

The information in this booklet must not be given to the public



British Rail

Train Crew Manual

Class 37 Locomotives

Drivers Fault-finding Data

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CONTENTS

	Page
1. Warning and other indications	1
2. Fuses and the effect of their rupturing in service	1
3. Fuse changing procedure	3
4. Circuit breakers and the effect of their tripping in service	4
5. Cocks in the fuel system	4

FAULT

1. Engine STOPS Red 'engine stopped' indicator light BRIGHT Blue 'general fault' indicator light BRIGHT	5
2. AWS warning indication sounds and cannot be reset, brake application is initiated Engine STOPS Desk indicator lights EXTINGUISHED	6
3. Complete loss of traction power Brake application	6
4. Complete loss of traction power	8
5. Blue 'general fault' indicator light BRIGHT	10
6. Partial loss of traction power Yellow 'wheelslip' indicator light BRIGHT	12
7. Partial loss of traction power/locomotive does not develop full power	13

1. WARNING AND OTHER INDICATIONS

The usual indications are provided in the driving compartments:

- 1.1 Three indicator lights on the driving desk which are DIM when conditions are normal and BRIGHT when there is a fault condition.

Red BRIGHT	—	diesel engine stopped
Yellow BRIGHT	—	wheel slip, or fault developing in a traction motor or its associated circuitry
Blue BRIGHT	—	general fault indication (refer to subsidiary panel)

- 1.2 Four indicator lights on a subsidiary panel in No.2 driving compartment only. These are normally DIM but become BRIGHT under fault conditions, and are located on the control cubicle which forms the rear of the driving compartment.

Oil Pressure	—	engine lub. oil pressure below 25 p.s.i.
Fuel	—	fuel level low
Water	—	coolant temperature high (195°F or above)
Blowers	—	a traction motor blower has stopped

- 1.3 An earth fault indicator on the control cubicle in No.2 driving compartment only, which displays black and white diagonal stripes in a 'window' if the Earth Fault Relay (E.F.R.) has tripped.

- 1.4 Dual-braked locomotives only — Four repeater lights to show the position of the brake selector switch i.e.

vacuum passenger	vacuum goods
air passenger	air goods

2. FUSES AND THE EFFECT OF THEIR RUPTURING IN SERVICE

- 2.1 Exhauster Motors — The associated exhauster will stop and difficulty will be experienced in creating vacuum on long trains. If both exhauster fuses rupture vacuum will be lost when running.
- (2) 100 amp *
- * 50 amp on some locomotives

2.2	Compressor Motors — (2) 160 amp ** Dual-braked locomotives ** 100 amp on some locomotives	The associated compressor will stop. Vacuum braked trains — If the fuse of the working compressor ruptures the main reservoir pressure will be reduced and the brakes will apply when the pressure falls to approximately 70 p.s.i. A changeover switch enables the other compressor to be selected and the defective fuse should not be changed until a convenient time, unless the locomotive is required for an air braked train. NOTE: On some locomotives it will be necessary to reverse the switch when changing ends if a compressor fuse is ruptured. Air braked trains — If either fuse ruptures the time taken to charge the system will be excessive, and if both rupture air pressure will be lost and the brakes will apply when the pressure falls to approximately 70 p.s.i.
	Compressor Motor (1) 100 amp Vacuum-braked only locomotives	The compressor will stop and traction power will be lost when main reservoir pressure falls to 55 p.s.i.
2.3	Blower Motors — (2) 160 amps	The associated traction motor blower will stop, traction motor field diversion will be lost and the BLUE general fault indicator will be BRIGHT together with the subsidiary indicator light 'Blowers' at No.2 end.
2.4	Fuel Pump Motor — 15/16 amps	The fuel transfer pump will stop running and the diesel engine will eventually shut down through fuel starvation.
2.5	Lub. Oil Priming Pump Motor — 30/32 amps	The lub. oil priming pump will not run when the master switch is moved to E.O. before the engine is started.

- 2.6 A.W.S. — The A.W.S. converter will not operate and
15/16 amps electrical supply to the A.W.S. equipment
will be lost, initiating an A.W.S. brake
application. The A.W.S. warning horn will
sound and cannot be silenced by pressing
the reset button.
- 2.7 Lighting (2) — All lighting will be extinguished.
15/16 amps

3. FUSE CHANGING PROCEDURE

- 3.1 Stop the diesel engine.
- 3.2 Move the battery isolating switch to OFF.
- 3.3 Remove the suspected fuse.
- 3.4 Move the battery isolating switch to ON.
- 3.5 Place the suspect fuse on the fuse tester, if it is not ruptured the firebell will ring. If it is ruptured the fire bell will not ring.
- 3.6 Test a replacement fuse of the correct amperage.
- NOTE:** Where two ratings are listed in Section 2 either value may be used as a replacement e.g. 30 or 32 amp rating.
- 3.7 Move the battery isolating switch to OFF.
- 3.8 Replace the original fuse or the replacement as necessary.
- 3.9 Move the battery isolating switch to ON, restart the diesel engine and proceed.

NOTE 1. ONLY ONE SPARE FUSE SHOULD BE USED, IF THIS RUPTURES THE ASSOCIATED CIRCUITRY IS DEFECTIVE AND CANNOT BE USED.

2. IN THE CASE OF EITHER OF THE MAIN LIGHTING FUSES THE SUPPLY IS **NOT** ISOLATED WHEN THE BATTERY ISOLATING SWITCH IS MOVED TO 'OFF'. GREAT CARE MUST BE TAKEN WHEN CHANGING EITHER OF THESE FUSES.

4. CIRCUIT BREAKERS AND THE EFFECT OF THEIR TRIPPING IN SERVICE.

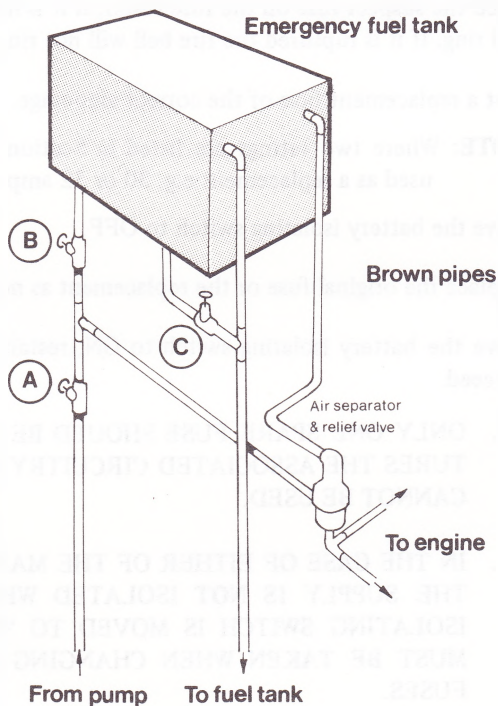
- 4.1 Control Circuit Breaker — The AWS warning indication will sound and cannot be reset and a brake application will be initiated.
The diesel engine will shut down and the indicator lights on the driving desk will be extinguished.

4.2 Cab Heaters (2))

- 4.3 Demister) — The associated equipment will not function.
)

4.4 Cooker/Hotplate)

5. COCKS IN THE FUEL SYSTEM



INDICATIONS IN DRIVING COMPARTMENT	POSSIBLE CAUSE	SUBSIDIARY INDICATIONS	RECOMMENDED ACTION
1. Engine STOPS Red 'engine stopped' indicator light BRIGHT Blue 'general fault' indicator light BRIGHT 	a. Engine over speed	—	Check engine overspeed device on free end of diesel engine. If 'tripped' i.e. chrome button not protruding then reset. If device trips again immediately on restarting the engine - fail locomotive. If device trips again when full power is restored reset ONCE MORE, use manual over-ride control handle at drive end of engine to restrict engine r.p.m. If device trips again - request assistance.
	b. Low water level	—	Check coolant gauge on header tank and check system for leakage. If level is low and arrangements cannot be made to top-up the system then request assistance.
	c. Fuel starvation	'Fuel' light possibly BRIGHT at No.2 end	Check fuel transfer pump at free end of engine. If not running — check fuse and change as necessary. If pump still does not run change to gravity feed i.e. close cock 'A' in the fuel line from the pump and open cock 'B' below the emergency fuel tank (see page 4). If pump is running — check fuel contents gauge. If empty open cock 'C' to drain fuel from emergency tank to main tank. Prime the system where possible. Note: On standard locomotives the 'low fuel' warning denotes there is sufficient fuel for 30 minutes running time. On modified locomotives, which have the former boiler water tank to provide extra fuel, this gives an additional 25 minutes running time.

INDICATIONS IN DRIVING COMPARTMENT	POSSIBLE CAUSE	SUBSIDIARY INDICATIONS	RECOMMENDED ACTION
1. Engine STOPS (contd)	d. Low lub. oil pressure (below 20 p.s.i.)	'Oil pressure' light BRIGHT at No.2 end 	Check oil level in sump. If above MAX on dipstick. DO NOT ATTEMPT TO RESTART ENGINE (fuel dilution) – request assistance. If between MAX and MIN attempt a local start (at drive end of engine) and observe oil pressure gauge. If engine starts and pressure is above 25 p.s.i. then proceed. If below MIN - request assistance.
2. AWS warning sounds and will not reset, brake application. Engine STOPS Desk indicator lights EXTINGUISHED	a. Control Circuit Breaker tripped	Indicator lights on control cubicle at No.2 end EXTINGUISHED 	Check control circuit breaker in fuse cupboard at No.2 end. Attempt to reset NOT MORE THAN THREE TIMES.
3. Complete loss of traction power Brake application	a. DUAL BRAKED LOCOMOTIVES ONLY Loss of main reservoir pressure (below 70 p.s.i.) Note: The low main reservoir feature of the brake application unit will vent the air brake pipe	–	Check compressors – if NOT running check compressor governor at No.1 end, toggle should be 'up'. If still not running check compressor fuses at No.2 end. Note: On a dual braked locomotive, running under vacuum conditions, move compressor changeover switch to CHANGE/CHANGEVER/EMERGENCY to bring in the other compressor. Check fuse later when convenient. If compressors ARE running check system for leakage – particularly drain cocks, flexible hoses etc. If working two pipe air braked train close cocks between locomotive and train to identify location of loss.

INDICATIONS IN DRIVING COMPARTMENT	POSSIBLE CAUSE	SUBSIDIARY INDICATIONS	RECOMMENDED ACTION
3. Complete loss of traction power (contd) Brake application	b. DUAL BRAKED LOCOMOTIVES ONLY Loss of air brake pipe pressure (below 42 p.s.i.) (main reservoir pressure adequate – above 95 p.s.i.)	—	Check main reservoir pressure is above 95 p.s.i. Isolate A.W.S. and D.S.D. equip- ment in turn (DSD isolating cock in No.2 nose end) and check if brake pipe pressure is regained after each isolation. If still unable to regain pressure examine flexible hoses and cocks. Close cocks between locomotive and air braked train to identify location of loss e.g. could be passenger communication valve operated.
	c. Loss of vacuum brake pipe (below 12 ins.)	—	Check exhausters – if NOT running check that exhauster control button is fully depressed and that exhauster isolating (knife) switches are fully closed. If still not running check exhauster fuses. If exhausters ARE running check system for leakage, particularly flexible hoses. Part hoses between locomotive and train to identify location e.g. could be passenger communication valve operated. Note: On VACUUM BRAKED ONLY LOCOMOTIVES isolate A.W.S. and D.S.D. equipment in turn (DSD isolating cock in No.2 nose end) and check if vacuum brake pipe is regained after each isolation.
	d. A.W.S. fuse ruptured	The AWS warning sounds and cannot be cancelled until fuse is changed (or the AWS equipment is isolated)	Check fuse and change as necessary.

INDICATIONS IN DRIVING COMPARTMENT	POSSIBLE CAUSE	SUBSIDIARY INDICATIONS	RECOMMENDED ACTION
4. Complete loss of traction power	a. VACUUM BRAKED ONLY LOCOMOTIVES Loss of main reservoir pressure (below 55 p.s.i.) or Air pressure switch (AP2/APS2) defective	—	Check compressor, if NOT running check compressor governor at No.1 end – toggle should be 'up'. If still not running check compressor fuse at No.2 end. If compressor IS running check system for leaks, particularly drain cocks, flexible hoses etc. Check toggle of AP2/APS2 in No.2 nose end, should be 'up' Note: AP2/APS2 should close as main reservoir pressure rises to 70 p.s.i.
	b. Loss of control air pressure (below 40 p.s.i.) or Air pressure switch (AP1/APS1) defective	—	Check that control reservoir isolating cock is fully open (adjacent to BIS at floor level) and that toggle of control air pressure switch AP1/APS1 is 'up' (within control cubicle at No.2 end Note: STOP ENGINE AND OPEN B.I.S. BEFORE OPENING CONTROL CUBICLE)
	c. IN VACUUM CONDITIONS Vacuum control governor defective (possibly after a brake application)	—	Check vacuum control governor (VCG) toggle in No.2 nose end, should be 'down'. Note: VCG should close as vacuum brake pipe rises to 15 ins.
	d. DUAL BRAKE LOCOMOTIVES Air brake pipe governor defective (possible after a brake application)	—	Check brake pipe governor (BPG) in No.2 nose end, toggle should be 'up'. Note: BPG should close as air brake pipe rises to 56 p.s.i.

INDICATIONS IN DRIVING COMPARTMENT	POSSIBLE CAUSE	SUBSIDIARY INDICATIONS	RECOMMENDED ACTION
4. Complete loss of traction power (contd)	e. Earth fault relay (EFR) tripped	EFR 'flag' visible in window of control cubicle No.2 end.	Close power controller, pause and re-open slowly observing ammeter. If EFR trips again note the reading at which it tripped, close controller and, if circumstances permit, continue by not exceeding that 'tripped' reading on the ammeter until a convenient point to stop for examination is reached. Examine traction motors for signs of overheating and, if evident, isolate the appropriate pair by the switch in No.2 end. If there is no evidence find defective pair by trial and error. If power still cannot be regained, or retained, after isolation of traction motors then request assistance. Notes 1. Isolation not possible on earlier locomotives fitted with traction motor isolating links. Request assistance. 2. If isolation of traction motors has enabled power to be regained then check axles for rotation before continuing. 3. Field diversion will be suspended when motors are isolated. 4. Reduce maximum amps by one third for each pair isolated. 5. On locomotives 37001 to 37119 if traction motors 2 and 5 are isolated the main ammeter reading will be lost. PROCEED WITH EXTREME CARE.

INDICATIONS IN DRIVING COMPARTMENT	POSSIBLE CAUSE	SUBSIDIARY INDICATIONS	RECOMMENDED ACTION
5. Blue 'general fault' indicator light BRIGHT 	a. Low oil pressure fault developing (pressure below 25 p.s.i.)	'Oil Pressure' light BRIGHT at No.2 end 	Clear running lines if at all possible and then check reading on oil pressure gauge (to confirm the fault indication). Request assistance as necessary. Note: Engine will shut down if oil pressure falls further to 20 p.s.i. – see Fault Id.
	b. Low fuel supply	'Fuel' light BRIGHT at No. 2 end 	On standard locomotives the 'low fuel' warning denotes that there is sufficient fuel for 30 minutes running time. On modified locomotives, which have the former boiler water tank to provide extra fuel, this gives an additional 25 minutes running time. Clear running lines as necessary and, when possible, open cock 'C' to drain fuel from emergency tank to main tank, priming the system where possible (see page 4).
	c. High water temperature (195°F)	'Water' light BRIGHT at No.2 end 	Reduce power when possible and, if the blue 'general fault' indicator light then dims, proceed. When convenient check that radiator shutters are fully open and that coolant level is satisfactory. If coolant level is low and arrangements cannot be made for it to be topped-up, or there is evidence of leakage, clear running lines and request assistance.

INDICATIONS IN DRIVING COMPARTMENT	POSSIBLE CAUSE	SUBSIDIARY INDICATIONS	RECOMMENDED ACTION
5. Blue 'general fault' indicator light BRIGHT (contd)	d. Traction motor blower fault	'Blowers' light BRIGHT at No.2 end FIELD DIVERSION NOT OPERATIVE 	Reduce power when possible, not exceeding 1200 amps, and check blower fuses at No.2 end when convenient. If either is ruptured change as appropriate. If replacement fuse also ruptures, or fuses are sound and blower still does not run, then proceed providing amps do not exceed 1600 for a short period when re-starting, and do not exceed 1200 continuously. Request assistance as necessary.

INDICATIONS IN DRIVING COMPARTMENT	POSSIBLE CAUSE	SUBSIDIARY INDICATIONS	RECOMMENDED ACTION
6. Partial loss of traction power Yellow 'wheelslip' indicator light BRIGHT	a. Wheelslip		Wheelslip should be self-correcting – if it persists ease controller to an ammeter reading at which the wheelslip light remains dim. If rail conditions are very poor close controller, apply sand, and re-open controller slowly.
	b. Traction motor fault developing	—	If wheelslip light is BRIGHT, and it is evident that there is no wheelslip, then stop at first convenient point and examine traction motors for signs of over-heating etc. and if evident isolate the appropriate pair by the switch at No.2 end. If there is no evidence find defective pair by trial and error. Notes 1. Isolation not possible on earlier locomotives fitted with traction motor isolating links, clear running lines if possible and request assistance. 2. Check axles for rotation before continuing. 3. Field diversion will be suspended when traction motors are isolated. 4. Reduce maximum amps by one third for each pair isolated. 5. On locomotives 37001 to 37119 if traction motors 2 and 5 are isolated the main ammeter reading will be lost. PROCEED WITH EXTREME CARE.

INDICATIONS IN DRIVING COMPARTMENT	POSSIBLE CAUSE	SUBSIDIARY INDICATIONS	RECOMMENDED ACTION
7. Partial loss of traction power/locomotive does not develop full power	a. Fuel racks not fully open	—	When convenient check that manual over-ride control handle at drive end of engine is fully at the TOP of the quadrant.
	b. Loss of regulating air pressure	—	When convenient check system e.g. flexible hoses, cocks, connections to governor, master key left in unoccupied driving compartment, master switch away from OFF etc. etc.
	c. Traction motors isolated (by a previous person)	—	Check isolating switch (where provided at No.2 end) when convenient. If no appropriate entry in the repair book de-isolate. Report facts in repair book as appropriate.
	d. Charging air pressure low	—	When practicable check charging air pressure gauges which should indicate 5 p.s.i. when power controller is fully open.