

BRITISH RAILWAYS



DRIVER'S MANUAL

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FAULT FINDING DATA AND
CHARTS FOR DIESEL MULTIPLE
UNIT TRAINS WITH MECHANICAL
TRANSMISSION EXCEPTING CLASS
126 (WHITE CIRCLE) CARS

This booklet supersedes
all previous issues.

B.R. 33056/13
ISSUE 3

FAULT FINDING INSTRUCTIONS FOR DIESEL MULTIPLE UNIT TRAINS WITH MECHANICAL TRANSMISSION EXCEPTING CLASS 126 (WHITE CIRCLE) CARS.

1 NOTES FOR THE GUIDANCE OF DRIVERS IF A FAULT OCCURS.

- 1.1 If a D.M.U. train shows only a slight reduction in power no immediate action is necessary. A check on the equipment should be made at the next stopping point. If no obvious defects can be seen the journey may be completed.
- 1.2 If a severe reduction in power occurs an investigation should be made within 5 miles, at the most convenient stopping point. An immediate stop must be made if there is excessive noise or smoke emitted from any equipment or if the fire alarm bells ring.
- 1.3 A shortage of power may be accompanied by an engine indicator light becoming extinguished or low engine speed indicated by the driving tachometer if the defect is in the leading power car. Alternatively a shortage of power may be indicated by the engine speed increasing very rapidly after a gear has been selected.

GREAT CARE MUST BE TAKEN TO ENSURE THAT NO SIGNAL ASPECTS OR LINE SIDE WARNING BOARDS ETC. ARE MISSED WHENEVER INSTRUMENTS OR DRIVING COMPARTMENT INDICATORS ARE BEING CHECKED.

- 1.4 If a complete loss of power occurs an attempt must be made to coast and bring the train to a stand under the protection of the next fixed signal.

When a train has been brought to a stand as a result of an equipment defect and the necessary Rules have been carried out, refer to the chart with a heading applicable to the indication or defect.

This will show the various possible causes of the trouble and indicate the action to be taken. In some instances the possibilities may be numerous and the simpler defects should be checked before the more difficult ones. When a cause for a defect can be definitely established and it is known that it can be corrected, inform the nearest signalman, station official or the Traffic Control, stating how long it will be before the trouble may be overcome. When the defect has had attention, start

the engines and make a test to ensure that traction power may be obtained and that all systems function. The train may then be worked forward.

If any doubt exists as to the possibility of overcoming the fault, assistance must be requested immediately. When the assisting locomotive or train is provided, the coupling and subsequent operation should be performed as directed in BR 33056/49. If the train can only work forward on reduced power, the nearest signalman, station official or the Traffic Control must be advised of the circumstances.

- 1.5 At the end of the turn of duty, or before this time when applicable, the defects must be reported and all necessary repairs must be entered in the Repair Book of the defective vehicle. This will greatly assist the maintenance staff at the depot in which the repairs are carried out.
2. The following chart indicates the readings given by all instruments and indicates the action to be taken if incorrect readings are given when the engines are running.

INSTRUMENT	Reading with engines running at least 10 minutes		ACTION TO BE TAKEN
	Train Standing	Train Moving	
Main reservoir air pressure gauge	80 – 90 p.s.i.	80 – 90 p.s.i.	Report any variations below the minimum or above the maximum
Vacuum brake pipe gauge	0 – 21 in.Hg.	21 in.Hg.	Report any variations from 21 in.Hg. with the brakes released
Vacuum release pipe gauge	0 – 30 in.Hg.	28 – 30 in.Hg.	Report any instances where less than 27 in.Hg. is obtained when running Report all instances where vacuum is seriously reduced when releasing the brakes
Speedometer	0	0 – 70 m.p.h.	Report any defects
Engine tachometer	400–450 r.p.m.	400–1900r.p.m.	Report any readings outside these limits with the engines running

3. Final drive isolation. In the event of any engine becoming defective the final drive unit must be isolated as follows.

3.1 Without PILOT AIR VALVE

- 3.1.1 Apply the parking brake.
- 3.1.2 Stop the engines.
- 3.1.3 Turn the engine isolating switch to ISOLATED.
- 3.1.4 Turn the final drive isolating plunger $\frac{1}{4}$ turn to the ISOLATED position.
- 3.1.5 With the control circuit switch ON, move the reversing handle from FORWARD to REVERSE and back again three times, pausing 5 seconds in each position.
- 3.1.6 Check that the final drive has isolated by turning the cardan shaft by hand.

3.2 With PILOT AIR VALVE.

- 3.2.1 Apply the parking brake.
- 3.2.2 Stop the engines.
- 3.2.2 Turn the engine isolating switch to ISOLATED.
- 3.2.4 Isolate the pilot air valve, by closing the cock.
- 3.2.5 Manually isolate the final drive.
- 3.2.6 Return the pilot air valve to NORMAL, by opening the cock.
- 3.2.7 Check that the final drive has isolated by turning the cardan shaft by hand.

IMPORTANT: A train may be allowed to continue in traffic with up to one engine in four isolated, or one in two on a single power car. Trains with one power car and one engine isolated must be taken out of service at the first opportunity.

If a final drive becomes defective, the AIR AND AXLE lights will not illuminate and no indication of engagement of the

opposite end final drive will therefore be given in the driving compartment. The direction can be checked by the pointer on top of the final drive.

Final drive gearboxes must not be isolated if the train is standing on or adjacent to track which is equipped with live rails.

If a train is on such a track when an engine becomes defective it may proceed, provided the remainder of the equipment is in good order, until there is an opportunity to isolate the final drive in safety.

If a train is being hauled dead over electrified lines, the hauling speed must not exceed 25 m.p.h. and the distance must not exceed 10 miles. If the final drive gearbox must be isolated because of damage, or because of the length of run on the electrified track, the power must be switched OFF from the appropriate sections before the isolating fork is used.

See also page 7 'Effect of the No.7 fuse rupturing'.

4 EFFECT OF FUSES RUPTURING IN A D.M.U. POWER CAR.

Various fuses are fitted in the electrical circuits of D.M.U. trains. Two fuses are fitted which can bring a train to a stand in the event of rupture. These are:—

Control Circuit fuse — No. 6.

Local Control fuse — No. 7.

4.1 Effect of a No. 6. Fuse Rupturing.

The control circuit light and all panel lights will be extinguished.

The brakes will be applied by the driver's safety device.

The engines will return to idling speed.

The engines will not stop when the stop button is pressed in the driving compartment.

The gearboxes will revert to neutral.

4.2 Action to be taken if the fuse cannot be changed:—

- 4.2.1 Apply the parking brake
- 4.2.2 Remove the control circuit key and move the Reversing handle to NEUTRAL.
- 4.2.3 Check the train for obvious defects such as overheated electrical equipment or smoke. See 4.2.6 below.

4.2.4 If no defects are visible from normal observation, insert the control key in another driving position and turn the switch to ON, checking that the control circuit light becomes illuminated.

4.2.5 Return to the leading driving compartment, select a direction with the reversing handle, release the parking brake and proceed normally after receiving the guard's signal.

4.2.6 If there is evidence of overheating or other damage in any vehicle on the train, the No. 6. fuse may rupture in any car in which the control switch is closed and the instruction in 4.3. or 4.4 below, must be observed.

4.3 If in carrying out the instruction in 4.2.3. above, smoke is seen to be issuing from the leading power car of a train which has more than one power car, the instruction in 4.2.4. and 4.2.5. should not be carried out and the following must be substituted:—

4.3.1 Deal with the fire as necessary and ascertain if it safe for the train to continue.

4.3.2 Isolate the driver's safety device and final drive gearboxes of the defective car. Manual operation of the E.P. valves will be necessary in order to isolate the final drive gearboxes. Move the A.W.S. change-end switch to OFF.

4.3.3 Disconnect the jumper cables between the defective (leading) power car and the next car and secure them in their sockets.

4.3.4 Insert the control circuit key, reversing handle and brake handle into their positions in an alternative driving compartment and move the AWS switch to ON.

- 4.3.5 Check that the brakes are applied by D.S.D. action then release the parking brake in the leading car.
- 4.3.6 Drive the train to the next point where the passengers can be de-trained, with the guard in the leading driving compartment and operating the brake valve and horn as necessary.

IMPORTANT: THE BUZZER WILL BE INOPERATIVE IN THESE CIRCUMSTANCES AND THE GUARD SHOULD BE CLEARLY INSTRUCTED THAT HAND SIGNALS WILL BE NECESSARY.

4.4 If in carrying out the instructions in 4.2.3. above, smoke is seen to be issuing from a power car behind the leading one, in a train which has more than two power cars, proceed as follows:—

4.4.1 Deal with the fire as necessary and ascertain if it is safe for the train to continue.

4.4.2 Ascertain the number of power cars in the train on either side of the defective one.

4.4.3 IF A GREATER NUMBER ARE AHEAD OF THE DEFECTIVE CAR, disconnect the jumper cables in front of it and secure them in their sockets. Isolate the driver's safety devices and final drive gearboxes of each car, including the defective one, behind the point where the jumper cables have been disconnected. Manual operation of the E.P. valves will be necessary in order to isolate the final drive gearboxes.

4.4.4 Insert the control circuit key in any driving compartment between the leading car and the point where the jumper cables have been disconnected.

4.4.5 Check that the brakes are applied, then release the parking brake in the leading car.

4.4.6 The train may then be driven from the leading car.

- IMPORTANT:**
- 1. The buzzer will not operate from a car behind the point where the jumpers are disconnected.
 - 2. Class 108/1 and 108/2 (lightweight) power cars must not be used to propel or haul a weight in excess of 75 tonnes.

4.4.7 IF A GREATER NUMBER ARE TO THE REAR OF THE DEFECTIVE CAR, disconnect the jumper cables in the rear of it and secure them in their sockets. Isolate the driver's safety devices and final drive gearboxes of each car, including the defective one, in front of the point where the jumper cables have been disconnected. Manual operation of the E.P. valves will be necessary in order to isolate the final drive gearboxes.

4.4.8 Insert the control circuit key, reversing handle and brake handle into their positions in a driving compartment to the rear of the defective car.

4.4.9 Check that the brakes are applied, then release the parking brake in the leading car.

4.4.10 Drive the train to the next point where the passengers can be detrained, with the guard in the leading driving compartment operating the brake valve and horn as necessary.

IMPORTANT: THE BUZZER WILL BE INOPERATIVE IN THESE CIRCUMSTANCES AND THE GUARD SHOULD BE CLEARLY INSTRUCTED THAT HAND SIGNALS WILL BE NECESSARY.

4.5 Effect of the No. 7 Fuse Rupturing.

The gearboxes will return to NEUTRAL on the affected car.

The brakes will be applied by the driver's safety device.

The AIR and AXLE lights for the affected car will be extinguished, unless it is fitted with a Pilot Air Valve.

The engines will not stop on the affected car, when a STOP button is pressed.

4.6 Action to be taken if the fuse cannot be changed:—

4.6.1 Apply the parking brake.

4.6.2 Check which car has the defective fuse by noting the AIR and AXLE light that is extinguished.

NOTE: This check cannot be made on cars fitted with Pilot Air Valves. A check must therefore be made by finding the car on which the engines do not stop, when the STOP button is pressed.

4.6.3 Stop the engines on the defective car manually by operating the solenoid linkage, or by closing the fuel isolating cock.

4.6.4 Turn both the final drive isolating plungers $\frac{1}{4}$ turn to the ISOLATED position on the defective car.

4.6.5 At the E.P. valve box, operate the Forward and Reverse E.P. valve test buttons alternatively, pausing 5 seconds between each operation, until the final drives have locked into neutral. Check by turning the cardan shafts by hand.

NOTE: Final drive gearboxes with manual isolating handles should be isolated as follows:—

(a) Isolate the Pilot Air Valve if fitted, by closing the cock.

(b) Manually isolate each final drive gearbox by moving the isolating handle until it becomes locked in the NEUTRAL position.

(c) Check that both cardan shafts will turn by hand.

4.6.6 Isolate the driver's safety device in the affected car.

4.6.7 Return to the leading driving compartment, release the parking brake and after receiving the guard's hand signal, proceed under reduced power.

NOTE: If the defective fuse is in the leading power car, the control circuit key should be inserted in another power car driving position if the remaining running time is to exceed $\frac{1}{2}$ hour or if any lighting is to be used. This is because the batteries of a car with a defective No. 7 fuse will not be charged.

IMPORTANT:

Final drive gearboxes must not be isolated if the train is standing on or adjacent to track which is equipped with live conductor rails. If a train has a ruptured No. 7 fuse and is

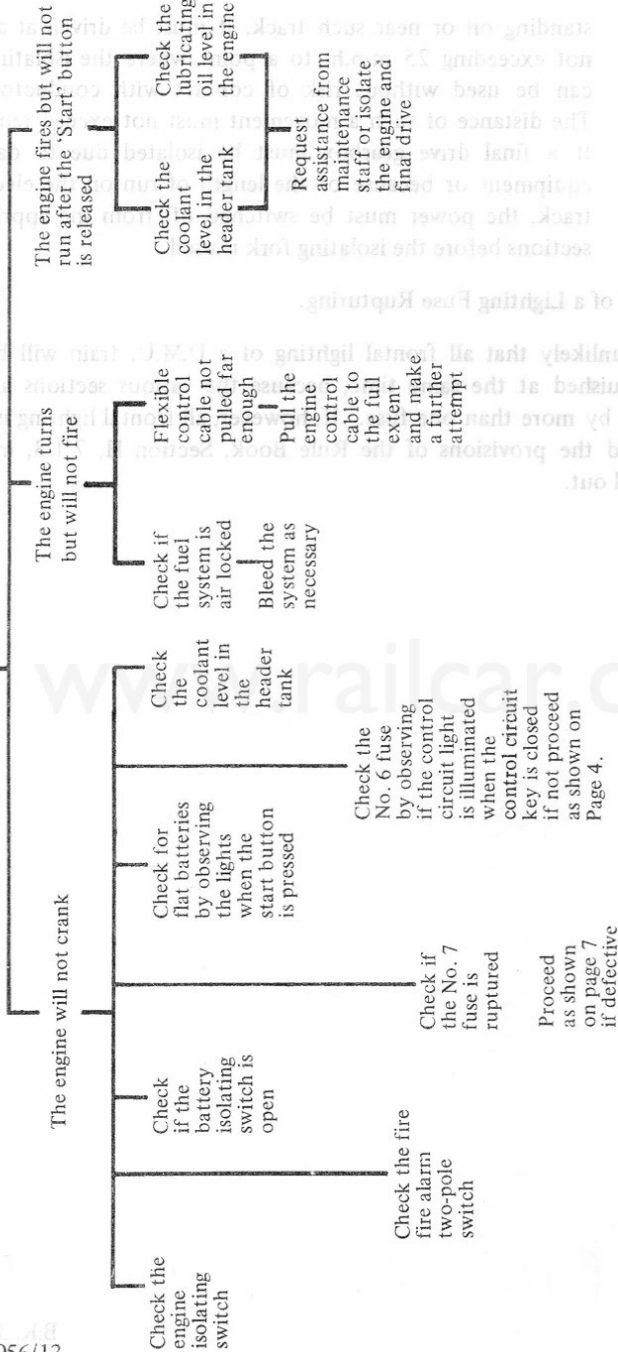
standing on or near such track, it must be driven at a speed not exceeding 25 m.p.h. to a point where the isolating fork can be used without risk of contact with conductor rails. The distance of such a movement must not exceed ten miles. If a final drive gearbox must be isolated due to damaged equipment or because of the length of run on the electrified track, the power must be switched off from the appropriate sections before the isolating fork is used.

4.7 Effect of a Lighting Fuse Rupturing.

It is unlikely that all frontal lighting of a D.M.U. train will become extinguished at the same time, because the various sections are protected by more than one fuse. If, however, all frontal lighting is extinguished the provisions of the Rule Book, Section H, 7.1.3, must be carried out.

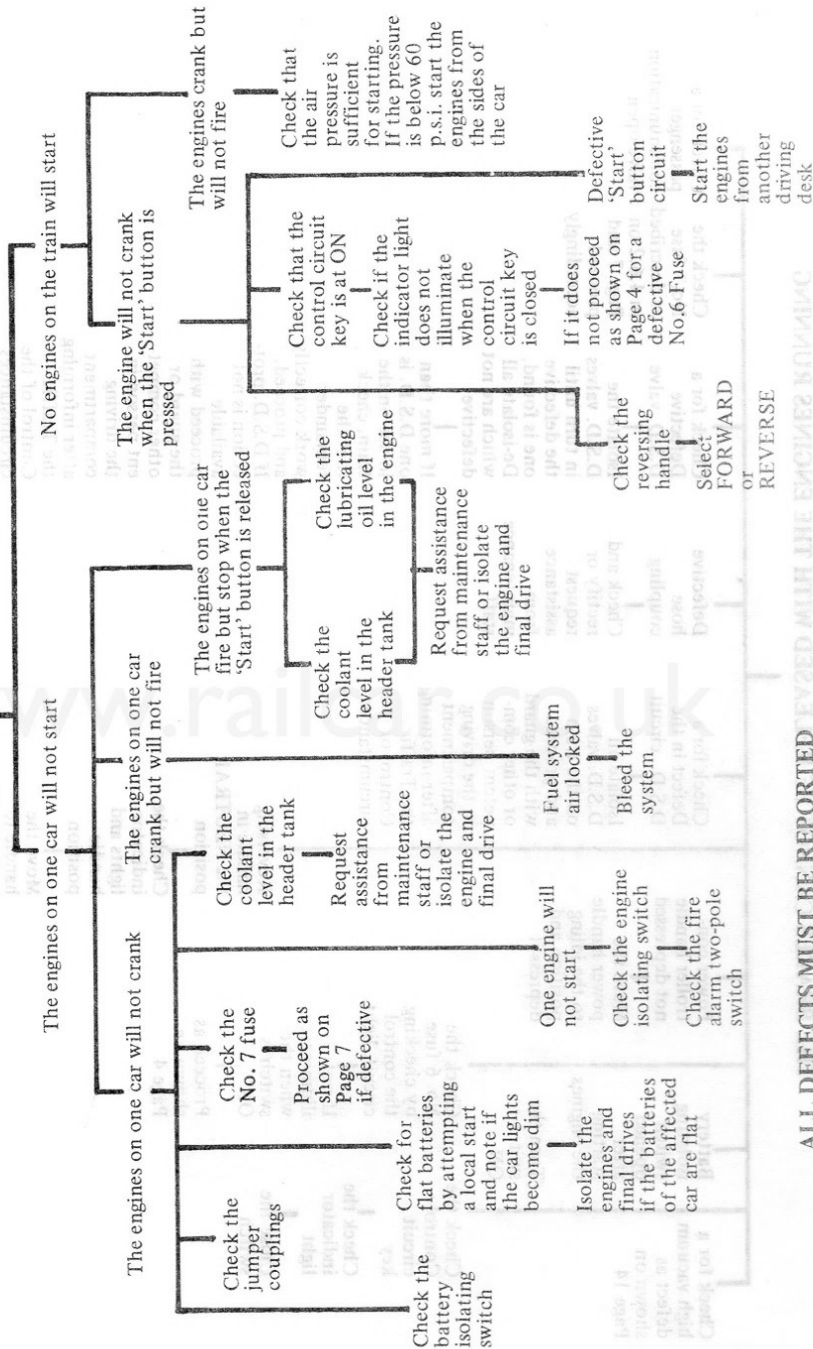
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**SIDE STARTING, NO AIR PRESSURE
THE ENGINE WILL NOT START**



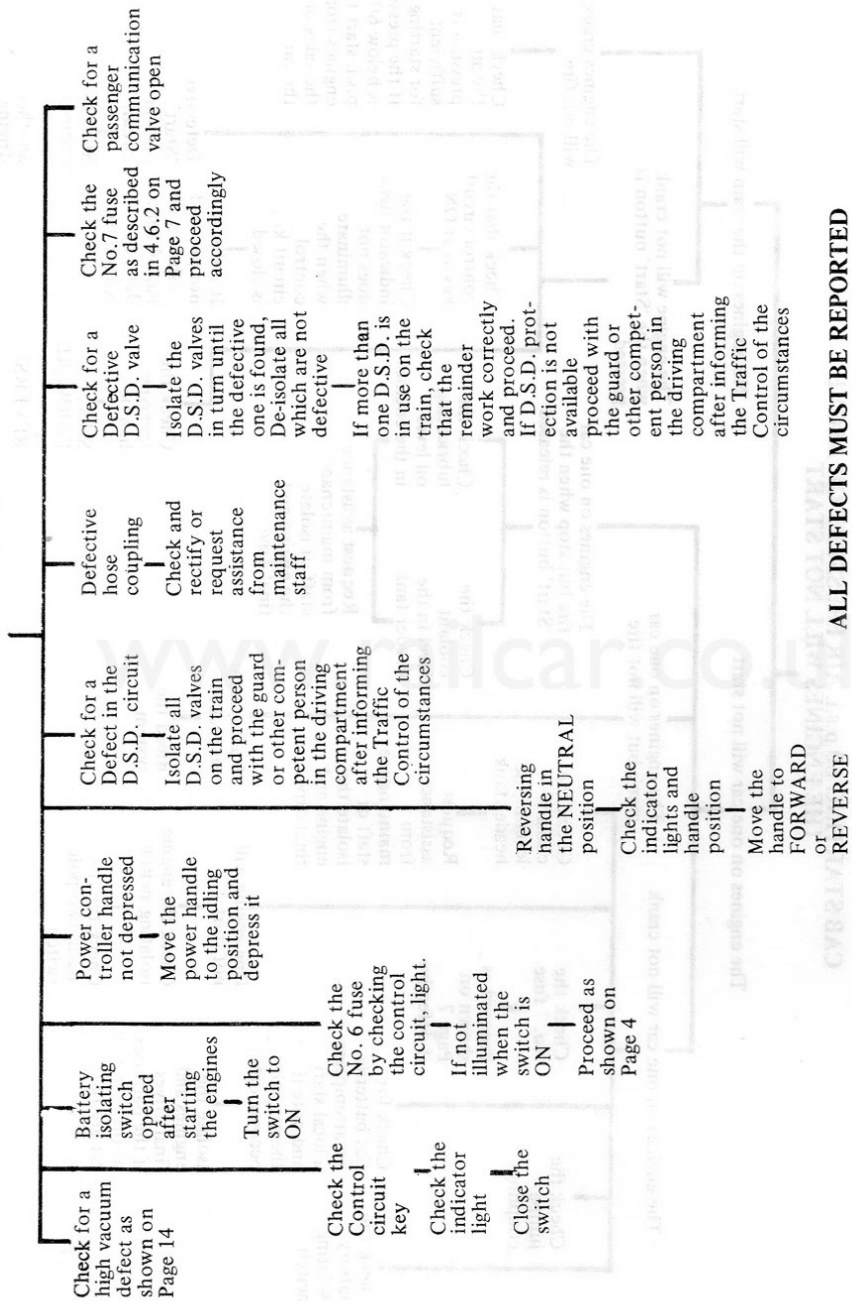
ALL DEFECTS MUST BE REPORTED

CAB STARTING 60 p.s.i. AIR PRESSURE OR ABOVE THE ENGINES WILL NOT START



ALL DEFECTS MUST BE REPORTED

THE BRAKES CANNOT BE RELEASED WITH THE ENGINES RUNNING



ALL DEFECTS MUST BE REPORTED

THE BRAKES ARE APPLIED ON THE TRAIN WHEN RUNNING

Faults applicable to leading car only

Pressure on power controller handle released

Return the handle to the idling position apply downward pressure and re-apply power as necessary

Defect in D.S.D. circuit. See NOTE

Isolate all valves on the train

Work forward with the guard in the leading driving compartment and advise the Traffic Control

Check if an A.W.S. switch is closed in a rear driving compartment. This will cause the brakes to be applied after cancellation

(1) When a DISTANT signal is passed at CAUTION or

(2) When a M.A.S. is passed at CAUTION or PRELIMINARY CAUTION or

(3) When a test indicator is passed

Check the train and move the A.W.S. switch to OFF in any driving compartment

Check for a defective D.S.D. valve. See NOTE

Isolate the D.S.D. valves in turn until the defective one is found. De-isolate all which are not defective

If more than one D.S.D. is in use on the train, check that the remainder work correctly and proceed. If D.S.D. protection is not available the guard must ride in the leading driving compartment and the Traffic Control must be informed

Faults applicable to any car on the train

Check for a defective vacuum brake pipe hose

Check the train and rectify the fault or request assistance from C. & W. staff

Check for a Passenger or guard's communication

If in section, stop the engines remove the brake handle, reversing switch key, apply the parking brake, obtain the detectors and proceeded in accordance with the Rule Book, Section, M 3.11

Check the No.7 fuse as described in 4.6.2 on Page 7 and proceed accordingly

Check for a defective vacuum system see Page 14

Check the No. 6 fuse by checking the control circuit light

If not illuminated when the switch is ON

Proceed as shown on Page 4.

NOTE: If the D.S.D. electrical circuit is defective, all D.S.D. valves on the train will draw air. This may not be audible on the rear units until those ahead of them are isolated. During the check, another person must hold the power controller handle.

ALL DEFECTS MUST BE REPORTED

HIGH VACUUM CANNOT BE OBTAINED WITH THE BRAKE VALVE AT LAP AND THE ENGINES RUNNING

Check all reservoir hoses

If a defective hose is found uncouple it
Place defective hose and reservoir hose of next car on their dummy plugs

Disconnect reservoir hoses at opposite end of car, if applicable and place them on their dummy plugs

If the defective hose is not on a leading car, proceed

If the defective hose is on a leading car

If high vacuum cannot be obtained on the leading car

If high vacuum can be obtained on the leading car, proceed

On a single train
Disconnect all reservoir hoses and place them on their dummy plugs

If a defective hose is not found

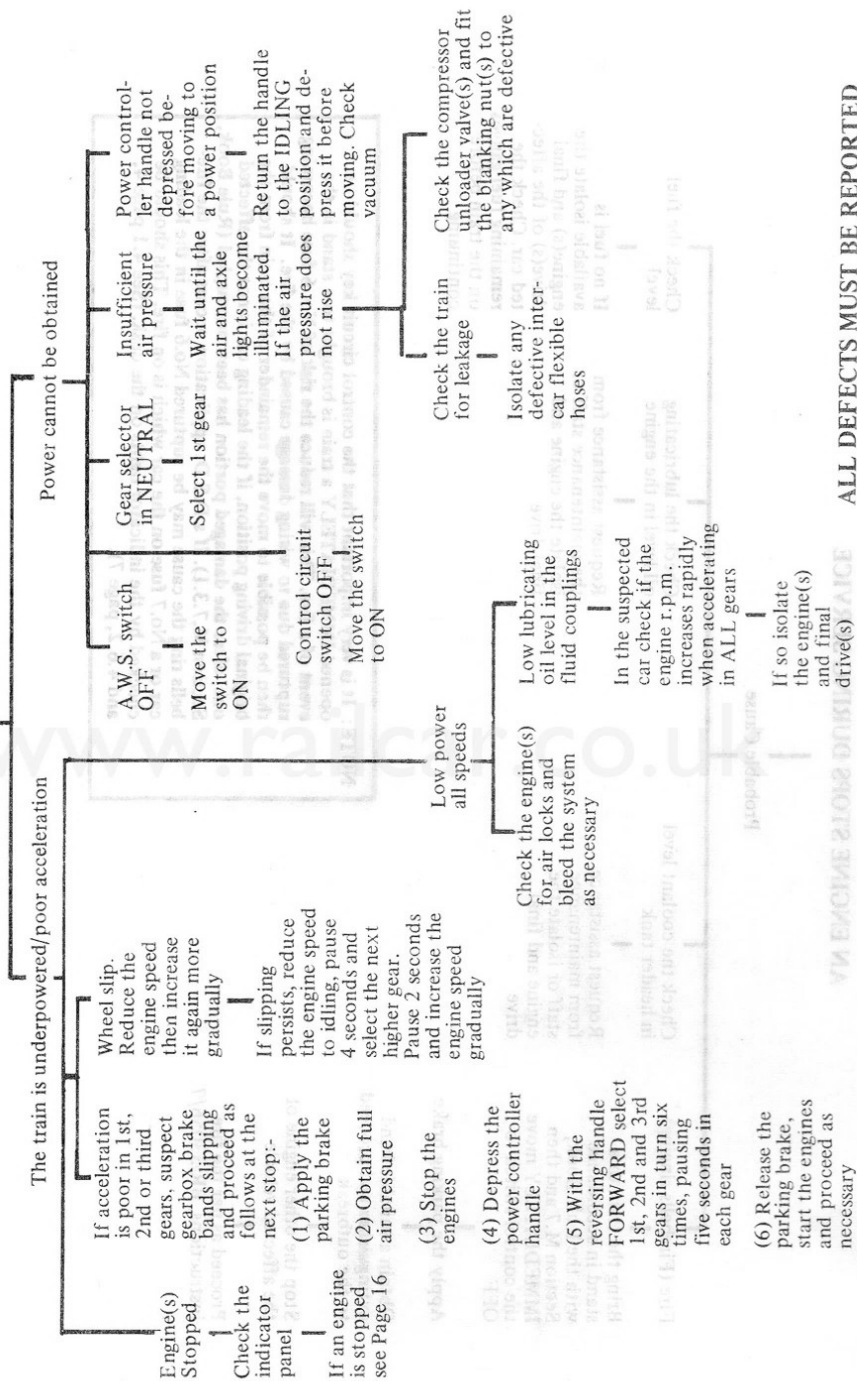
When train is composed of more than one basic unit

Uncouple reservoir hoses between units to find which has the defective car. On defective unit proceed as for single unit. Recouple all other reservoir hoses.

Drive the train from another cab with the guard in the leading cab, using the buzzer code, horn and emergency brake valve as necessary. Detrain the passengers at the first opportunity and request assistance. If more than one basic unit is used the rear unit may be detached and coupled at the front but with the reservoir pipes uncoupled. Carry out the brake continuity test before moving.

ALL DEFECTS MUST BE REPORTED

POWER DEFECTS



ALL DEFECTS MUST BE REPORTED

AN ENGINE STOPS DURING SERVICE

Probable Cause

- Fire (Firebells ringing)
 - Bring the train to a stand in accordance with the Rule Book, Section M.7 and then IMMEDIATELY move the control switch to OFF
- Apply the parking brake
 - Obtain a suitable hand extinguisher and proceed to the outbreak
 - Stop the other engine of the affected vehicle
 - Proceed as per the fire instructions, BR.33056/7
- Check the coolant level in header tank
 - Request assistance from maintenance staff or isolate the engine and final drive
- Check the lubricating oil level in the engine
 - Request assistance from the maintenance staff or isolate the engine and final drive
- Check the fuel level
 - If no fuel is available isolate the engine(s) and final drive(s) of the affected car. Check the remaining fuel gauges on the train before continuing

NOTE: It is very important that the control circuit key should be opened IMMEDIATELY a train is brought to a stand in the event of a fire. This will reduce the risk of No. 6 fuse becoming ruptured due to wiring damage caused by the fire. It should then be possible to move the remainder of the train from the original driving position, if the leading car is not the affected one, after the damaged portion has been uncoupled (Rule Book, Section M.7.3.1). If a D.S.D. application occurs after the firebells ring the cause may be ruptured No.6 fuse in the leading car or a No.7 fuse on the car which is on fire. This should be checked by the indicator lights on the desk. (See 4.1 page 4, and 4.6.2, page 7).

ALL DEFECTS MUST BE REPORTED