

BR 33003/92

March, 1961

DRIVING INSTRUCTIONS FOR
DIESEL MULTIPLE UNIT TRAINS
POWER CARS

(Mechanical or Hydraulic Transmission)

“BLUE SQUARE” COUPLING SYMBOLS

www.railcar.co.uk



**DRIVING INSTRUCTIONS FOR DIESEL
MULTIPLE-UNIT TRAINS
"BLUE SQUARE" COUPLING SYMBOLS**

GENERAL DESCRIPTION

Each power car is provided with one or two engines. Driving controls are provided at one end only of the power cars and each driving trailer. Driving controls are not provided in trailer cars. When the trains are marshalled a driving compartment must be on each end.

NOTE:- On certain trains power cars **without** driving controls are incorporated in the train.

POWER EQUIPMENT

Each power car is fitted with one or two engines coupled to either mechanical or hydraulic transmissions.

The h.p. range of the engines are as follows:-

B.U.T. Types of 150 and 230 h.p.

Rolls-Royce Types of 180 and 238 h.p.

The mechanical type transmission consists of:-

- (i) A fluid coupling.
- (ii) Wilson type 4-speed epicyclic gearbox (Electro-pneumatic operated).
- (iii) Final drive gearbox incorporating reversing arrangement consisting of axially sliding dog between bevel gears.

Hydraulic transmission Rolls-Royce type three stage torque converter.

Final drive gearbox Similar to mechanically driven cars.

DRIVER'S CONTROLS

In power cars and driving trailers.

1. Control switch (with Yale type removable key) and indicator light.
2. Throttle handle (engine speed) incorporating the Deadman's device.
3. Gear-drive selector handle (on hydraulic transmission cars drive selector handle incorporating gear positions for use when controlling "Blue Square" gearbox type cars).
4. Reversing lever (detachable).
5. Engine Start buttons.
6. Engine Stop button.
7. Engine indicator lights.
8. Air pressure and final drive direction indicator lights.

9. Control panel lights test button (i.e. engine and air indicator lights).
10. Engine Tachometer and Change speed indicator (in Rolls-Royce hydraulic transmission cars speedometer fitted instead of change speed indicator).
11. Dual horn control.
12. Speedometer (on R.R. hydraulic transmission cars change speed indicator incorporated—coloured sectors—yellow—white).
13. Air pressure gauge.
14. Vacuum gauge (Duplex).
15. Driver's brake valve (handle detachable).
16. Emergency vacuum brake valve.
17. Marker light and indicator light switches.
18. Route indicator light switches.
19. Instrument light switches and dimmer.
20. Windscreen wiper valves.
21. Change-over switch, engine speed (where applicable).
22. Destination indicator light switch.
23. Buzzer and buzzer button.
24. Handbrake.
25. Deadman's isolating valve (in power cars only).
26. Car heater switches.
27. Deadman's hold-over button.
28. Car and train light control.
29. Fire alarm bell.
30. Demister control lever.
31. Demister and cab heating switch.
32. A.W.S. key.
33. A.W.S. isolating cock.
34. A.W.S. indicator.
35. A.W.S. re-set button.
36. Loudaphone (when fitted).
37. Handbrake indicator light.

GENERAL INFORMATION

All control devices, e.g. (gear-drive selector, throttle handle (engine speed), reverser, etc., are operated by electro-pneumatic (E.P.) valves, therefore, **DO NOT USE FORCE WHEN MOVING CONTROL LEVERS OR HANDLES.**

The electrical control system of each car is complete in itself but may be linked to that of another car by electrical jumper connections.

Any failure of the air pressure system resulting in a severe drop in pressure will shut down the engine to IDLING.

Loss of engine oil pressure will extinguish the engine indicator light and stop the engine.

NOTE:- On single engined cars, twelve engine indicator lights are provided so that twin engined cars can be coupled and will indicate normally, but when the single engine of one of these cars is indicated, both R.H. and L.H. lamps will illuminate or go out together.

The throttle handle is also the Deadman's handle and if it is allowed to spring up the engines will drop down to IDLING speed and after 5 to 7 seconds delay the vacuum brake will be applied. To re-set the Deadman's device and regain control, the throttle handle must be moved back past the IDLING position before the handle can be depressed.

The gear-drive selector handle and the reversing lever are mechanically interlocked. The gear-drive selector handle is locked in the NEUTRAL position and cannot be moved until the reversing lever is moved to the FORWARD or REVERSE position.

The reversing lever cannot be moved unless the gear-drive selector handle is in NEUTRAL.

SPECIAL NOTE

DO NOT MOVE THE GEAR-DRIVE SELECTOR HANDLE FROM THE NEUTRAL POSITION UNTIL READY TO START THE TRAIN, EXCEPT WHEN "TOGGLING UP" THE GEARBOX BRAKE BANDS, WHEN GEARBOX TYPE CARS ARE IN THE TRAIN.

DRIVER'S DAILY DUTIES WHEN IN SERVICE

At Commencement of Turn

1. Obtain the satchel containing the control switch key, reversing lever, vacuum brake handle, A.W.S. key and carriage keys.
2. Check that—
 - (a) the detonator cases are intact in all Driving Compartments;
 - (b) the Deadman's isolating valve covers **are intact** in all Power Cars. If a cover is not intact it must be reported;
 - (c) the handbrake is ON in the leading driving compartment;
 - (d) **THE HANDBRAKES ARE OFF IN ALL TRAILING COMPARTMENTS.**
3. The over-ride switch is in the ON position (where fitted).
4. **LOCK ALL DOORS OF TRAILING DRIVING COMPARTMENTS.**

At a convenient time during Turn

1. Make a short inspection of the train and check that the apparatus is generally in good working condition. Check fuel tank levels.
2. "Toggle up" the gearbox brake bands as follows when any gearbox type cars are in the train:-
 - (a) Check that full air pressure is available.
 - (b) STOP the engines.
 - (c) Hold the Deadman's device in the RUNNING position.
 - (d) With the reversing lever in FORWARD position, move the

gear-drive selector handle to engage 1st, 2nd and 3rd gears (not 4th) about six times, pausing in each gear position to allow the brake bands to engage fully.

- (e) Return the gear-drive selector handle to NEUTRAL.
- (f) Re-start the engines.

REPORT ALL KNOWN DEFECTS AT END OF TURN.

STARTING THE ENGINES

1. Place A.W.S. key into position and move to ON. Turn the control switch key to the ON position.
2. Check that the gear-drive selector handle is locked in the NEUTRAL position, i.e. reversing lever removed from controller, and that the handbrake is ON.
3. If at least 75 lbs./sq. in. air pressure is available in the system, and the engines are warm, they may be started from the driving compartment. The procedure is as follows:-
 - (a) Place the reversing lever into position and move it to FORWARD or REVERSE to obtain control of the equipment in the driving compartment.
 - (b) Depress the throttle handle to engage the Deadman's device, then move it to 1st or 2nd throttle position.
 - (c) Twin engined cars:- Press left and right "Start" buttons in turn and release each immediately the indicator lights show that all engines on that bank have been started. **DO NOT PRESS BOTH "START" BUTTONS TOGETHER.** When all engines have started, return throttle handle to IDLING position.
 - (d) On single engine cars:- Press either start button and release immediately the indicator lights show that the engines have started. **DO NOT PRESS BOTH "START" BUTTONS TOGETHER.** When all the engines have started return throttle handle to IDLING position.

Should the train consist in part of single engined power cars and the remainder twin engined cars, the starting procedure for twin engined cars should be employed. In these circumstances, depressing one of the "start" buttons will start ALL the engines on the single engined cars and one bank of the twin engined cars. Depressing the other start button will start the remaining bank of engines on the latter cars.

- (e) Check that the air indicator lights have illuminated, indicating that the final drives are correctly engaged. If not, with the engines running at IDLING speed—
 - (i) to engage remaining final drives of any Gearbox cars in the train, place reversing lever to the opposite direction of travel—pause—and then re-select required direction of travel.
 - (ii) to engage remaining final drives of Hydraulic Transmission, torque converter cars, depress Deadman's handle for at least five seconds.

NOTE:- If an engine does not start, i.e., its indicator light is not illuminated within approximately three seconds, release "Start" button for not less than 10 seconds to allow engine to come to rest before pressing the button again.

If an engine refuses to start, check that the engine isolating switch is in the ON position. Check fuel tank contents gauge for fuel content and ensure that the fuel cock is open. Then start engine locally as shown in Item 4 (c-e). STOP the engine, proceed to the driving compartment and start all engines in the normal manner.

4. If 75 lbs./sq. in. air pressure is not available in the system or the engines are cold, they must be started individually from the side of the car. The procedure is as follows:-

- (a) Check that the control switch key is in the ON position.
- (b) Check that the gear-drive selector handle is locked in the NEUTRAL position AND THE REVERSING LEVER REMOVED FROM THE CONTROLLER, and that the handbrake is ON.

At Side of Car

- (c) On B.U.T. type engines—Pull the fuel injection pump handle throttle to Full Open position and hold it there.
On Rolls-Royce type engines—Select excess fuel by depressing the button on the engine governor, then pull the fuel injection pump handle throttle control to FULL OPEN position and hold it there.
- (d) Press the "Start" button, which is located on a small panel beside the engine, and release it immediately the engine starts.
- (e) Release the fuel injection pump hand throttle control gradually until the engine runs at IDLING speed—do not race the engine.
- (f) Start the other engines in a similar manner, then return to the driving cab.
- (g) When the air pressure in the system has built up to 75 lbs./sq. in. STOP all engines, then place the reversing lever into position in the controller and move it to FORWARD, also place A.W.S. key into position and move it to ON to obtain control of the equipment in the driving compartment, then proceed to re-start the engine as shown in Item 3 (b-e).

NOTE:- If an engine does not start within approximately three seconds, release "Start" button for not less than 10 seconds to allow the engine to come to rest before pressing the button again.

WITH THE ENGINES RUNNING

- (a) Place the brake handle into position, depress and hold down the throttle handle to obtain control of the Deadman's device, then move the brake handle to the RELEASE position. The A.W.S. apparatus must be reset by pressing and releasing the "reset button." Check that 21 ins. of vacuum can be obtained in the

train pipe and remains steady at not less than 19 ins. by returning the brake valve handle to LAP position. There should be at least 26 ins. on the high vacuum reservoir side gauge.

This is to ensure that there is sufficient vacuum in the top side of the brake cylinders for the efficient operation of the brake.

NOTE:- The time required to obtain 21 ins. of vacuum in the top side of the brake cylinders after the strings have been pulled on a vehicle or vehicles should not be less than $1\frac{1}{2}$ minutes.

- (b) Return the vacuum brake handle to RELEASE position, then let go the throttle handle. Check that it springs up to the Deadman's position and that after 5 - 7 seconds' delay the brakes are applied.
- (c) Check that the air pressure has built up to approximately 95 lbs./sq. in.
- (d) Apply the vacuum brake and **RELEASE THE HANDBRAKE** in the driving compartment.

NOTE:- In future single unit diesel power cars will be fitted with an additional duplex vacuum gauge which will indicate the top side vacuum in each brake cylinder on the car only; at least 19 ins. must be registered on this gauge before moving off.

STARTING THE TRAIN

1. When the train consists of gearbox only, or gearbox and torque converter type cars:

- (a) Ensure that there is adequate vacuum on the reservoir side.
- (b) Obtain control of the Deadman's device and hold the throttle handle in the IDLING position.
- (c) Release the vacuum brake to about 15 ins. of vacuum then "lap" the brake valve.
- (d) **WITH THE ENGINES IDLING** move the drive selector handle to first gear position. (Do not pause in any other gear position).
- (e) Release the vacuum brake fully by placing the brake handle into the OFF position. The train should not be moved with the brakes dragging.
- (f) After a pause of **NOT LESS THAN TWO SECONDS** from the moment of selecting first gear, open the throttle notch by notch; the train will commence to move. As the speed increases, change gear as indicated on the engine speed indicator (tachometer) if driving from a gearbox car, or marked speedometer if driving from a torque converter car.

NOTE:- Never stand for more than a few seconds with a gear selected. If the brake fails to release, return the gear-drive selector handle to NEUTRAL.

2. When the train consists of torque converter cars only:

- (a) Ensure that there is adequate vacuum on the reservoir side.
- (b) Obtain control of the Deadman's device and hold the throttle handle in the IDLING position.

- (c) Release the vacuum brake to about 15 ins. of vacuum then "lap" the brake valve.
- (d) WITH THE ENGINES IDLING, move the gear-drive selector handle to the "D" position.
- (e) Release the vacuum brake fully by placing the brake handle into the OFF position. The train should not be moved with the brake dragging.
- (f) After a pause of NOT LESS THAN TWO SECONDS, open the throttle to full for maximum acceleration; the train will commence to move.
- (g) Converter drive is held up to approximately 46 m.p.h. when direct drive will automatically be engaged.

During the transition from converter to direct drive, the engines are automatically returned to IDLING and then speeded up again to a value appropriate to direct drive at that road speed.

When the train is retarded, converter drive is automatically re-engaged at approximately 39 m.p.h.

GEAR CHANGING

(a) Changing up

When the Engine Speed Indicator shows "Change Up" on gearbox type cars—or when the speedometer needle has moved up to the TOP end of a coloured sector on Torque Converter type cars:-

1. Return the throttle handle to IDLING position, then pause for 4 seconds.
2. Select the next higher gear.
3. PAUSE FOR TWO SECONDS, then re-open the throttle notch by notch.
4. Change gear progressively in the same manner until top gear is engaged.

N.B.: DO NOT MOVE THE GEAR-DRIVE SELECTOR HANDLE UNTIL THE ACTUAL GEAR CHANGE IS TO BE MADE.

(b) Changing Down

When the Engine Speed Indicator shows "Change Down" on gearbox type cars, or when the speedometer needle has fallen back to the appropriate colour sector on Torque Converter type cars:-

1. Return the throttle handle to IDLING position.
2. Immediately select the next lower gear.
3. Pause for TWO SECONDS, then re-open the throttle notch by notch.

N.B.: DO NOT MOVE THE GEAR-DRIVE SELECTOR HANDLE UNTIL THE ACTUAL GEAR CHANGE IS TO BE MADE.

(c) Automatic Lock-Out

If driving from a power car fitted with Torque Converters it

will automatically have its engines throttled back and direct drive will be selected at approximately 39 m.p.h. (the gear change on trailing gearbox type cars being controlled automatically from the torque converter car). No action is required by driver at this time. The change back to hydraulic drive is also automatic.

If driving with a gearbox type car leading, change gear progressively as shown under "gear changing" above.

COASTING (Gearbox Type Cars)

A free wheel is fitted on the propellor shaft between the fluid flywheel and the gearbox. When the maximum running speed required is obtained, to allow the train to coast:-

1. Return the throttle handle to IDLING position.
2. Place the gear-drive selector handle into the fourth gear position.

Re-opening the Throttle

If it is necessary to re-open the throttle, place the gear-drive selector handle into the appropriate gear then pause for TWO SECONDS before re-opening the throttle handle notch by notch.

NOTE:- The correct speeds are as follows:-

1st gear	0—15 m.p.h.
2nd gear	15—27 m.p.h.
3rd gear	27—41 m.p.h.
4th gear	over 41 m.p.h.

COASTING (Torque Converter Type Cars)

A free wheel is fitted within the torque converter to allow the propellor shaft to over-run.

1. Return the throttle handle to IDLING position.
2. Place the gear drive selector handle into the "D" position, on torque converter cars, and place it into 4th gear position on gearbox type cars.
3. Re-open the throttle only when it is required to maintain running speed.

If it is necessary to re-open the throttle when coupled to gearbox type cars, place the gear-drive selector handle into the appropriate gear position, then pause for FOUR SECONDS before re-opening the throttle handle notch by notch.

NOTE:- The correct speeds are as follows:-

(speedometer colour
sector)

Torque Converter Cars

1st gear	Yellow	0 - 16 m.p.h.
2nd gear	White	16 - 27 m.p.h.
3rd gear	Yellow	27 - 42 m.p.h.
4th gear	White	over 42 m.p.h.

STOPPING THE TRAIN

1. Return the throttle handle to IDLING and hold in that position.
2. Apply the vacuum brakes as required.

STOPPING THE TRAIN

1. Return the throttle handle to IDLING and hold in that position.
2. Apply the vacuum brake as required.
3. On gearbox type cars:- When almost at a stand return the gear-drive selector handle to NEUTRAL without pausing in any other gear. If in 4th gear the lever should be moved direct to Neutral.

NOTE:- If the train speed has been reduced, e.g., due to a signal check, and the signal is placed into the clear position before the train is brought to a stand, release the vacuum brake and then follow the procedure described under "Coasting, Re-opening the Throttle," above.

On Torque Converter Cars:- When almost at a stand return the gear drive selector handle from "D" to NEUTRAL. If coupled to gearbox type cars, return gear-drive selector handle to NEUTRAL without pausing in any other gear. If in 4th or "D" gear, the lever should be moved direct to NEUTRAL.

CHANGING ENDS

1. Put the vacuum brake ON, then place the vacuum brake handle to the LAP position and remove handle.
2. STOP the engines.
3. Remove the reversing lever.
4. Turn control switch to the OFF position and remove keys.
5. Remove A.W.S. key.
6. Lock driving compartment doors and remove keys.
7. Proceed to the other end of the train and place handles and lever into their appropriate positions. Place key into control switch and turn to ON position.
8. Place A.W.S. key into position.
9. Place reversing lever in FORWARD or REVERSE as required.
10. Proceed to re-start the engines as shown under "Starting the Engine" item 3(b-e), when at least 75 lbs./sq. in. air pressure is available.
11. Depress and release the A.W.S. reset button.

REVERSING THE TRAIN

If it is necessary to reverse the train without changing ends, when the train has been brought to a stand, check that the gear-drive selector handle has been placed into the NEUTRAL position, then—

1. With the engines IDLING, move the reversing lever to REVERSE. Noting that the air indicator lights are momentarily extinguished, indicating that the final drives have correctly re-

engaged. If not, with the engines still IDLING, take action as under "Starting the Engines" item 3(e) (i) or (ii).

2. Proceed as in "Starting the Train" items (c) to (f).

N.B.: DO NOT ATTEMPT TO REVERSE WHEN THE TRAIN IS MOVING.

STOPPING THE ENGINES

1. Return the throttle handle to IDLING position, then release to Deadman's position.
2. Check that the vacuum brake is ON, then return brake valve handle to LAP position.
3. Press engine "Stop" button and hold in that position until engines have stopped (engine lights are extinguished).
4. Apply the handbrake, then remove control switch key to stop the buzzer sounding and extinguish the handbrake indicator light.

STABLING THE TRAIN

Reversal of Final Drives

When diesel multiple unit trains are stabled and it is known (i.e. at terminal points) or anticipated that the next movement will be in the opposite direction, drivers before leaving the train should select the opposite direction on the reverser with a view to the final drives being engaged in the direction for the next movement, thus obviating any difficulty of correct engagement later when the equipment and lubricant may have become cold.

If reversing the train without changing ends—

1. When the reversing lever is moved to the REVERSED position, check that the indicator lights are momentarily extinguished—indicating that the final drives have correctly changed and re-engaged.
2. REMOVE THE CONTROL SWITCH KEY before moving the reversing lever through the "forward" position to the "remove lever" position. This is necessary to prevent the train being again reversed during the removal of the reversing lever.
3. Stop the engines by method shown above.
4. Check that the handbrake is applied.
5. Place vacuum brake valve handle to LAP position and remove the handle.
6. Remove reversing lever.
7. Remove A.W.S. key.
8. Shut off compartment heaters if in use.
9. Lock the driving compartment and partition doors.
10. Return the satchel containing the brake handle reversing lever, control switch key, A.W.S. key and carriage keys to the responsible person on duty at the depot.
11. Report any known defects.

TRAIN HEATING

Controls in Driving Compartments

Heating is by means of hot air suitably directed into the passenger compartment of each vehicle. The operation of the heater is automatic apart from switching on and operating the heat control.

To operate the heater turn the heater switch in a clockwise direction to **FULL HEAT** position. This supplies current to the glow plug (an Element) and the glow plug light on the Indicator Panel should be illuminated. (If this fails, return switch to **OFF** position and do not attempt to re-start). After a period of 45 seconds the air fan light will be illuminated on the indicator panel denoting that the heater fan and fuel pumps are working. In approximately 3½ minutes the Glow Plug indicator light will be automatically extinguished. If the oil fails to ignite in the above period the fan and fuel pump is automatically switched off, and it is then necessary to return the control switch to **OFF** and restart. Not more than three attempts should be made to start the apparatus.

If the switch is in the Full Heat position and the heater cuts out, the indicator light will be extinguished. Return switch to **OFF**, then attempt to re-start the heater as described above.

To admit cold air to the train turn the switch in an anti-clockwise direction past the **OFF** position to **Cold**.

TRAIN HEATING

Controls in Guard's Compartment

Heating is by means of hot air suitably directed into the passenger compartments and driving compartments of each vehicle.

The operation of the heaters is automatic apart from switching on in the **Guard's** compartment.

The heater local control switches in the driving compartments **MUST NOT** be operated by either the driver or the guard; these switches are for maintenance check purposes only.

To operate the heater controls in the guard's compartment the following procedure should be followed:-

Heating Cycling—Guard's Compartment

1. Select heating position.
2. Switch Isolator **ON**. The Isolator and Failure Indicators will light up.
3. Press Starter button.

The failure indicator light will go out and the heater will operate automatically.

If the failure indicator lights up, wait for one minute then press the starter button again.

If a failure is still indicated after **THREE** such attempts to re-start, the matter must be reported.

To stop the heaters: Place isolator switch to **OFF**.

Cold Ventilation

1. Select ventilating position.

2. Switch isolator ON.

The isolator indicator will light up and the heater fan will run.

To switch off: Place isolator switch to OFF.

FAULTS IN TRAFFIC

If there is indication that an engine has stopped while the train is running, before attempting to re-start it, confirm at the next convenient stopping point that the engine has in fact stopped. Attempt to re-start by depressing the appropriate local "Start" button, not more than three times. If this fails to re-start the engine, turn the engine isolating switch to OFF and, if possible, lock the final drive in NEUTRAL. (move over-ride switch to OFF position where fitted). Proceed to the terminal point on the remaining engines. At the terminal point the final drive **must** be locked in NEUTRAL and the matter reported.

To Lock Final Drives in Neutral

STOP ALL ENGINES, then, with the special tool which is available in the Guard's compartment, withdraw the NEUTRAL lock, turn it a quarter-turn and allow it to go right home. Proceed to the driving compartment and move the reversing lever slowly from FORWARD to REVERSE and back several times to ensure that the NEUTRAL lock is fully entered into the slot. Check that the main propeller shaft to the final drive concerned can be rotated by hand. If a final drive cannot be isolated see 1(c) below.

On a number of torque converter type cars a yellow painted emergency over-ride switch which is mounted on the Solebar near number one bogie must be operated to the OFF position, otherwise neither engine will respond to the throttle handle, but it must be restored to the ON position when the fault has been rectified.

NOTE:- (a) If no air pressure is available, the majority of final drives cannot be operated to allow the lock to be engaged in NEUTRAL.

(b) Certain final drives have a handle for manual selection of neutral from the trackside. Operate neutral lock first.

ASSISTING DISABLED TRAIN

In an emergency, a disabled diesel train may be assisted by another diesel train or by a locomotive.

Transmission Failure

1. Assistance by a train of same type

- (a) If the control equipment and vacuum brake train systems are in order, normal coupling to units of the same type may be made in accordance with the Appendix instructions for the "Working of Diesel Trains—Coupling and Uncoupling."
- (b) Before proceeding, turn isolating switch of engines concerned to OFF: the final drive gears of the defective power unit must be set and locked in the NEUTRAL position, if possible.
- (c) Where the final drive cannot be disengaged, a speed of

25 m.p.h. in either direction must not be exceeded to the point where the disabled train can be taken out of traffic.

2. Assistance by a train of different type or by a locomotive

When assisted by a different type of train or by a locomotive, the vacuum release pipe hose should remain on the stop, the vacuum hose to the train pipe only being connected.

- (a) Set the driver's brake valve handle in the LAP position.
- (b) Place the gear-drive selector handle in the NEUTRAL position and STOP ALL ENGINES on the disabled train. Set and lock ALL the final drive gears in the NEUTRAL position, if possible. If a final drive cannot be disengaged, a speed of 25 m.p.h. in either direction must not be exceeded to the point where the disabled train can be taken out of traffic.
- (c) Tear off the cover in front of the Deadman's isolating valve and move the handle to the ISOLATE position. When in multiple, ALL Deadman's controls must be isolated.
- (d) Remove the reversing lever, control switch key and A.W.S. key.

FAILURES OF CONTROL EQUIPMENT

Driving Controls

(a) **Leading Driving Compartment**

Remove control switch key, reversing lever, brake handle and A.W.S. key, then proceed to the next driving compartment and endeavour to gain control. Then act in accordance with the Appendix Instruction for the "Working of Diesel Mechanical Trains—Driving Apparatus Disabled."

(b) **Train of more than two cars including two or more Power Cars**

In a train composed of more than two cars including two or more power cars, the failure of the battery on any one power car does not necessitate the failure of the train, as the control switch key can be transferred to any other power car and control obtained of the train. It is not possible, however, to re-start the engines of the power car on which the battery has failed. The final drives on this power car must be locked in NEUTRAL.

(c) **Deadman's Device**

If there is a vacuum brake leakage caused by a defective Deadman's device, tear off the cover in front of the Deadman's isolating valve and move the handle to the ISOLATE position.

IF A DEADMAN'S CONTROL IS ISOLATED THE MATTER MUST BE REPORTED as soon as possible.

The tear-off cover must not be replaced by an unauthorised person.

COMPRESSED AIR SYSTEM—UNLOADER VALVE

In the event of an unloader valve defect remove the blank nut

from dummy stud adjacent to the unloader valve and fit it on to the escape connection of the valve after unscrewing protection cap.

Westinghouse type—no blank nut provided. An isolating cock at the other end of the reservoir can be turned off if an unloader valve is faulty. This prevents loss of air from train compressed air system although the unloader valve continues to blow.

FIRE PRECAUTIONS

In the event of a fire, which will be normally indicated by the fire warning bells ringing if fire is adjacent to an engine, bring the train to a stand as laid down in Rule No. 188. When the train has been brought to a stand take a hand-operated fire extinguisher from the driving compartment and inspect the engine that has been affected as shown by the indicator light in the driving compartment. An additional indication of the engine concerned will be given by the red warning light which will be illuminated on the appropriate fire alarm control box.

After ensuring that the fire has been extinguished, the small metal tab on the front of the fire alarm control box should be pulled off. This will uncover a switch which should be operated to stop the alarm bell, extinguish the warning light and render it impossible to re-start the affected engine. After this has been done, and before proceeding, turn the engine isolating switch to OFF and, if possible, set and lock the final drive gears of the defective engine in the NEUTRAL position. Where the final drive cannot be disengaged, a speed of 25 m.p.h. must not be exceeded to the point where the train can be taken out of traffic.

The alarm isolating switch referred to does not cut out the re-setting thermostat and should this operate through a recurrence of fire on the engine or fluid flywheel, the alarm bells will ring and the warning light will be lit. In this event the fire will not be extinguished automatically. It is essential, therefore, for the remaining hand-operated fire-fighting equipment to be used as a matter of the utmost urgency after the train has been stopped.

If the automatic extinguishing apparatus has operated, avoid inhaling a concentration of the gas which has a faint smell, and avoid touching the liquid with the skin or clothes.

As the gas is heavier than air, the concentration will be at low levels near the ground.

See General Instructions and Notices in Appendix to the Operating Instructions regarding First-Aid treatment to a person contaminated by the fire extinguishing medium used in the automatic appliance.

GENERAL NOTES

COUPLING AND UNCOUPLING

1. See that the Driver's controls are in the OFF position before trains are coupled or uncoupled.
2. Place the Control Isolating switch to OFF before the jumper cables are coupled or uncoupled.

3. On re-starting the engines ensure that all indicator lights and controls respond before moving the train.

WARNING HORNS

When sounding the horn, to comply with Rule 127 and the Appendix Instructions, operate the lever in such a manner as to give the 2-tone sound that these horns are designed to emit. This is of the utmost importance, and if the horn is defective it must be reported immediately.

DRIVERS IN COURSE OF TRAINING

Drivers in course of training are only allowed to operate the controls and brake on passenger trains under the direct supervision of the Instructor.

MOVEMENT UNDER FLOOD WATER CONDITIONS

1. **Normal** movement of rail cars should cease when the water level reaches 1 in. below the underside of the head of the running rail.
2. **Emergency** running at 3 m.p.h. is permissible, whether conductor rails are present or not, with the water level not exceeding 4 in. above the top of the running rail.
3. Movement should not be permitted when the water level exceeds 4 in. above the top of the running rail.

HAND BRAKES

All power cars and driving trailers will be fitted with an indicator lamp in the driving cab which when illuminated indicates that the handbrake in that driving cab is ON when the control switch key is turned to the ON position. In addition, if a handbrake is left on anywhere in the train the buzzer in all cabs sounds continuously.

**ERRATA SHEET FOR DRIVING INSTRUCTIONS FOR
DIESEL MULTIPLE UNIT TRAINS—BLUE SQUARE
COUPLING SYMBOLS — BR.33003/92.**

The above driving instructions (issued March, 1961) are to be amended as shown below:-

Page 5

Under sub-heading 'At Side of Car' Item (e) 2nd line, eighth word to read "speed".

Pages 7 & 8

Under Gear Changing — sub-heading (c) 'Automatic Lock-out' delete the whole of the paragraph.

Page 9

Delete the words 'stopping the train' and items 1 and 2 at the top of the page.

Page 10

Stabling the train

Reversal of Final Drives

Items 2 and 3 should be reversed, i.e. Stop the engines **before** removing the control switch key.

AMENDMENT TO DIESEL RAIL-CAR
DRIVING INSTRUCTIONS.

VACUUM BRAKES.

WITH THE ENGINES RUNNING.

- (a) Place the brake handle into position depress and hold down the throttle handle to obtain control of the deadman's device then move the brake handle to the RELEASE position. Check that 21" of vacuum can be obtained in the train pipe and remains steady at not less than 19" by returning the brake valve handle to LAP position. There should be at least 26" on the high vacuum reservoir side gauge.

This is to ensure that there is sufficient vacuum in the top side of the brake cylinders for the efficient operation of the brake.

- Note (i) The time required to obtain 21" of vacuum in the top side of the brake cylinders after the strings have been pulled on a vehicle or vehicles should not be less than 1½ minutes.
- Note (ii) In future, single unit diesel railcars will be fitted with an additional Duplex vacuum gauge which will indicate the top side vacuum in each brake cylinder on that car only; at least 19" must be registered on this gauge before moving off.
- (b) Return the vacuum brake handle to RELEASE position then let go the throttle handle. Check that it springs up to the deadman's position and that after 5 to 7 seconds delay the brakes are applied.
- (c) Check that the air pressure is built up to approximately 95-lbs per sq.in.
- (d) Apply the vacuum brake and take off the hand brake in the driving compartment.