity Test

The brake continuity test must be carried out between the driving cab of the push/pull train and one cab of the failed 141 class if light engine, or the rearmost vehicle of the train attached to the failed 141 class.

Before proceeding, ensure that brake cylinders are released on the failed 141 class, all scotches are removed and all handbrakes are released.

Resultant Brake Control Available

ON DRIVING CAB OF ASSISTING PUSH/PULL TRAIN -

Full braking control of assisting push/pull train and air braked train attached to failed 141 class. Brakes on failed 141 class will not apply.

ON OTHER CABS OF ASSISTING PUSH/PULL TRAIN -

Brakes applied on assisting push/pull train and air braked train attached to failed 141 class, by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

ON PASSENGER SALOONS OF PUSH/PULL TRAIN -

The passenger communication valves will apply brakes on assisting push/pull train and air braked train attached to failed 141 class. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

ON FAILED 141 CLASS -

Brakes applied on assisting push/pull train and air braked train attached to failed 141 class by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

ON AIR BRAKED PASSENGER TRAIN ATTACHED TO FAILED 141 CLASS -

The passenger communication valves and guard's brake valves will apply brakes on push/pull train and air braked train attached to failed 141 class. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

DIVIDE OF VEHICLES -

Divide of brake pipe hoses will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

Conditions Governing The Assisting Movement

PREPARATION

(i) Assisting driver must drive from the leading cab of the push/pull train.

HAULING MOVEMENT

(i) Passengers must be detrained from the push/pull train prior to carrying out the movement.

(ii) Speed must not exceed 64km/h (40mph) or the maximum permitted for any vehicle on the train whichever is the more restrictive. If the permitted speed for any portion of line is less than 80 km/h (50 mph), then speed must be reduced by 16km/h (10mph) below this permitted speed subject to a lower limit of 8km/h (5mph).

(iii) Driver of the failed 141 class should remain on the failed locomotive.

(iv) Movement is permitted only to the next interlocking or station where the failed 141 class and its train, if attached, can be disposed of.

PROPELLING MOVEMENT

(i) Brakesman must travel in the leading cab of the failed 141 class.

(ii) Speed of movement must not exceed 32km/h (20mph) when the brakesman is a driver. If the permitted speed for any portion of line is less than 32km/h (20mph), then speed must be reduced to 8 km/h (5mph).

(iii) Speed of movement must not exceed 16km/h (10mph) when the brakesman is other than a driver. If the permitted speed for any portion of line is less than 16km/h (10mph), then speed must be reduced to 8 km/h (5mph).

(iv) Movement is permitted only to the next interlocking or station where the failed 141 class and its train can be disposed of.

Unable To Release Brakes On The Failed 141 Class Due To Damage

Where for example air brake pipes are broken due to collision etc. the following now applies:

(i) In movement (13) the failed 141 class can only be moved as a loose coupled vehicle.

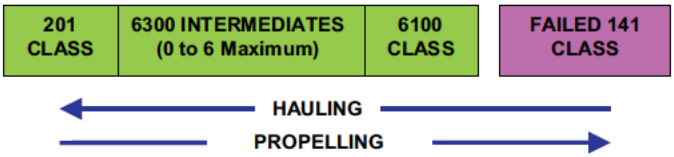
(ii) In movement (14) it is permitted to proceed with the failed 141 class unbraked provided a continuous brake is available on its train in rear. If this is not possible the failed 141 class must be removed as a loose coupled vehicle separately.

A. ASSISTING MOTIVE POWER UNIT COUPLING TO FAILED 141 CLASS

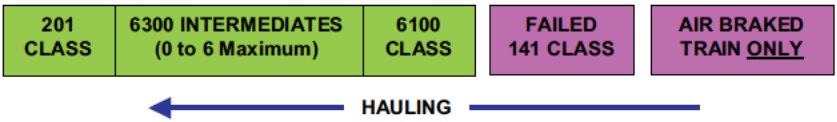
A4. ASSISTANCE FROM PUSH/PULL TRAIN - 6100 CLASS WITH 201 CLASS MOTIVE POWER, PART 2.

Permitted Movements

(15)



(16)



Preparation Of Failed 141 Class

1. Secure the locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2.
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full service and leave the locomotive brake handle applied.

Coupling And Preparation Of Assisting 6100 Class

1. Ease up to failed 141 class.
2. In the cab, from which the assisting manoeuvre will be made (i.e. the 201 or 6100 class), apply the train brake handle to emergency.
3. Attach shackle. Couple brake (red) and main res (yellow) hoses between the 6100 class and the 141 class and open the air cocks for these hoses. Open one of the independent equalising (green) hose cocks on the failed 141 class.

Assistance Conducted From The 201 Class (Hauling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi and vacuum gauge building to 18ins minimum.

Assisting Conducted From The 6100 Class (Propelling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi.

IMPORTANT

- **If the brake pipe fails to build and main res falls continuously, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed 141 class. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**
- **If the brake cylinders on the failed 141 class do not release when the brake pipe builds to 68 – 72 psi, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed 141 class. Observe that when the main res tanks are blown completely, the brake cylinders have released. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**
- **The brakes on the failed 141 class will not react to activation of the locomotive or train brake handle on the 6100/201 class. Only in the case of divide of the failed 141 class from the push/pull train will the brakes apply.**

Brake Continuity Test

The brake continuity test must be carried out between the driving cab of the push/pull train and one cab of the failed 141 class if light engine, or the rearmost vehicle of the train attached to the failed 141 class.

Before proceeding, ensure that brake cylinders are released on the failed 141 class, all scotches are removed and all handbrakes are released.

Resultant Brake Control Available

ON DRIVING CAB OF ASSISTING PUSH/PULL TRAIN -

Full braking control of assisting push/pull train and air braked train attached to failed 141 class. Brakes on failed 141 class will not apply.

ON OTHER CABS OF ASSISTING PUSH/PULL TRAIN -

Brakes applied on assisting push/pull train and air braked train attached to failed 141 class, by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

ON PASSENGER SALOONS OF PUSH/PULL TRAIN -

The passenger communication valves will apply brakes on assisting push/pull train and air braked train attached to failed 141 class. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

ON FAILED 141 CLASS -

Brakes applied on assisting push/pull train and air braked train attached to failed 141 class by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

ON AIR BRAKED PASSENGER TRAIN ATTACHED TO FAILED 141 CLASS -

The passenger communication valves and guard's brake valves will apply brakes on push/pull train and air braked train attached to failed 141 class. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

DIVIDE OF VEHICLES -

Divide of brake pipe hoses will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

Conditions Governing The Assisting Movement

PREPARATION

(i) Assisting driver must drive from the leading cab of the push/pull train.

HAULING MOVEMENT

(i) Passengers must be detrained from the push/pull train prior to carrying out the movement.

(ii) Speed must not exceed 64km/h (40mph) or the maximum permitted for any vehicle on the train whichever is the more restrictive. If the permitted speed for any portion of line is less than 80 km/h (50 mph), then speed must be reduced by 16km/h (10mph) below this permitted speed subject to a lower limit of 8km/h (5mph).

(iii) Driver of the failed 141 class should remain on the failed locomotive.

(iv) Movement is permitted only to the next interlocking or station where the failed 141 class and its train, if attached, can be disposed of.

PROPELLING MOVEMENT

(i) Brakesman must travel in the leading cab of the failed 141 class.

(ii) Speed of movement must not exceed 32km/h (20mph) when the brakesman is a driver. If the permitted speed for any portion of line is less than 32km/h (20mph), then speed must be reduced to 8 km/h (5mph).

Speed of movement must not exceed 16km/h (10mph) when the brakesman is other than a driver. If the permitted speed for any portion of line is less than 16km/h (10mph), then speed must be reduced to 8 km/h (5mph).

(iii) Movement is permitted only to the next interlocking or station where the failed 141 class can be disposed of.

Unable To Release Brakes On The Failed 141 Class Due To Damage

Where for example air brake pipes are broken due to collision etc. the following now applies:

(i) In movement (15) the failed 141 class can only be moved as a loose coupled vehicle.

(ii) In movement (16) it is permitted to proceed with the failed 141 class unbraked provided a continuous brake is available on its train in rear. If this is not possible the failed 141 class must be removed as a loose coupled vehicle separately.

A. ASSISTING MOTIVE POWER UNIT COUPLING TO FAILED 141 CLASS

A4. ASSISTANCE FROM PUSH/PULL TRAIN - 6100 CLASS WITH 201 CLASS MOTIVE POWER, PART 3.

Permitted Movements

(17)

6100 CLASS	6300 INTERMEDIATES (0 to 6 Maximum)	201 CLASS	FAILED 141 CLASS	VACUUM OR MIXED BRAKED TRAIN

HAULING ←

Preparation Of Failed 141 Class

1. Secure the locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2.
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full service and leave the locomotive brake handle applied.

Coupling And Preparation Of Assisting 201 Class

1. Ease up to failed 141 class.
2. In the 201 cab, from which the assisting manoeuvre will be made, apply the train brake handle to emergency.
3. Attach and screw up shackle. Couple brake (red) and main res (yellow) hoses between the locomotives and open the air cocks for these hoses. Couple vacuum hoses. Open one of the independent equalising (green) hose cocks on the failed 141 class.

Assistance Conducted From The 201 Class (Hauling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi and vacuum gauge building to 18ins minimum.

IMPORTANT

- **If the brake pipe fails to build and main res falls continuously, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed 141 class. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**
- **If the brake cylinders on the failed 141 class do not release when the brake pipe builds to 68 – 72 psi, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed 141 class. Observe that when the main res tanks are blown completely, the brake cylinders have released. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**
- **The brakes on the failed 141 class will not react to activation of the locomotive or train brake handle on the 201 class. Only in the case of divide of the failed 141 class from the push/pull train will the brakes apply.**

Brake Continuity Test

The brake continuity test must be carried out between the driving cab of the 201 class and

(i) the rearmost vehicle of a vacuum braked train attached to the failed 141 class

(ii) the rearmost vehicle of each of the air and vacuum portions of a mixed braked train attached to the failed 141 class.

Before proceeding, ensure that brake cylinders are released on the failed 141 class, all scotches are removed and all handbrakes are released.

Resultant Brake Control Available

ON DRIVING CAB OF ASSISTING PUSH/PULL TRAIN -

Full braking control of assisting push/pull train and vacuum or mixed braked train attached to failed 141 class. Brakes on failed 141 class will not apply.

ON OTHER CABS OF ASSISTING PUSH/PULL TRAIN -

Brakes applied on assisting push/pull train and vacuum or mixed braked train attached to failed 141 class, by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

ON PASSENGER SALOONS OF PUSH/PULL TRAIN -

The passenger communication valves will apply brakes on assisting push/pull train and vacuum or mixed braked train attached to failed 141 class. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

ON FAILED 141 CLASS -

Brakes applied on assisting push/pull train and vacuum or mixed braked train attached to failed 141 class by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

ON VACUUM BRAKED PASSENGER TRAIN ATTACHED TO FAILED 141 CLASS -

The passenger communication valves and guard's brake valves will apply the brakes on the vacuum braked vehicles only. The guard's brake valve, only, will cut power and light the PC lamp on the assisting push/pull train provided vacuum is dropped to 0 ins. Brakes will not apply automatically on the assisting push/pull train. Brakes on failed 141 class will not apply.

DIVIDE OF VEHICLES -

Divide of brake pipe hoses will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

Divide of vacuum hoses will apply the brakes on the vacuum braked vehicles only. Power will be cut and PC lamp will light on assisting push/pull train. Brakes will not apply automatically on the assisting push/pull train. Brakes on failed 141 class will not apply.

Conditions Governing The Assisting Movement

PREPARATION

(i) Assisting driver must drive from the cab of the 201 class.

HAULING MOVEMENT

(i) Passengers must be detrained from the push/pull train prior to carrying out the movement.

(ii) Brakesman must travel in the cab of the 6100 class.

(iv) Speed of movement must not exceed 32km/h (20mph) when the brakesman is a driver. If the permitted speed for any portion of line is less than 32km/h (20mph), then speed must be reduced to 8 km/h (5mph).

Speed of movement must not exceed 16km/h (10mph) when the brakesman is other than a driver. If the permitted speed for any portion of line is less than 16km/h (10mph), then speed must be reduced to 8 km/h (5mph).

(iii) Movement is permitted only to the next interlocking or station where the failed 141 class and its train can be disposed of.

Unable To Release Brakes On The Failed 141 Class Due To Damage

Where for example air brake pipes are broken due to collision etc. the following now applies:

(i) In this movement it is permitted to proceed with the failed 141 class unbraked provided a continuous brake is available on its train in rear. If this is not possible the failed 141 class must be removed as a loose coupled vehicle separately.

Where for example the vacuum pipe only is broken due to collision etc., do not connect vacuum hoses between the 201 class and failed 141 class. The following now applies:

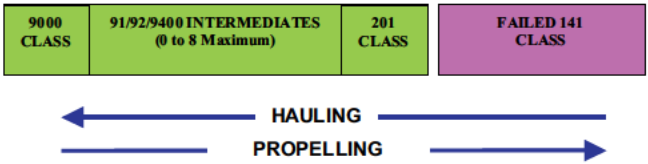
(i) In this movement the failed 141 class must be removed separately from its train (see permitted movement (13) in this subsection A4).

A. ASSISTING MOTIVE POWER UNIT COUPLING TO FAILED 141 CLASS

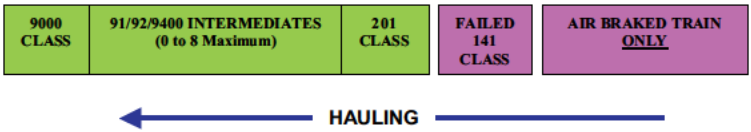
A5. ASSISTANCE FROM PUSH/PULL TRAIN - 9000 CLASS WITH 201 CLASS MOTIVE POWER, PART 1.

Permitted Consists

(18)



(19)



Preparation Of Failed 141 Class

1. Secure the locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2.
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full service and leave the locomotive brake handle applied.

Coupling And Preparation Of Assisting 201 Class

1. Ease up to failed 141 class.
2. In the cab, from which the assisting manoeuvre will be made (i.e. the 201 or 9000 class), apply the train brake handle to emergency.
3. Attach and screw up shackle. Couple brake (red) and main res (yellow) hoses between the locomotives and open the air cocks for these hoses. Open one of the independent equalising (green) hose cocks on the failed 141 class.

Assistance Conducted From The 201 Class (Propelling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi and vacuum gauge building to 18ins minimum.

Assistance Conducted From The 9000 Class (Hauling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi.

IMPORTANT

- **If the brake pipe fails to build and main res falls continuously, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed 141 class. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**
- **If the brake cylinders on the failed 141 class do not release when the brake pipe builds to 68 – 72 psi, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed 141 class. Observe that when the main res tanks are blown down completely, the brake cylinders have released. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**
- **The brakes on the failed 141 class will not react to activation of the locomotive or train brake handle on the 9000/201 class. Only in the case of divide of the failed 141 class from the push/pull train will the brakes apply.**

Brake Continuity Test

The brake continuity test must be carried out between the driving cab of the push/pull train and one cab of the failed 141 class if light engine, or the rearmost vehicle of the train attached to the failed 141 class.

Before proceeding, ensure that brake cylinders are released on the failed 141 class, all scotches are removed and all handbrakes are released.

Resultant Brake Control Available

ON DRIVING CAB OF ASSISTING PUSH/PULL TRAIN -

Full braking control of assisting push/pull train and air braked train attached to failed 141 class. Brakes on failed 141 class will not apply.

ON OTHER CABS OF ASSISTING PUSH/PULL TRAIN -

Brakes applied on assisting push/pull train and air braked train attached to failed 141 class, by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

ON PASSENGER SALOONS OF PUSH/PULL TRAIN -

The emergency passenger door release pushbuttons will apply brakes on assisting push/pull train and air braked train attached to failed 141 class. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

ON FAILED 141 CLASS -

Brakes applied on assisting push/pull train and air braked train attached to failed 141 class by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

ON AIR BRAKED PASSENGER TRAIN ATTACHED TO FAILED 141 CLASS -

The passenger communication valves and guard's brake valves will apply brakes on push/pull train and air braked train attached to failed 141 class. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

DIVIDE OF VEHICLES

Divide of brake pipe hoses will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

Conditions Governing The Assisting Movement

PREPARATION

(i) Assisting driver must drive from the leading cab of the push/pull train.

HAULING MOVEMENT

(i) Passengers must be detrained from the push/pull train prior to carrying out the movement.

(ii) Speed must not exceed 64km/h (40mph) or the maximum permitted for any vehicle on the train whichever is the more restrictive. If the permitted speed for any portion of line is less than 80 km/h (50 mph), then speed must be reduced by 16km/h (10mph) below this permitted speed subject to a lower limit of 8km/h (5mph).

(iii) Driver of the failed 141 class should remain on the failed locomotive.

(iv) Movement is permitted only to the next interlocking or station where the failed 141 class and its train, if attached, can be disposed of.

PROPELLING MOVEMENT

(i) Brakesman must travel in the leading cab of the failed 141 class.

(ii) Speed of movement must not exceed 32km/h (20mph) when the brakesman is a driver. If the permitted speed for any portion of line is less than 32km/h (20mph), then speed must be reduced to 8 km/h (5mph).

Speed of movement must not exceed 16km/h (10mph) when the brakesman is other than a driver. If the permitted speed for any portion of line is less than 16km/h (10mph), then speed must be reduced to 8 km/h (5mph).

(iii) Movement is permitted only to the next interlocking or station where the failed 141 class can be disposed of.

Unable To Release Brakes On The Failed 141 Class Due To Damage

Where for example air brake pipes are broken due to collision etc. the following now applies:

(i) In movement (18) the failed 141 class can only be moved as a loose coupled vehicle.

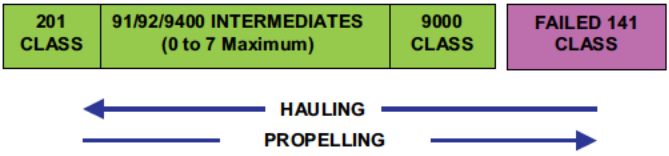
(ii) In movement (19) it is permitted to proceed with the failed 141 class unbraked provided a continuous brake is available on its train in rear. If this is not possible the failed 141 class must be removed as a loose coupled vehicle separately.

A. ASSISTING MOTIVE POWER UNIT COUPLING TO FAILED 141 CLASS

A5. ASSISTANCE FROM PUSH/PULL TRAIN - 9000 CLASS WITH 201 CLASS MOTIVE POWER, PART 2.

Permitted Consists

(20)



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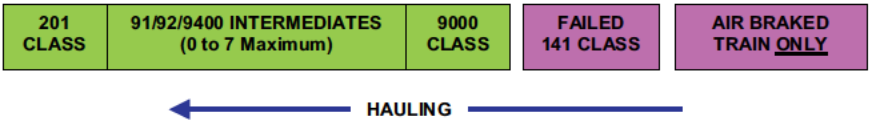


Preparation Of Failed 141 Class

1. Secure the locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2.
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full service and leave the locomotive brake handle applied.

Coupling And Preparation Of Assisting 9000 Class

1. Ease up to failed 141 class.
2. In the cab, from which the assisting manoeuvre will be made (i.e. the 201 or 9000 class), apply the train brake handle to emergency.
3. Attach shackle. Couple brake (red) and main res (yellow) hoses between the 9000 class and the failed 141 class and open the air cocks for these hoses. Open one of the independent equalising (green) hose cocks on the failed 141 class.

Assistance Conducted From The 201 Class (Hauling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi and vacuum gauge building to 18ins minimum.

Assisting Conducted From The 9000 Class (Propelling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi.

IMPORTANT

- **If the brake pipe fails to build and main res falls continuously, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed 141 class. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**
- **If the brake cylinders on the failed 141 class do not release when the brake pipe builds to 68 – 72 psi, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed 141 class. Observe that when the main res tanks are blown down completely, the brake cylinders have released. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**
- **The brakes on the failed 141 class will not react to activation of the locomotive or train brake handle on the 9000/201 class. Only in the case of divide of the failed 141 class from the push/pull train will the brakes apply.**

Brake Continuity Test

The brake continuity test must be carried out between the driving cab of the push/pull train and one cab of the failed 141 class if light engine, or the rearmost vehicle of the train attached to the failed 141 class.

Before proceeding, ensure that brake cylinders are released on the failed 141 class, all scotches are removed and all handbrakes are released.

Resultant Brake Control Available

ON DRIVING CAB OF ASSISTING PUSH/PULL TRAIN -

Full braking control of assisting push/pull train and air braked train attached to failed 141 class. Brakes on failed 141 class will not apply.

ON OTHER CABS OF ASSISTING PUSH/PULL TRAIN -

Brakes applied on assisting push/pull train and air braked train attached to failed 141 class, by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

ON PASSENGER SALOONS OF PUSH/PULL TRAIN -

The emergency passenger door release pushbuttons will apply brakes on assisting push/pull train and air braked train attached to failed 141 class. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

ON FAILED 141 CLASS -

Brakes applied on assisting push/pull train and air braked train attached to failed 141 class by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

ON AIR BRAKED PASSENGER TRAIN ATTACHED TO FAILED 141 CLASS -

The passenger communication valves and guard's brake valves will apply brakes on push/pull train and air braked train attached to failed 141 class. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

DIVIDE OF VEHICLES -

Divide of brake pipe hoses will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

Conditions Governing The Assisting Movement

PREPARATION

(i) Assisting driver must drive from the leading cab of the push/pull train.

HAULING MOVEMENT

(i) Passengers must be detrained from the push/pull train prior to carrying out the movement.

(ii) Speed must not exceed 64km/h (40mph) or the maximum permitted for any vehicle on the train whichever is the more restrictive. If the permitted speed for any portion of line is less than 80 km/h (50 mph), then speed must be reduced by 16km/h (10mph) below this permitted speed subject to a lower limit of 8km/h (5mph).

(iii) Driver of the failed 141 class should remain on the failed locomotive.

(iv) Movement is permitted only to the next interlocking or station where the failed 141 class and its train, if attached, can be disposed of.

PROPELLING MOVEMENT

(i) Brakesman must travel in the leading cab of the failed 141 class.

(ii) Speed of movement must not exceed 32km/h (20mph) when the brakesman is a driver. If the permitted speed for any portion of line is less than 32km/h (20mph), then speed must be reduced to 8 km/h (5mph).

Speed of movement must not exceed 16km/h (10mph) when the brakesman is other than a driver. If the permitted speed for any portion of line is less than 16km/h (10mph), then speed must be reduced to 8 km/h (5mph).

(iii) Movement is permitted only to the next interlocking or station where the failed 141 class can be disposed of.

Unable To Release Brakes On The Failed 141 Class Due To Damage

Where for example air brake pipes are broken due to collision etc. the following now applies:

(i) In movement (20) the failed 141 class can only be moved as a loose coupled vehicle.

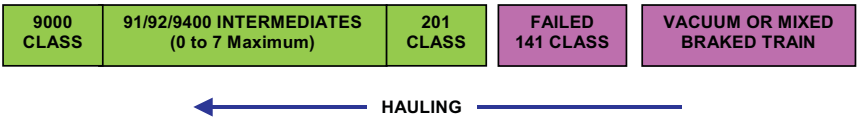
(ii) In movement (21) it is permitted to proceed with the failed 141 class unbraked provided a continuous brake is available on its train in rear. If this is not possible the failed 141 class must be removed as a loose coupled vehicle separately.

A. ASSISTING MOTIVE POWER UNIT COUPLING TO FAILED 141 CLASS

A5. ASSISTANCE FROM PUSH/PULL TRAIN - 9000 CLASS WITH 201 CLASS MOTIVE POWER, PART 3.

Permitted Movements

(22)



Preparation Of Failed 141 Class

1. Secure the locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2.
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full service and leave the locomotive brake handle applied.

Coupling And Preparation Of Assisting 201 Class

1. Ease up to failed 141 class.
2. In the 201 cab, from which the assisting manoeuvre will be made, apply the train brake handle to emergency.
3. Attach and screw up shackle. Couple brake (red) and main res (yellow) hoses between the locomotives and open the air cocks for these hoses. Couple vacuum hoses. Open one of the independent equalising (green) hose cocks on the failed 141 class.

Assistance Conducted From The 201 Class (Hauling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi and vacuum gauge building to 18ins minimum.

IMPORTANT

- **If the brake pipe fails to build and main res falls continuously, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed 141 class. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**
- **If the brake cylinders on the failed 141 class do not release when the brake pipe builds to 68 – 72 psi, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed 141 class. Observe that when the main res tanks are blown completely, the brake cylinders have released. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**
- **The brakes on the failed 141 class will not react to activation of the locomotive or train brake handle on the 201 class. Only in the case of divide of the failed 141 class from the push/pull train will the brakes apply.**

Brake Continuity Test

The brake continuity test must be carried out between the driving cab of the 201 class and

(i) the rearmost vehicle of a vacuum braked train attached to the failed 141 class

(ii) the rearmost vehicle of each of the air and vacuum portions of a mixed braked train attached to the failed 141 class.

Before proceeding, ensure that brake cylinders are released on the failed 141 class, all scotches are removed and all handbrakes are released.

Resultant Brake Control Available

ON DRIVING CAB OF ASSISTING PUSH/PULL TRAIN -

Full braking control of assisting push/pull train and vacuum or mixed braked train attached to failed 141 class. Brakes on failed 141 class will not apply.

ON OTHER CABS OF ASSISTING PUSH/PULL TRAIN -

Brakes applied on assisting push/pull train and vacuum or mixed braked train attached to failed 141 class, by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

ON PASSENGER SALOONS OF PUSH/PULL TRAIN -

The emergency passenger door release pushbuttons will apply brakes on assisting push/pull train and vacuum or mixed braked train attached to failed 141 class. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

ON FAILED 141 CLASS -

Brakes applied on assisting push/pull train and vacuum or mixed braked train attached to failed 141 class by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

ON VACUUM BRAKED PASSENGER TRAIN ATTACHED TO FAILED 141 CLASS -

The passenger communication valves and guard's brake valves will apply the brakes on the vacuum braked vehicles only. The guard's brake valve, only, will cut power and light the PC lamp on the assisting push/pull train provided vacuum is dropped to 0 ins. Brakes will not apply automatically on the assisting push/pull train. Brakes on failed 141 class will not apply.

DIVIDE OF VEHICLES -

Divide of brake pipe hoses will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

Divide of vacuum hoses will apply the brakes on the vacuum braked vehicles only. Power will be cut and PC lamp will light on assisting push/pull train. Brakes will not apply automatically on the assisting push/pull train. Brakes on failed 141 class will not apply.

Conditions Governing The Assisting Movement

PREPARATION

(i) Assisting driver must drive from the cab of the 201 class.

HAULING MOVEMENT

(i) Passengers must be detrained from the push/pull train prior to carrying out the movement.

(ii) Brakesman must travel in the cab of the 9000 class.

(iii) Speed of movement must not exceed 32km/h (20mph) when the brakesman is a driver. If the permitted speed for any portion of line is less than 32km/h (20mph), then speed must be reduced to 8 km/h (5mph).

Speed of movement must not exceed 16km/h (10mph) when the brakesman is other than a driver. If the permitted speed for any portion of line is less than 16km/h (10mph), then speed must be reduced to 8 km/h (5mph).

(iv) Movement is permitted only to the next interlocking or station where the failed 141 class and its train can be disposed of.

Unable To Release Brakes On The Failed 141 Class Due To Damage

Where for example air brake pipes are broken due to collision etc. the following now applies:

(i) In this movement it is permitted to proceed with the failed 141 class unbraked provided a continuous brake is available on its train in rear. If this is not possible the failed 141 class must be removed as a loose coupled vehicle separately.

Where for example the vacuum pipe only is broken due to collision etc., do not connect vacuum hoses between the 201 class and failed 141 class. The following now applies:

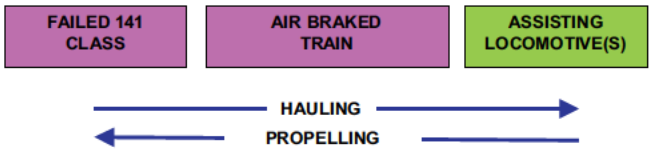
(i) In this movement the failed 141 class must be removed separately from its train (see permitted movement (18) in this subsection A5).

B. ASSISTING MOTIVE POWER UNIT COUPLING TO AIR BRAKED TRAIN IN REAR OF FAILED 141 CLASS

B1. ASSISTANCE FROM BGM (121,141 OR 181), 2 X BGM, 071 OR 201 CLASS.

Permitted Movements

(23)



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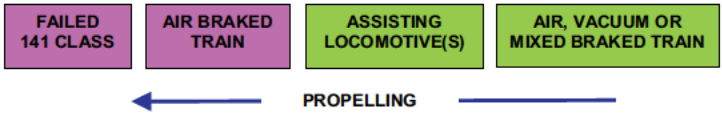


Preparation Of Failed 141 Class

1. Secure the locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2.
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full service and leave the locomotive brake handle applied.

Coupling And Preparation Of Assisting Locomotive(s)

1. Ease up to air braked train in rear of failed 141 class.
2. In the cab, from which the assisting manoeuvre will be made, apply the train brake handle to emergency.
3. Attach shackle. Couple brake (red) and main res (yellow) hoses between the locomotive and the train and open the air cocks for these hoses. Open one of the independent equalising (green) hose cocks on the failed 141 class.
4. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
5. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi and vacuum gauge building to 18ins minimum.

IMPORTANT

- **If the brake pipe fails to build and main res falls continuously, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed 141 class. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**
- **If the brake cylinders on the failed 141 class do not release when the brake pipe builds to 68 – 72 psi, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed 141 class. Observe that when the main res tanks are blown completely, the brake cylinders have released. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**
- **The brakes on the failed 141 class will not react to activation of the locomotive or train brake handle on the 201 class. Only in the case of divide of brake pipe and main res hoses between vehicles will the brakes apply on the failed 141 class.**

Brake Continuity Test

The brake continuity test must be carried out between the driving cab of the assisting locomotive(s) and the furthest cab of the failed 141 class.

Before proceeding, ensure that brake cylinders are released on the failed 141 class, all scotches are removed and all handbrakes are released.

Resultant Brake Control Available

ON DRIVING CAB OF ASSISTING LOCOMOTIVE(S) -

Full braking control of assisting locomotive(s), air braked vehicles attached to failed 141 class and air or vacuum braked vehicles attached to assisting locomotive(s). Brakes on failed 141 class will not apply.

ON OTHER CAB(S) OF ASSISTING LOCOMOTIVE(S) -

Brakes applied on air braked vehicles attached to failed 141 class, assisting locomotive(s) and air or vacuum braked vehicles attached to assisting locomotive(s), by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting locomotive(s). Brakes on failed 141 class will not apply.

ON FAILED 141 CLASS -

Brakes applied on air braked vehicles attached to failed 141 class, assisting locomotive(s) and air or vacuum braked vehicles attached to assisting locomotive(s), by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting locomotive(s). Brakes on failed 141 class will not apply.

ON AIR BRAKED PASSENGER TRAIN ATTACHED TO FAILED 141 CLASS OR ON AIR BRAKED PASSENGER TRAIN ATTACHED TO ASSISTING LOCOMOTIVE(S) -

The passenger communication valves and guard's brake valves will apply brakes on air braked vehicles attached to failed 141 class, assisting locomotive(s) and air (or vacuum) braked vehicles attached to assisting locomotive(s), by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting locomotive(s). Brakes on failed 141 class will not apply.

ON VACUUM BRAKED PASSENGER TRAIN ATTACHED TO ASSISTING LOCOMOTIVE(S) -

The passenger communication valves and guard's brake valves will apply the brakes on the vacuum braked vehicles only. The guard's brake valve, only, will cut power and light the PC lamp on the assisting locomotive(s), provided vacuum is dropped to 0 ins. Brakes will not apply automatically on the assisting locomotive(s) or air braked train attached to the failed 141 class. Brakes on failed 141 class will not apply.

DIVIDE OF VEHICLES -

Divide of brake pipe hoses will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting locomotive(s).

Divide of vacuum hoses will apply the brakes on the vacuum braked vehicles only. Power will be cut and PC lamp will light on assisting locomotive(s). Brakes will not apply automatically on the assisting locomotive(s) or air braked train attached to the failed 141 class. Brakes on failed 141 class will not apply.

Conditions Governing The Assisting Movement

PREPARATION

(i) Assisting driver must drive from the leading cab.

HAULING MOVEMENT

(i) **Wrong direction** - Speed must not exceed 32km/h (20mph). If the permitted speed for any portion of line is less than 32km/h (20mph), then speed must be reduced to 8 km/h (5mph).

(ii) Driver of the failed 141 class should remain on the failed locomotive.

(iii) Movement (23) is permitted only to the next interlocking or station where the failed 141 class can be disposed of or the movement changed to an allowed hauling movement.

PROPELLING MOVEMENT

(i) Brakesman must travel in the leading cab of the failed 141 class.

(ii) Speed of movement must not exceed 32km/h (20mph) when the brakesman is a driver. If the permitted speed for any portion of line is less than 32km/h (20mph), then speed must be reduced to 8 km/h (5mph).

Speed of movement must not exceed 16km/h (10mph) when the brakesman is other than a driver. If the permitted speed for any portion of line is less than 16km/h (10mph), then speed must be reduced to 8 km/h (5mph).

(iii) Movement (23) is permitted only to the next interlocking or station where the failed 141 class can be disposed of or the movement changed to an allowed hauling movement.

(iv) Movement (24) is permitted only to the next interlocking or station where the failed 141 class and its train can be disposed of.

Unable To Release Brakes On The Failed 141 Class Due To Damage

Where for example air brake pipes are broken on the failed 141 class due to collision etc. the following now applies:

(i) In movement (23) & (24) the failed 141 class can only be moved as a loose coupled vehicle. The train and failed 141 class can be removed complete under the following conditions:

(a) In movement (23) by hauling if station or interlocking in rear is within one mile of the failure location and there is no rising gradient greater than 1 in 200.

(b) In movement (23) & (24) by propelling if station or interlocking ahead is within one mile of the failure location and there is no falling gradient greater than 1 in 200.

If these conditions cannot be met

(a) In movement (23) the failed 141 class must be removed as a loose coupled vehicle separately.

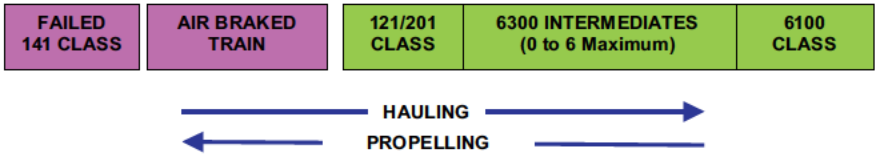
(b) Movement (24) is not permitted. Assistance can only be provided by an Assisting Motive Power Unit Coupling to Failed 141 Class.

B. ASSISTING MOTIVE POWER UNIT COUPLING TO AIR BRAKED TRAIN IN REAR OF FAILED 141 CLASS

B2. ASSISTANCE FROM PUSH/PULL TRAIN - 6100 CLASS WITH 121 OR 201 CLASS MOTIVE POWER, PART 1.

Permitted Movements

(25)



Preparation Of Failed 141 Class

1. Secure the locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2.
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full service and leave the locomotive brake handle applied.

Coupling And Preparation Of Assisting 121/201 Class

1. Ease up to air braked train in rear of failed 141 class.
2. In the cab, from which the assisting manoeuvre will be made (i.e. the assisting 121/201 or 6100 class), apply the train brake handle to emergency.
3. Attach and screw up shackle. Couple brake (red) and main res (yellow) hoses between the 121/201 class and the train and open the air cocks for these hoses. Open one of the independent equalising (green) hose cocks on the failed 141 class.

Assistance Conducted From The Assisting 121/201 Class (Propelling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi and vacuum gauge building to 18ins minimum.

Assistance Conducted From The 6100 Class (Hauling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi.

IMPORTANT

- **If the brake pipe fails to build and main res falls continuously, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed 141 class. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**
- **If the brake cylinders on the failed 141 class do not release when the brake pipe builds to 68 – 72 psi, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed 141 class. Observe that when the main res tanks are blown completely, the brake cylinders have released. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**
- **The brakes on the failed 141 class will not react to activation of the locomotive or train brake handle on the 201 class. Only in the case of divide of brake pipe and main res hoses between vehicles will the brakes apply on the failed 141 class.**

Brake Continuity Test

The brake continuity test must be carried out between the driving cab of the push/pull train and the furthest cab of the failed 141 class.

Before proceeding, ensure that brake cylinders are released on the failed 141 class, all scotches are removed and all handbrakes are released.

Resultant Brake Control Available

ON DRIVING CAB OF ASSISTING PUSH/PULL TRAIN -

Full braking control of push/pull train and air braked vehicles attached to failed 141 class. Brakes on failed 141 class will not apply.

ON OTHER CABS OF ASSISTING PUSH/PULL TRAIN -

Brakes applied on assisting push/pull train and air braked vehicles attached to failed 141 class, by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

ON PASSENGER SALOONS OF PUSH/PULL TRAIN -

The passenger communication valves will apply brakes on assisting push/pull train and air braked vehicles attached to failed 141 class. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

ON FAILED 141 CLASS -

Brakes applied on assisting push/pull train and air braked vehicles attached to failed 141 class, by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

ON AIR BRAKED PASSENGER TRAIN ATTACHED TO FAILED 141 CLASS -

The passenger communication valves and guard's brake valves will apply brakes on assisting push/pull train and air braked vehicles attached to failed 141 class. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

DIVIDE OF VEHICLES -

Divide of brake pipe hoses will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

Conditions Governing The Assisting Movement

PREPARATION

(i) Assisting driver must drive from the leading cab.

HAULING MOVEMENT

(i) Passengers must be detrained from the push/pull train prior to carrying out the movement.

(ii) **Wrong direction -** Speed must not exceed 32km/h (20mph). If the permitted speed for any portion of line is less than 32km/h (20mph), then speed must be reduced to 8 km/h (5mph).

(iii) Driver of the failed 141 class should remain on the failed locomotive.

(iv) This movement is permitted only to the next interlocking or station where the failed 141 class and its train can be disposed of.

PROPELLING MOVEMENT

(i) Brakesman must travel in the leading cab of the failed 141 class.

(ii) Speed of movement must not exceed 32km/h (20mph) when the brakesman is a driver. If the permitted speed for any portion of line is less than 32km/h (20mph), then speed must be reduced to 8 km/h (5mph).

Speed of movement must not exceed 16km/h (10mph) when the brakesman is other than a driver. If the permitted speed for any portion of line is less than 16km/h (10mph), then speed must be reduced to 8 km/h (5mph).

(iii) This movement is permitted only to the next interlocking or station where the failed 141 class and its train can be disposed of.

Unable To Release Brakes On The Failed 141 Class Due To Damage

Where for example air brake pipes are broken on the failed 141 class due to collision etc. the following now applies:

(i) In this movement the failed 141 class can only be moved as a loose coupled vehicle. The train and failed 141 class can be removed complete under the following conditions:

a) By hauling if station or interlocking in rear is within one mile of the failure location and there is no rising gradient greater than 1 in 200.

b) By propelling if station or interlocking ahead is within one mile of the failure location and there is no falling gradient greater than 1 in 200.

If these conditions cannot be met

(a) The failed 141 class must be removed as a loose coupled vehicle separately.

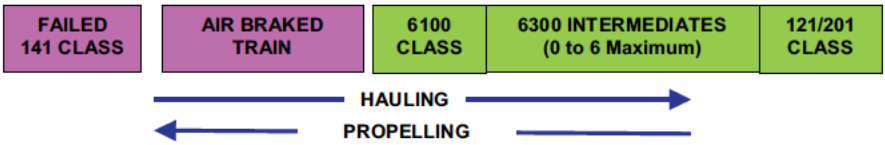
NOTES

B. ASSISTING MOTIVE POWER UNIT COUPLING TO AIR BRAKED TRAIN IN REAR OF FAILED 141 CLASS

B2. ASSISTANCE FROM PUSH/PULL TRAIN - 6100 CLASS WITH 121 OR 201 CLASS MOTIVE POWER, PART 2.

Permitted Movements

(26)



Preparation Of Failed 141 Class

1. Secure the locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2.
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full service and leave the locomotive brake handle applied.

Coupling And Preparation Of Assisting 6100 Class

1. Ease up to air braked train in rear of failed 141 class.
2. In the cab, from which the assisting manoeuvre will be made (i.e. the assisting 121/201 or 6100 class), apply the train brake handle to emergency.
3. Attach shackle. Couple brake (red) and main res (yellow) hoses between the 6100 class and the train and open the air cocks for these hoses. Open one of the independent equalising (green) hose cocks on the failed 141 class.

Assistance Conducted From The Assisting 121/201 Class (Hauling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi and vacuum gauge building to 18ins minimum.

Assistance Conducted From The 6100 Class Propelling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi.

IMPORTANT

> **If the brake pipe fails to build and main res falls continuously, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed 141 class. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**

> **If the brake cylinders on the failed 141 class do not release when the brake pipe builds to 68 – 72 psi, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed 141 class. Observe that when the main res tanks are blown down completely, the brake cylinders have released. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**

> **The brakes on the failed 141 class will not react to activation of the locomotive or train brake handle on the assisting push/pull train. Only in the case of divide of brake pipe and main res hoses between vehicles will the brakes apply on the failed 141 class.**

Brake Continuity Test

The brake continuity test must be carried out between the driving cab of the push/pull train and one cab of the failed 141 class.

Before proceeding, ensure that brake cylinders are released on the 141 class, all scotches are removed and all handbrakes are released.

Resultant Brake Control Available

ON DRIVING CAB OF ASSISTING PUSH/PULL TRAIN -

Full braking control of push/pull train and air braked vehicles attached to failed 141 class. Brakes on failed 141 class will not apply.

ON OTHER CABS OF ASSISTING PUSH/PULL TRAIN -

Brakes applied on assisting push/pull train and air braked vehicles attached to failed 141 class, by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

ON PASSENGER SALOONS OF PUSH/PULL TRAIN -

The passenger communication valves will apply brakes on assisting push/pull train and air braked vehicles attached to failed 141 class. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

ON FAILED 141 CLASS -

Brakes applied on assisting push/pull train and air braked vehicles attached to failed 141 class, by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

ON AIR BRAKED PASSENGER TRAIN ATTACHED TO FAILED 141 CLASS -

The passenger communication valves and guard's brake valves will apply brakes on assisting push/pull train and air braked vehicles attached to failed 141 class. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

DIVIDE OF VEHICLES -

Divide of brake pipe hoses will apply brakes on all vehicles. Power will be cut and PC lamp will light on push/pull train.

Conditions Governing The Assisting Movement

PREPARATION

(i) Assisting driver must drive from the leading cab.

HAULING MOVEMENT

(i) Passengers must be detrained from the push/pull train prior to carrying out the movement.

(ii) **Wrong direction -** Speed must not exceed 32km/h (20mph). If the permitted speed for any portion of line is less than 32km/h (20mph), then speed must be reduced to 8 km/h (5mph).

(iii) Driver of the failed 141 class should remain on the failed locomotive.

(iv) This movement is permitted only to the next interlocking or station where the failed 141 class and its train can be disposed of.

PROPELLING MOVEMENT

(i) Brakesman must travel in the leading cab of the failed 141 class.

(ii) Speed of movement must not exceed 32km/h (20mph) when the brakesman is a driver. If the permitted speed for any portion of line is less than 32km/h (20mph), then speed must be reduced to 8 km/h (5mph).

Speed of movement must not exceed 16km/h (10mph) when the brakesman is other than a driver. If the permitted speed for any portion of line is less than 16km/h (10mph), then speed must be reduced to 8 km/h (5mph).

(iii) This movement is permitted only to the next interlocking or station where the failed 141 class and its train can be disposed of.

Unable To Release Brakes On The Failed 141 Class Due To Damage

Where for example air brake pipes are broken on the failed 141 class due to collision etc. the following now applies:

(i) In this movement the failed 141 class can only be moved as a loose coupled vehicle. The train and failed 141 class can be removed complete under the following conditions:

a) By hauling if station or interlocking in rear is within one mile of the failure location and there is no rising gradient greater than 1 in 200.

b) By propelling if station or interlocking ahead is within one mile of the failure location and there is no falling gradient greater than 1 in 200.

If these conditions cannot be met

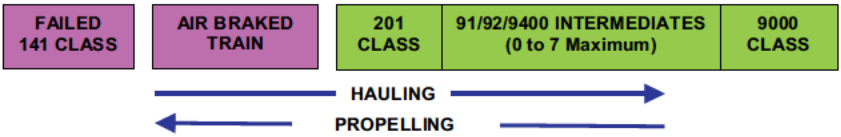
(a) The failed 141 class must be removed as a loose coupled vehicle separately.

B. ASSISTING MOTIVE POWER UNIT COUPLING TO AIR BRAKED TRAIN IN REAR OF FAILED 141 CLASS

B3. ASSISTANCE FROM PUSH/PULL TRAIN - 9000 CLASS WITH 201 CLASS MOTIVE POWER, PART 1.

Permitted Movements

(27)



Preparation Of Failed 141 Class

1. Secure the locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2.
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full service and leave the locomotive brake handle applied.

Coupling And Preparation Of Assisting 201 Class

1. Ease up to air braked train in rear of failed 141 class.
2. In the cab, from which the assisting manoeuvre will be made (i.e. the 201 or 9000 class), apply the train brake handle to emergency.
3. Attach and screw up shackle. Couple brake (red) and main res (yellow) hoses between the 201 class and the train and open the air cocks for these hoses. Open one of the independent equalising (green) hose cocks on the failed 141 class.

Assistance Conducted From The 201 Class (Propelling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi and vacuum gauge building to 18ins minimum.

Assisting Conducted From The 9000 Class (Hauling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi.

IMPORTANT

- **If the brake pipe fails to build and main res falls continuously, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed 141 class. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**
- **If the brake cylinders on the failed 141 class do not release when the brake pipe builds to 68 – 72 psi, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed 141 class. Observe that when the main res tanks are blown down completely, the brake cylinders have released. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**
- **The brakes on the failed 141 class will not react to activation of the locomotive or train brake handle on the assisting push/pull train. Only in the case of divide of brake pipe and main res hoses between vehicles will the brakes apply on the failed 141 class.**

Brake Continuity Test

The brake continuity test must be carried out between the driving cab of the push/pull train and one cab of the failed 141 class.

Before proceeding, ensure that brake cylinders are released on the 141 class, all scotches are removed and all handbrakes are released.

Resultant Brake Control Available

ON DRIVING CAB OF ASSISTING PUSH/PULL TRAIN -

Full braking control of push/pull train and air braked vehicles attached to failed 141 class. Brakes on failed 141 class will not apply.

ON OTHER CABS OF ASSISTING PUSH/PULL TRAIN -

Brakes applied on assisting push/pull train and air braked vehicles attached to failed 141 class, by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

ON PASSENGER SALOONS OF PUSH/PULL TRAIN -

The emergency passenger door release pushbutton will apply brakes on assisting push/pull train and air braked vehicles attached to failed 141 class. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

ON FAILED 141 CLASS -

Brakes applied on assisting push/pull train and air braked vehicles attached to failed 141 class, by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

ON AIR BRAKED PASSENGER TRAIN ATTACHED TO FAILED 141 CLASS -

The passenger communication valves and guard's brake valves will apply brakes on assisting push/pull train and air braked vehicles attached to failed 141 class. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

DIVIDE OF VEHICLES -

Divide of brake pipe hoses will apply brakes on all vehicles. Power will be cut and PC lamp will light on assisting push/pull train.

Conditions Governing The Assisting Movement

PREPARATION

(i) Assisting driver must drive from the leading cab.

HAULING MOVEMENT

(i) Passengers must be detrained from the push/pull train prior to carrying out the movement.

(ii) **Wrong direction -** Speed must not exceed 32km/h (20mph). If the permitted speed for any portion of line is less than 32km/h (20mph), then speed must be reduced to 8 km/h (5mph).

(iii) Driver of the failed 141 class should remain on the failed locomotive.

(iv) This movement is permitted only to the next interlocking or station where the failed 141 class and its train can be disposed of.

PROPELLING MOVEMENT

(i) Brakesman must travel in the leading cab of the failed 141 class.

(ii) Speed of movement must not exceed 32km/h (20mph) when the brakesman is a driver. If the permitted speed for any portion of line is less than 32km/h (20mph), then speed must be reduced to 8 km/h (5mph).

Speed of movement must not exceed 16km/h (10mph) when the brakesman is other than a driver. If the permitted speed for any portion of line is less than 16km/h (10mph), then speed must be reduced to 8 km/h (5mph).

(iii) This movement is permitted only to the next interlocking or station where the failed 141 class and its train can be disposed of.

Unable To Release Brakes On The Failed 141 Class Due To Damage

Where for example air brake pipes are broken on the failed 141 class due to collision etc. the following now applies:

(i) In this movement the failed 141 class can only be moved as a loose coupled vehicle. The train and failed 141 class can be removed complete under the following conditions:

a) By hauling if station or interlocking in rear is within one mile of the failure location and there is no rising gradient greater than 1 in 200.

b) By propelling if station or interlocking ahead is within one mile of the failure location and there is no falling gradient greater than 1 in 200.

If these conditions cannot be met

(a) The failed 141 class must be removed as a loose coupled vehicle separately.

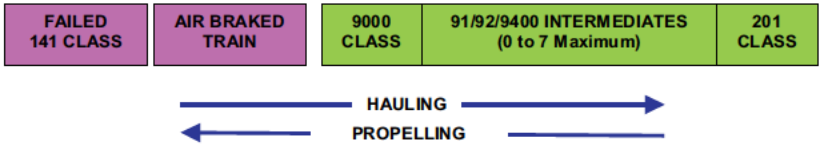
NOTES

B. ASSISTING MOTIVE POWER UNIT COUPLING TO AIR BRAKED TRAIN IN REAR OF FAILED 141 CLASS

B3. ASSISTANCE FROM PUSH/PULL TRAIN - 9000 CLASS WITH 201 CLASS MOTIVE POWER, PART 2.

Permitted Movements

(28)



Preparation Of Failed 141 Class

1. Secure the locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full service and leave the locomotive brake handle applied.

Coupling And Preparation Of Assisting 9000 Class

1. Ease up to air braked train in rear of failed 141 class.
2. In the cab, from which the assisting manoeuvre will be made (i.e. the 201 or 9000 class), apply the train brake handle to emergency.
3. Attach shackle. Couple brake (red) and main res (yellow) hoses between the 9000 class and the train and open the air cocks for these hoses. Open one of the independent equalising (green) hose cocks on the failed 141 class.

Assistance Conducted From The 201 Class (Hauling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi and vacuum gauge building to 18ins minimum.

Assisting Conducted From The 9000 Class (Propelling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi.

IMPORTANT

- **If the brake pipe fails to build and main res falls continuously, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed 121 class. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**
- **If the brake cylinders on the failed 121 class do not release when the brake pipe builds to 68 – 72 psi, apply the train brake handle to emergency again. Open the drain cocks and blow down the main res tanks completely on the failed 121 class. Observe that when the main res tanks are blown down completely, the brake cylinders have released. Close the drain cocks. Allow main res pressure to build again and then release the train brake handle.**
- **The brakes on the failed 141 class will not react to activation of the locomotive or train brake handle on the assisting push/pull train. Only in the case of divide of brake pipe and main res hoses between vehicles will the brakes apply on the failed 141 class.**

Brake Continuity Test

The brake continuity test must be carried out between the driving cab of the push/pull train and the furthest cab of the failed 141 class.

Before proceeding, ensure that brake cylinders are released on the 141 class, all scotches are removed and all handbrakes are released.

Resultant Brake Control Available

ON DRIVING CAB OF ASSISTING PUSH/PULL TRAIN -

Full braking control of push/pull train and air braked vehicles attached to failed 141 class. Brakes on failed 141 class will not apply.

ON OTHER CABS OF ASSISTING PUSH/PULL TRAIN -

Brakes applied on assisting push/pull train and air braked vehicles attached to failed 141 class, by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

ON PASSENGER SALOONS OF PUSH/PULL TRAIN -

The emergency passenger door release pushbutton will apply brakes on assisting push/pull train and air braked vehicles attached to failed 141 class. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

ON FAILED 141 CLASS -

Brakes applied on assisting push/pull train and air braked vehicles attached to failed 141 class, by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

ON AIR BRAKED PASSENGER TRAIN ATTACHED TO FAILED 141 CLASS -

The passenger communication valves and guard's brake valves will apply brakes on assisting push/pull train and air braked vehicles attached to failed 141 class. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

DIVIDE OF VEHICLES -

Divide of brake pipe hoses will apply brakes on all vehicles. Power will be cut and PC lamp will light on push/pull train.

Conditions Governing The Assisting Movement

PREPARATION

(i) Assisting driver must drive from the leading cab.

HAULING MOVEMENT

(i) Passengers must be detrained from the push/pull train prior to carrying out the movement.

(ii) **Wrong direction -** Speed must not exceed 32km/h (20mph). If the permitted speed for any portion of line is less than 32km/h (20mph), then speed must be reduced to 8 km/h (5mph).

(iii) Driver of the failed 141 class should remain on the failed locomotive.

(iv) This movement is permitted only to the next interlocking or station where the failed 141 class and its train can be disposed of.

PROPELLING MOVEMENT

(i) Brakesman must travel in the leading cab of the failed 141 class.

(ii) Speed of movement must not exceed 32km/h (20mph) when the brakesman is a driver. If the permitted speed for any portion of line is less than 32km/h (20mph), then speed must be reduced to 8 km/h (5mph).

Speed of movement must not exceed 16km/h (10mph) when the brakesman is other than a driver. If the permitted speed for any portion of line is less than 16km/h (10mph), then speed must be reduced to 8 km/h (5mph).

(iii) This movement is permitted only to the next interlocking or station where the failed 141 class and its train can be disposed of.

Unable To Release Brakes On The Failed 141 Class Due To Damage

Where for example air brake pipes are broken on the failed 141 class due to collision etc. the following now applies:

(i) In this movement the failed 141 class can only be moved as a loose coupled vehicle. The train and failed 141 class can be removed complete under the following conditions:

a) By hauling if station or interlocking in rear is within one mile of the failure location and there is no rising gradient greater than 1 in 200.

b) By propelling if station or interlocking ahead is within one mile of the failure location and there is no falling gradient greater than 1 in 200.

If these conditions cannot be met

(a) The failed 141 class must be removed as a loose coupled vehicle separately.

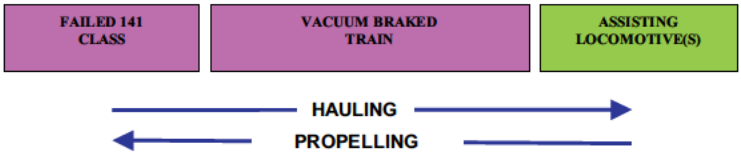
NOTES

C. ASSISTING MOTIVE POWER UNIT COUPLING TO VACUUM BRAKED TRAIN IN REAR OF FAILED 141 CLASS

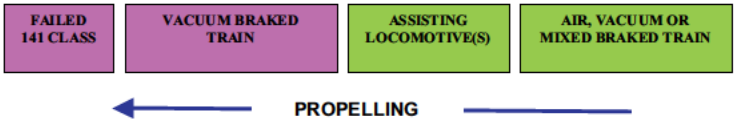
C1. ASSISTANCE FROM BGM (121,141 OR 181), 2 X BGM, 071 OR 201 CLASS FAILED 141 CLASS ENGINE IS RUNNING AND NO BRAKE FAULT.

Permitted Movements

(29)



(30)



Initial Preparation Of Failed 141 Class

1. Secure the locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2.
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full service and leave the locomotive brake handle applied.

Coupling And Preparation Of Assisting Locomotive(s)

1. Ease up to vacuum braked train in rear of failed 141 class.
2. In the cab, from which the assisting manoeuvre will be made, apply the train brake handle to emergency.
3. Attach and screw up shackle. Couple vacuum hoses between the locomotive and the train.

Further Preparation Of Failed 141 Class

(In a consist do this on one locomotive only)

1. Switch start/run switch to run.
2. Switch on eng run switch.
3. Cut in MU2.
4. Put forward/reverse handle in the direction of the movement.
5. Reset the deadman and release the train brake handle. Observe brake pipe gauge building to 68 - 72 psi. Vacuum gauge will not build at this stage.
6. Release the locomotive brake handle. Reset the deadman and CAWS as required to prevent brakes applying.

Assistance conducted from the assisting locomotive(s) (hauling/propelling)

1. Keeping the train brake handle in emergency. Allow main res air pressure to build to 100 - 120 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi and vacuum gauge building to 18 ins minimum.

IMPORTANT

> **The fault on the failed 141 class may cause the trainline alarm bell to ring when the start/run switch is switched to run. If this happens, return the start/run switch to isolate to silence the bell. You will then have to isolate the deadman to allow you release the brakes on the failed 141 class.**

Brake Continuity Test

The brake continuity test must be carried out between the driving cab of the assisting locomotive(s) and the furthest cab of the failed 141 class.

Before proceeding, ensure that brake cylinders are releasing on the 141 class, all scotches are removed and all handbrakes are released.

Resultant Brake Control Available

ON DRIVING CAB OF ASSISTING LOCOMOTIVE(S) -

Full braking control of assisting locomotive(s), vacuum braked vehicles attached to failed 141 class and air or vacuum braked vehicles attached to assisting locomotive(s). Brakes on failed 141 class will not apply automatically.

ON OTHER CAB(S) OF ASSISTING LOCOMOTIVE(S) -

Brakes applied on vacuum braked vehicles attached to failed 141 class, assisting locomotive(s) and air or vacuum braked vehicles attached to assisting locomotive(s), by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting locomotive(s). Brakes on failed 141 class will not apply automatically.

ON FAILED 141 CLASS -

Brakes applied on failed 141 class and all vacuum braked vehicles only by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting locomotive(s). Brakes will not apply automatically on assisting locomotive(s) or air braked vehicles.

ON AIR BRAKED PASSENGER TRAIN ATTACHED TO ASSISTING LOCOMOTIVE(S) -

The passenger communication valves and guard's brake valves will apply brakes on assisting locomotive(s), air braked vehicles and vacuum braked vehicles. Power will be cut and PC lamp will light on assisting locomotive(s). Brakes will not apply automatically on failed 141 class.

ON VACUUM BRAKED PASSENGER TRAIN ATTACHED TO ASSISTING LOCOMOTIVE(S) OR FAILED 141 CLASS -

The passenger communication valves and guard's brake valves will apply the brakes on the vacuum braked vehicles only. The guard's brake valve, only, will cut power and light the PC lamp on the assisting locomotive(s), provided vacuum is dropped to 0 ins. Brakes will not apply automatically on the assisting locomotive(s), failed 141 class or air braked vehicles.

DIVIDE OF VEHICLES -

Divide of brake pipe hoses will apply brakes on assisting locomotive(s), air braked vehicles and vacuum braked vehicles. Power will be cut and PC lamp will light on assisting locomotive(s). Brakes will not apply automatically on the failed 141 class.

Divide of vacuum hoses will apply the brakes on the vacuum braked vehicles only. Power will be cut and PC lamp will light on assisting locomotive(s). Brakes will not apply automatically on the assisting locomotive(s), failed 141 class, or air braked vehicles.

Conditions Governing The Assisting Movement

PREPARATION

(i) Assisting driver must drive from the leading cab.

HAULING MOVEMENT

(i) **Wrong direction -** Speed of movement must not exceed 16km/h (10mph).

(ii) Brakesman must travel on the failed locomotive.

(iii) Movement (29) is permitted only to the next interlocking or station where the failed 141 class can be disposed of or the movement changed to an allowed hauling movement.

PROPELLING MOVEMENT

(i) Speed of movement must not exceed 16km/h (10mph).

(ii) Brakesman must travel in the leading cab of the failed 141 class.

(iii) Movement (29) is permitted only to the next interlocking or station where the failed 141 class can be disposed of or the movement changed to an allowed hauling movement.

(iv) Movement (30) is permitted only to the next interlocking or station where the failed 141 class and its train can be disposed of.

Unable To Release Brakes On The Failed 141 Class Due To Damage

See next section.

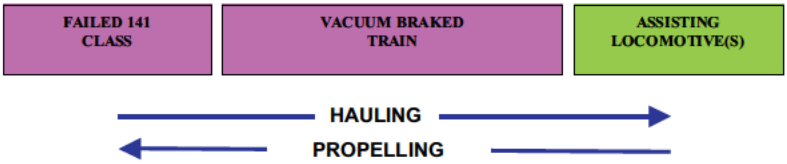
NOTES

C. ASSISTING MOTIVE POWER UNIT COUPLING TO VACUUM BRAKED TRAIN IN REAR OF FAILED 141 CLASS

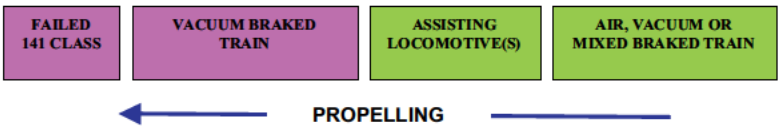
C2. ASSISTANCE FROM BGM (121,141 OR 181), 2 X BGM, 071 OR 201 CLASS FAILED 141 CLASS ENGINE IS SHUT DOWN OR FAILED 141 CLASS HAS BRAKE FAULT.

Permitted Movements

(31)



(32)



Initial Preparation Of Failed 141 Class

1. Secure the locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2.
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full service and leave the locomotive brake handle applied.

Coupling And Preparation Of Assisting Locomotive(s)

1. Ease up to vacuum braked train in rear of failed 141 class.
2. In the cab, from which the assisting manoeuvre will be made, apply the train brake handle to emergency.
3. Attach and screw up shackle. Couple vacuum hoses between the locomotive(s) and the train.
4. Keeping the train brake handle in emergency, ensure main res air pressure is at 100 – 130 psi.
5. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi and vacuum gauge building to 18ins minimum.

Further Preparation Of Failed 141 Class

1. Open the drain cocks and blow down the main res tanks completely on the failed 141 class. Observe that when the main res tanks are blown down completely, the brake cylinders have released.

IMPORTANT

> **Having blown down the main res tanks, the service brake on the failed 141 class is now inoperable. The handbrake is the only brake available on the locomotive.**

Brake Continuity Test

The brake continuity test must be carried out between the driving cab of the assisting locomotive(s) and one cab of the failed 141 class.

Before proceeding, ensure that brake cylinders are released on the 141 class, all scotches are removed and all handbrakes are released.

Resultant Brake Control Available

ON DRIVING CAB OF ASSISTING LOCOMOTIVE(S) -

Full braking control of assisting locomotive(s), vacuum braked vehicles attached to failed 141 class and air or vacuum braked vehicles attached to assisting locomotive(s). Brakes on failed 141 class will not apply.

ON OTHER CAB(S) OF ASSISTING LOCOMOTIVE(S) -

Brakes applied on vacuum braked vehicles attached to failed 141 class, assisting locomotive(s) and air or vacuum braked vehicles attached to assisting locomotive(s), by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting locomotive(s). Brakes on failed 141 class will not apply.

ON FAILED 141 CLASS -

Brakes applied on all vacuum braked vehicles only by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting locomotive(s). Brakes will not apply automatically on assisting locomotive(s) or air braked vehicles. Brakes on failed 141 class will not apply.

ON AIR BRAKED PASSENGER TRAIN ATTACHED TO ASSISTING LOCOMOTIVE(S) -

The passenger communication valves and guard's brake valves will apply brakes on assisting locomotive(s), air braked vehicles and vacuum braked vehicles. Power will be cut and PC lamp will light on assisting locomotive(s). Brakes will not apply on failed 141 class.

ON VACUUM BRAKED PASSENGER TRAIN ATTACHED TO ASSISTING LOCOMOTIVE(S) -

The passenger communication valves and guard's brake valves will apply the brakes on the vacuum braked vehicles only. The guard's brake valve, only, will cut power and light the PC lamp on the assisting locomotive(s), provided vacuum is dropped to 0 ins. Brakes will not apply automatically on the assisting locomotive(s) or air braked vehicles. Brakes will not apply on the failed 141 class.

DIVIDE OF VEHICLES -

Divide of brake pipe hoses will apply brakes on assisting locomotive(s), air braked vehicles and vacuum braked vehicles. Power will be cut and PC lamp will light on assisting locomotive(s). Brakes will not apply on the failed 141 class.

Divide of vacuum hoses will apply the brakes on the vacuum braked vehicles only. Power will be cut and PC lamp will light on assisting locomotive(s). Brakes will not apply automatically on the assisting locomotive(s) or air braked vehicles. Brakes will not apply on the failed 141 class.

Conditions Governing The Assisting Movement

PREPARATION

(i) Assisting driver must drive from the leading cab.

HAULING MOVEMENT

(i) **Wrong direction -** Speed of movement must not exceed 16km/h (10mph).

(ii) Brakesman must travel on the failed 141 class.

(iii) Movement (31) is permitted only if station or interlocking in rear is within one mile of the failure location and there is no rising gradient greater than 1 in 200.

(iv) When the section is cleared the failed 141 class can be disposed of or the movement changed to an allowed hauling movement.

PROPELLING MOVEMENT

(i) Speed of movement must not exceed 16km/h (10mph).

(ii) Brakesman must travel in the leading cab of the failed 141 class.

(iii) Movement (31) and (32) are permitted only if station or interlocking ahead is within one mile of the failure location and there is no falling gradient greater than 1 in 200.

(iv) When the section is cleared, in movement (31), the failed 141class can be disposed of or the movement changed to an allowed hauling movement.

If these conditions cannot be met

(i) In movement (31) the failed locomotive and train must be removed in two separate movements.

(ii) Movement (32) is not permitted. Assistance can only be provided by an Assisting Motive Power Unit Coupling to Failed 141 Class.

Damage To Vacuum Pipe On The Failed 141 Class

(i) Where for example the vacuum pipe is broken due to collision etc., remove the failed 141 class separately.

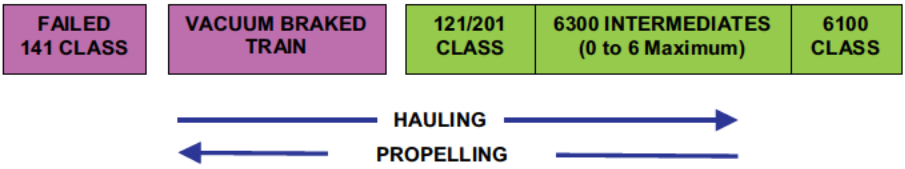
NOTES

C. ASSISTING MOTIVE POWER UNIT COUPLING TO VACUUM BRAKED TRAIN IN REAR OF FAILED 141 CLASS

C3. ASSISTANCE FROM PUSH/PULL TRAIN - 6100 CLASS WITH 121 OR 201 CLASS MOTIVE POWER FAILED 141 CLASS ENGINE IS RUNNING AND NO BRAKE FAULT

Permitted Movements

(33)



Initial Preparation Of Failed 141 Class

1. Secure the locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2.
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full service and leave the locomotive brake handle applied.

Coupling And Preparation Of Assisting 121/201 Class

1. Ease up to vacuum braked train in rear of failed 141 class.
2. In the 121/201 cab, from which the assisting manoeuvre will be made, apply the train brake handle to emergency.
3. Attach and screw up shackle. Couple vacuum hoses between the locomotive and the train.

Further Preparation Of Failed 141 Class

(In a consist do this on one locomotive only)

1. Switch start/run switch to run.
2. Switch on eng run switch.
3. Cut in MU2.
4. Put forward/reverse handle in the direction of the movement.
5. Reset the deadman and release the train brake handle. Observe brake pipe gauge building to 68 - 72 psi. Vacuum gauge will not build at this stage.
6. Release the locomotive brake handle. Reset the deadman and CAWS as required to prevent brakes applying.

IMPORTANT

> **The fault on the failed 141 class may cause the trainline alarm bell to ring when the start/run switch is switched to run. If this happens, return the start/run switch to isolate to silence the bell. You will then have to isolate the deadman to allow you release the brakes on the failed 141 class.**

Assistance Conducted From The 121/201 Class (hauling/propelling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi and vacuum gauge building to 18ins minimum.

Brake Continuity Test

The brake continuity test must be carried out between the driving cab of the 121/201 class and the furthest cab of the failed 141 class.

Before proceeding, ensure that brake cylinders are releasing on the 141 class, all scotches are removed and all handbrakes are released.

Resultant Brake Control Available

ON DRIVING CAB OF ASSISTING PUSH/PULL TRAIN -

Full braking control of push/pull train and vacuum braked vehicles attached to failed 141 class. Brakes on failed 141 class will not apply automatically.

ON OTHER CAB(S) OF PUSH/PULL TRAIN -

Brakes applied on assisting push/pull train and vacuum braked vehicles attached to failed 141 class, by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply automatically.

ON PASSENGER SALOONS OF PUSH/PULL TRAIN -

The passenger communication valves will apply brakes on assisting push/pull train and vacuum braked vehicles attached to failed 141 class. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply automatically.

ON FAILED 141 CLASS -

Brakes applied on failed 141 class and all vacuum braked vehicles only by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train. Brakes will not apply automatically on assisting push/pull train.

ON VACUUM BRAKED PASSENGER TRAIN ATTACHED TO FAILED 141 CLASS -

The passenger communication valves and guard's brake valves will apply the brakes on the vacuum braked vehicles only. The guard's brake valve, only, will cut power and light the PC lamp on the assisting push/pull train, provided vacuum is dropped to 0 ins. Brakes will not apply automatically on the assisting push/pull train or failed 141 class.

DIVIDE OF VEHICLES -

Divide of brake pipe hoses will apply brakes on assisting push/pull train and vacuum braked vehicles. Power will be cut and PC lamp will light on assisting push/pull train. Brakes will not apply automatically on the failed 141 class.

Divide of vacuum hoses will apply the brakes on the vacuum braked vehicles only. Power will be cut and PC lamp will light on assisting push/pull train. Brakes will not apply automatically on the assisting push/pull train or failed 141 class.

Conditions Governing The Assisting Movement

PREPARATION

(i) Assisting driver must drive from the cab of the 121/201 class.

HAULING MOVEMENT

(i) Passengers must be detrained from the push/pull train prior to carrying out the movement.

(ii) **Wrong direction -** Speed of movement must not exceed 16km/h (10mph).

(iii) Brakesman must travel on the failed 141 class.

(iv) Brakesman must travel in the cab of the 6100 class.

(v) This movement is permitted only to the next interlocking or station where the failed 141 class and its train can be disposed of.

PROPELLING MOVEMENT

(i) Speed of movement must not exceed 16km/h (10mph).

(ii) Brakesman must travel in the leading cab of the failed 141 class.

(iii) This movement is permitted only to the next interlocking or station where the failed 141 class and its train can be disposed of.

Unable To Release Brakes On The Failed 141 Class Due To Damage

See next section.

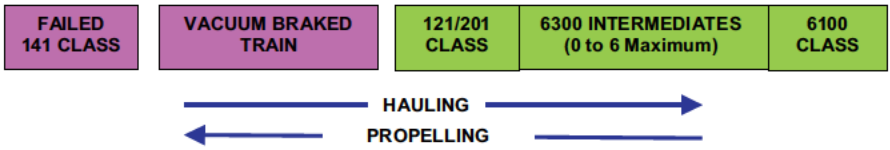
NOTES

C. ASSISTING MOTIVE POWER UNIT COUPLING TO VACUUM BRAKED TRAIN IN REAR OF FAILED 141 CLASS

C4. ASSISTANCE FROM PUSH/PULL TRAIN - 6100 CLASS WITH 121 OR 201 CLASS MOTIVE POWER FAILED 141 CLASS ENGINE IS SHUT DOWN OR FAILED 141 CLASS HAS BRAKE FAULT

Permitted Movements

(34)



Preparation Of Failed 141 Class

1. Secure the locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2.
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full service and leave the locomotive brake handle applied.

Coupling And Preparation Of Assisting 121/201 Class

1. Ease up to vacuum braked train in rear of failed 141 class.
2. In the 121/201 cab, from which the assisting manoeuvre will be made, apply the train brake handle to emergency.
3. Attach and screw up shackle. Couple vacuum hoses between the locomotive and the train.

Further Preparation Of Failed 141 Class

1. Open the drain cocks and blow down the main res tanks completely on the failed 141 class. Observe that when the main res tanks are blown down completely, the brake cylinders have released.

IMPORTANT

> **Having blown down the main res tanks, the service brake on the failed 141 class is now inoperable. The handbrake is the only brake available on the locomotive.**

Assistance Conducted From The 121/201 Class (hauling & propelling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi and vacuum gauge building to 18ins minimum.

Brake Continuity Test

The brake continuity test must be carried out between the driving cab of the 121/201 class and furthest cab of the failed 141 class.

Before proceeding, ensure that brake cylinders are released on the 141 class, all scotches are removed and all handbrakes are released.

Resultant Brake Control Available

ON DRIVING CAB OF ASSISTING PUSH/PULL TRAIN -

Full braking control of push/pull train and vacuum braked vehicles attached to failed 141 class. Brakes on failed 141 class will not apply.

ON OTHER CAB(S) OF PUSH/PULL TRAIN -

Brakes applied on assisting push/pull train and vacuum braked vehicles attached to failed 141 class, by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

ON PASSENGER SALOONS OF PUSH/PULL TRAIN -

The passenger communication valves will apply brakes on assisting push/pull train and vacuum braked vehicles attached to failed 141 class. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

ON FAILED 141 CLASS -

Brakes applied on all vacuum braked vehicles only by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train. Brakes will not apply automatically on assisting push/pull train. Brakes on the failed 141 class will not apply.

ON VACUUM BRAKED PASSENGER TRAIN ATTACHED TO FAILED 141 CLASS -

The passenger communication valves and guard's brake valves will apply the brakes on the vacuum braked vehicles only. The guard's brake valve, only, will cut power and light the PC lamp on the assisting push/pull train, provided vacuum is dropped to 0 ins. Brakes will not apply automatically on the assisting push/pull train. Brakes on the failed 141 class will not apply.

DIVIDE OF VEHICLES -

Divide of brake pipe hoses will apply brakes on assisting push/pull train and vacuum braked vehicles. Power will be cut on assisting push/pull train. Brakes on the failed 141 class will not apply.

Divide of vacuum hoses will apply the brakes on the vacuum braked vehicles only. Power will be cut on assisting push/pull train. Brakes will not apply automatically on the assisting push/pull train. Brakes on the failed 141 class will not apply.

Conditions Governing The Assisting Movement

PREPARATION

(i) Assisting driver must drive from the cab of the 121/201 class.

HAULING MOVEMENT

(i) Passengers must be detrained from the push/pull train prior to carrying out the movement.

(ii) **Wrong direction -** Speed of movement must not exceed 16km/h (10mph).

(iii) Brakesman must travel on the failed 141 class.

(iv) Brakesman must travel in the cab of the 6100 class.

(v) This movement is permitted only if station or interlocking in rear is within one mile of the failure location and there is no rising gradient greater than 1 in 200.

PROPELLING MOVEMENT

(i) Speed of movement must not exceed 16km/h (10mph).

(ii) Brakesman must travel in the leading cab of the failed 141 class.

(iii) This movement is permitted only if station or interlocking ahead is within one mile of the failure location and there is no falling gradient greater than 1 in 200.

If the above conditions cannot be met

(i) This movement is not permitted. Assistance can only be provided by an Assisting Motive Power Unit Coupling to Failed 141 Class.

Damage To Vacuum Pipe On The Failed 141 Class

Where for example the vacuum pipe is broken due to collision etc., remove the failed 141 class separately.

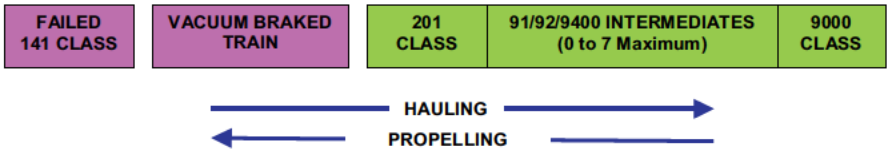
NOTES

C. ASSISTING MOTIVE POWER UNIT COUPLING TO VACUUM BRAKED TRAIN IN REAR OF FAILED 141 CLASS

C5. ASSISTANCE FROM PUSH/PULL TRAIN - 9000 CLASS WITH 201 CLASS MOTIVE POWER FAILED 141 CLASS ENGINE IS RUNNING AND NO BRAKE FAULT

Permitted Movements

(35)



Initial Preparation Of Failed 141 Class

1. Secure the locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2.
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full service and leave the locomotive brake handle applied.

Coupling And Preparation Of Assisting 201 Class

1. Ease up to vacuum braked train in rear of failed 141 class.
2. In the 201 cab, from which the assisting manoeuvre will be made, apply the train brake handle to emergency.
3. Attach and screw up shackle. Couple vacuum hoses between the locomotive and the train.

Further Preparation Of Failed 141 Class

(In a consist do this on one locomotive only)

1. Switch start/run switch to run.
2. Switch on eng run switch.
3. Cut in MU2.
4. Put forward/reverse handle in the direction of the movement.
5. Reset the deadman and release the train brake handle. Observe brake pipe gauge building to 68 - 72 psi. Vacuum gauge will not build at this stage.
6. Release the locomotive brake handle. Reset the deadman and CAWS as required to prevent brakes applying.

IMPORTANT

> **The fault on the failed 141 class may cause the trainline alarm bell to ring when the start/run switch is switched to run. If this happens, return the start/run switch to isolate to silence the bell. You will then have to isolate the deadman to allow you release the brakes on the failed 141 class.**

Assistance Conducted From The 201 Class (hauling & propelling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 - 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi and vacuum gauge building to 18ins minimum.

Brake Continuity Test

The brake continuity test must be carried out between the driving cab of the 201 class and the furthest cab of the failed 141 class.

Before proceeding, ensure that brake cylinders are releasing on the 141 class, all scotches are removed and all handbrakes are released.

Resultant Brake Control Available

ON DRIVING CAB OF ASSISTING PUSH/PULL TRAIN -

Full braking control of push/pull train and vacuum braked vehicles attached to failed 141 class. Brakes on failed 141 class will not apply automatically.

ON OTHER CAB(S) OF PUSH/PULL TRAIN -

Brakes applied on assisting push/pull train and vacuum braked vehicles attached to failed 141 class, by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply automatically.

ON PASSENGER SALOONS OF PUSH/PULL TRAIN -

The emergency passenger door release pushbutton will apply brakes on assisting push/pull train and vacuum braked vehicles attached to failed 141 class. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply automatically.

ON FAILED 141 CLASS -

Brakes applied on failed 141 class and all vacuum braked vehicles only by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train. Brakes will not apply automatically on assisting push/pull train.

ON VACUUM BRAKED PASSENGER TRAIN ATTACHED TO FAILED 141 CLASS -

The passenger communication valves and guard's brake valves will apply the brakes on the vacuum braked vehicles only. The guard's brake valve, only, will cut power and light the PC lamp on the assisting push/pull train, provided vacuum is dropped to 0 ins. Brakes will not apply automatically on the assisting push/pull train or failed 141 class.

DIVIDE OF VEHICLES -

Divide of brake pipe hoses will apply brakes on assisting push/pull train and vacuum braked vehicles. Power will be cut and PC lamp will light on assisting push/pull train. Brakes will not apply automatically on the failed 141 class.

Divide of vacuum hoses will apply the brakes on the vacuum braked vehicles only. Power will be cut and PC lamp will light on assisting push/pull train. Brakes will not apply automatically on the assisting push/pull train or failed 141 class.

Conditions Governing The Assisting Movement

PREPARATION

(i) Assisting driver must drive from the cab of the 201 class.

HAULING MOVEMENT

(i) Passengers must be detrained from the push/pull train prior to carrying out the movement.

(ii) **Wrong direction -** Speed of movement must not exceed 16km/h (10mph).

(iii) Brakesman must travel on the failed 141 class.

(iv) Brakesman must travel in the cab of the 9000 class.

(v) This movement is permitted only to the next interlocking or station where the failed 141 class and its train can be disposed of.

PROPELLING MOVEMENT

(i) Speed of movement must not exceed 16km/h (10mph).

(ii) Brakesman must travel in the leading cab of the failed 141 class.

(iii) This movement is permitted only to the next interlocking or station where the failed 141 class and its train can be disposed of.

Unable To Release Brakes On The Failed 141 Class Due To Damage

See next section.

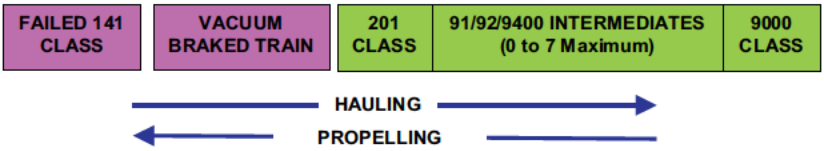
NOTES

C. ASSISTING MOTIVE POWER UNIT COUPLING TO VACUUM BRAKED TRAIN IN REAR OF FAILED 141 CLASS

C6. ASSISTANCE FROM PUSH/PULL TRAIN - 9000 CLASS WITH 201 CLASS MOTIVE POWER FAILED 141 CLASS ENGINE IS SHUT DOWN OR FAILED 141 CLASS HAS BRAKE FAULT

Permitted Movements

(36)



Preparation Of Failed 141 Class

1. Secure the locomotive.
2. Switch start/run switch to isolate.
3. Switch off eng run and gen field switches.
4. Remove control key.
5. Cut out MU2.
6. Apply the train brake handle to emergency to vent the brake pipe to 0 psi.
7. Return the train brake handle to full service and leave the locomotive brake handle applied.

Coupling And Preparation Of Assisting 201 Class

1. Ease up to vacuum braked train in rear of failed 141 class.
2. In the 201 cab, from which the assisting manoeuvre will be made, apply the train brake handle to emergency.
3. Attach and screw up shackle. Couple vacuum hoses between the locomotive and the train.

Further Preparation Of Failed 141 Class

1. Open the drain cocks and blow down the main res tanks completely on the failed 141 class. Observe that when the main res tanks are blown down completely, the brake cylinders have released.

IMPORTANT

> **Having blown down the main res tanks, the service brake on the failed 141 class is now inoperable. The handbrake is the only brake available on the locomotive.**

Assistance Conducted From The 201 Class (hauling & propelling)

1. Keeping the train brake handle in emergency, allow main res air pressure to build to 100 – 130 psi.
2. Release train brake handle. Observe brake pipe gauge building to 68 - 72 psi and vacuum gauge building to 18ins minimum.

Brake Continuity Test

The brake continuity test must be carried out between the driving cab of the 201 class and the furthest cab of the failed 141 class.

Before proceeding, ensure that brake cylinders are released on the 141 class, all scotches are removed and all handbrakes are released.

Resultant Brake Control Available

ON DRIVING CAB OF ASSISTING PUSH/PULL TRAIN -

Full braking control of push/pull train and vacuum braked vehicles attached to failed 141 class. Brakes on failed 141 class will not apply.

ON OTHER CAB(S) OF PUSH/PULL TRAIN -

Brakes applied on assisting push/pull train and vacuum braked vehicles attached to failed 141 class, by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

ON PASSENGER SALOONS OF PUSH/PULL TRAIN -

The emergency passenger door release pushbutton will apply brakes on assisting push/pull train and vacuum braked vehicles attached to failed 141 class. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on failed 141 class will not apply.

ON FAILED 141 CLASS -

Brakes applied on all vacuum braked vehicles only by opening the emergency brake valve or applying the train brake handle to emergency. Power will be cut and PC lamp will light on assisting push/pull train. Brakes will not apply automatically on assisting push/pull train. Brakes on the failed 141 class will not apply.

ON VACUUM BRAKED PASSENGER TRAIN ATTACHED TO FAILED 141 CLASS -

The passenger communication valves and guard's brake valves will apply the brakes on the vacuum braked vehicles only. The guard's brake valve, only, will cut power and light the PC lamp on the assisting push/pull train, provided vacuum is dropped to 0 ins. Brakes will not apply automatically on the assisting push/pull train. Brakes on the failed 141 class will not apply.

DIVIDE OF VEHICLES

Divide of brake pipe hoses will apply brakes on assisting push/pull train and vacuum braked vehicles. Power will be cut and PC lamp will light on assisting push/pull train. Brakes on the failed 141 class will not apply.

Divide of vacuum hoses will apply the brakes on the vacuum braked vehicles only. Power will be cut and PC lamp will light on assisting push/pull train. Brakes will not apply automatically on the assisting push/pull train. Brakes on the failed 141 class will not apply.

Conditions Governing The Assisting Movement

PREPARATION

(i) Assisting driver must drive from the cab of the 201 class.

HAULING MOVEMENT

(i) Passengers must be detrained from the push/pull train prior to carrying out the movement.

(ii) **Wrong direction -** Speed of movement must not exceed 16km/h (10mph).

(iii) Brakesman must travel on the failed 141 class.

(iv) Brakesman must travel in the cab of the 9000 class.

(v) This movement is permitted only if station or interlocking in rear is within one mile of the failure location and there is no rising gradient greater than 1 in 200.

PROPELLING MOVEMENT

(i) Speed of movement must not exceed 16km/h (10mph).

(ii) Brakesman must travel in the leading cab of the failed 141 class.

(iii) This movement is permitted only if station or interlocking ahead is within one mile of the failure location and there is no falling gradient greater than 1 in 200.

If the above conditions cannot be met

(i) This movement is not permitted. Assistance can only be provided by an Assisting Motive Power Unit Coupling to Failed 141 Class.

Damage To Vacuum Pipe On The Failed 141 Class

Where for example the vacuum pipe is broken due to collision etc., remove the failed 141 class separately.

NOTES

6. Information on Cork Kent station are its sheds in use and what do they store

1. Cork Depot

   Cork CME Platform Support is the owner/occupier of and maintains the Maintenance shed (LOCO Shed) and Maintenance service slab in Irish Rail Yard, Horgans Quay, Cork.
   The Loco Shed has 5 tracks entering that are currently used for the long term storage of 11 decommissioned 2700 class Diesel Multiple Units carriages and 1 decommissioned On Track Machine. The remainder of the shed is used for storage of parts, materials and equipment for the Local CME & Per Way departments.

   The Maintenance service slab is currently used for the daily running maintenance and servicing of the 2600 Diesel Multiple Units for the Cork Commuter Passenger services and the overnight running maintenance and servicing of the Tralee/Mallow Intercity 22000 Diesel Multiple units and Cork/Dublin MKIV Class Intercity units.

7. Finally, A list of all trains and locomotives in storage at Inchicore and at any other depots, this would include decommissioned trains and maintenance trains also

1. Trains stored at Inchicore and any other depots

   Trains are stored at Inchicore and Cork. This includes decommissioned trains also. Track Maintenance trains are operated from Kildare OTM depot.

   Units in Storage in Cork Depot:

   2609 & 2716 (2 car unit)

   2717 & 2718 (2 car unit)

   2713 & 2714 (2 car unit)

   2709 & 2710 (2 car unit)

   2719 & 2722 (2 car unit)

   2751 (single car unit)

   Plasser & Theurer 740 09-16 CAT-5/IR (OTM)

   List of Units in Storage in Inchicore :

   The list below shows all trains stored at Inchicore Works that are the property of Iarnrod Eireann and includes decommissioned trains. There are no maintenance trains stored at Inchicore Works.

   Note that there are other vehicles stored on the Inchicore site that are the property of other entities such as Belmond, the Railway preservation Society and are excluded from this list.

2701	Class 2700 Driving Motor Toilet M1
2703	Class 2700 Driving Motor Toilet M1
2705	Class 2700 Driving Motor Toilet M1
2707	Class 2700 Driving Motor Toilet M1
2711	Class 2700 Driving Motor Toilet M1
2715	Class 2700 Driving Motor Toilet M1
2721	Class 2700 Driving Motor Toilet M1
2723	Class 2700 Driving Motor Toilet M1
2702	Class 2700 Driving Motor M2
2704	Class 2700 Driving Motor M2
2706	Class 2700 Driving Motor M2
2708	Class 2700 Driving Motor M2
2712	Class 2700 Driving Motor M2
2720	Class 2700 Driving Motor M2
2724	Class 2700 Driving Motor M2
2726	Class 2700 Driving Motor M2
2753	Class 2700 Bi Driving Motor Toilet
8401	8400 Trailer
8402	8400 Trailer
8403	8400 Trailer
8404	8400 Trailer
8405	8400 Trailer
8201	8400 Motor
8202	8400 Motor
8203	8400 Motor
8204	8400 Motor
8205	8400 Motor
201	IE 201 Co'Co' Diesel Loco,
202	IE 201 Co'Co' Diesel Loco,
203	IE 201 Co'Co' Diesel Loco,
204	IE 201 Co'Co' Diesel Loco,
205	IE 201 Co'Co' Diesel Loco,
210	IE 201 Co'Co' Diesel Loco,
211	IE 201 Co'Co' Diesel Loco,
212	IE 201 Co'Co' Diesel Loco,
213	IE 201 Co'Co' Diesel Loco,

214	IE 201 Co'Co' Diesel Loco,
230	IE 201 Co'Co' Diesel Loco,