

2. Fleet Reliability



This section specifies the common fleet reliability and performance measures used by the fleet community. It clearly defines the principle measures which are reported to ReFocus, describing what should be and should not be included in the data.

2. Common Reliability Data

The key measure agreed by Fleet Challenge Steering Group and reported by ReFocus is Miles Per 701D (**Mp701D**), a measure of the reliability of fleet. The underlying data for this measure is provided to ReFocus at an individual fleet level and reported back each industry period.

Note: Mp701D is the prime measure of fleet reliability reported by ReFocus.

In addition to Mp701D, data is also collated from fleet engineers to record:

- I. Number of AWS/TPWS 701D Incidents
- II. Total Number of Non-Technical (701A) Incidents
- III. Total Number of Out-Of-Use toilets, in service on all fleets, across the period

Each of these measures are reported to ReFocus at TOC level only.

2.1 Miles per 701D Incident

2.1.1 DEFINITION

Incidents that occur as a result of the technical failure of on-train equipment are coded to 701D. Mp701D is a measure of the engineering reliability of trains expressed as the average mileage between 701D codified incidents that are associated with a 3 minute (or more) primary delay on one journey and/or result in any cancellation (or part cancellation). Mp701D is reported for individual fleets. The measure is produced by RDG from data provided by TOCs with operational control as shown in *Table 3. The operating TOC is accountable for fleet reporting to RDG but for subleased fleets, the lessor and lessee should agree between them who is responsible.*

2.1.2 SOURCE OF UNDERLYING DATA

The mileage is derived from actual fleet unit/trainset mileage as recorded in GEMINI or equivalent. Note that an HST trainset counts as 1 unit, not 2 power cars and x trailer cars separately, so the unit miles equate to the train miles. Two 2-car 150/2 sets working in one train count as two units and therefore its unit miles are twice the train miles.

Information relating to 3 Minute Delays is derived from TRUST, COMPASS, Control Logs and/or BUGLE. All sources need to be scrutinised for the relevant fleet codes as appropriate for each TOC.

2.1.3 DETERMINING THE NUMBER OF 701D INCIDENTS

In all cases, a 3 Minute Delay is defined as a train incident which results in a delay of 3 or more primary minutes to that train where the root cause is a technical or maintenance-related defect on the train. Any such incident which results in a cancellation or part cancellation is also included.

2.2 Fleet Technical TRUST Incidents - 701D

In order to make good business decisions, good data and information is a fundamental requirement. TOCs therefore need excellent Delay Attribution processes in place that result in accurate data stored in TRUST (Train Running Under System TOPS). This assists the wider industry to accurately establish the national picture in terms of fleet reliability performance.

In terms of 'Fleet' there are two 'KPI categories', namely: 701D: FLEET (TECHNICAL) and 701A: FLEET (NON-TECHNICAL).

Table 1 lists all the TRUST incident cause codes for a 701D incident.

Note: This table is fully aligned with the content of the latest version of the Delay Attribution Principles and Rules (DAPR) document available [from Network Rail](#).

Table 1 – 701D Applicable Cause Codes

Code	Description	Abbreviation	Use Cases / Delays and Cancellations associated with technical faults to:
M0	Delays associated with faults relating to train-borne safety systems within the cab	CAB SAFETY	<ul style="list-style-type: none"> Driver Safety Device (DSD) Driver Vigilance Device (DVD) Global System for Mobile Telecommunications – Railway (GSM-R) hardware confirmed fault, including: <ul style="list-style-type: none"> Cab radio will not switch on or boot up Cab radio locks up or freezes and cannot be used – normally accompanied by a fault message and code such as 'Radio Failure 0x' – where x is a number between 1 and 7; or 'Cab Radio Fault' and 'Control Panel Failure' Calls cannot be made due to a defective train aerial. Warning Horn On Train Data Recorder (OTDR) Radio Electronic Token Block (RETB) Equipment Speedometer Headlight or Tail Lights
M1	Delays associated with faults with the Pantograph, ADD, train borne power switch over systems and PANCHEX activations	PANTO/AC	<p>Delays associated with faults in the train borne power change over equipment. Confirmed Pantograph Automatic Dropping Device (ADD), associated system faults, positive PANCHEX activations and train borne power switch over systems (AC) such as:</p> <ul style="list-style-type: none"> Pantograph PANCHEX Activation Automatic Dropping Device (ADD) <p>Note: PGD17 Incident Investigation Template – Appendix 3 outlines how such incidents should be investigated</p> <ul style="list-style-type: none"> Automatic Power Control (APC) Automatic Power Change Over (APCO) train borne equipment <p>Note 1: Refer to Code 'NA' for balise controlled system failures</p> <p>Note 2: This code is used for balises that are defective or fail if the affected infrastructure mounted balise is the</p>

			<p>responsibility of the Train Operator and not Network Rail.</p> <ul style="list-style-type: none"> Where two or more consecutive trains, that utilise the same Balise, fail to recognise that Balise (where Balise is the responsibility of the Train Operator and not Network Rail).
M2	Delays associated with faults affecting the train-borne train control / signalling systems	ETCS	<p>Delay associated with the trainborne ETCS/ERTMS/ATO system</p> <ul style="list-style-type: none"> Automatic Train Operation (ATO) system European Train Control System (ETCS) European Railway Traffic Management System (ERTMS)
M7	Delays associated with faults with train doors and associated systems	DOORS	<ul style="list-style-type: none"> Crew Doors Passenger Doors Gangway Doors Toilet Doors Cab Conversion Doors Door open incidents Delays associated with faults in the train borne Platform Identification Beacon System (PIBS) equipment e.g. Not-balise controlled Selective Door Operation (SDO) system <p>Note 1: Refer to Code 'NA' for balise controlled SDO failures</p> <p>Note 2: This code is used for balise failures if the affected infrastructure mounted balise is the responsibility of the Train Operator and not Network Rail.</p> <ul style="list-style-type: none"> Where two or more consecutive trains, that utilise the same Balise, fail to recognise that Balise if the affected infrastructure mounted balise is the responsibility of the Train Operator and not Network Rail
M8	Delays associated with other technical faults above the Solebar	ABOVE SBAR	<ul style="list-style-type: none"> Cab Heating, Ventilation and Air Conditioning (HVAC) Saloon HVAC Internal Lighting Vacuum Circuit Breaker (VCB) Line Breaker / High Speed Circuit Breaker (HSCB) Toilets Window faults – excluding windows broken by vandalism or external causes Faulty passenger facilities e.g. seating Fire (not caused by vandalism) <p>Note: PGD17 Incident Investigation Template – Appendix 1 outlines how such incidents should be investigated</p>
M9	Delays associated with train-borne systems where NO FAULT is found with the train-based equipment or the track	FLEET NFF	<p>The Train Operator staff are unable to find the reported train-related safety problem or can prove the report to be false.</p> <ul style="list-style-type: none"> A single train fails to interact with infrastructure mounted system (balise) correctly on one or more occasion. Such systems include: <ul style="list-style-type: none"> Automatic Power Control (APC) Automatic Train Protection (ATP) Automatic Warning system (AWS)

			<ul style="list-style-type: none"> ○ European Train Control System (ETCS) ○ Automatic Power Change Over (APCO) ○ Platform Identification Beacon System (PIBS) ○ Selective Door Operation System (SDO) ○ Radio Electronic Token Block (RETB) ○ Train Protection and Warning System (TPWS) ● Global System for Mobile Telecommunications – Railway (GSMR-R) fault is reported on a train, but no fault can be found. ● Where one train fails to recognise a Balise but subsequent trains, utilising the same Balise, recognise it and no fault is found with the affected train.
MB	Delays associated with Electric locomotives	ELEC LOCO	<ul style="list-style-type: none"> ● Electric locomotive systems ● Fire (not caused by vandalism)
MC	Delays associated with Diesel locomotives	DIESL LOCO	<ul style="list-style-type: none"> ● Diesel locomotive systems ● Fire (not caused by vandalism)
MD	Delays associated with other technical faults below the Solebar	BELOW SBAR	<ul style="list-style-type: none"> ● Air System ● Propulsion system: <ul style="list-style-type: none"> ○ Transmission ○ Drive Train ○ Engine ○ Gearbox ○ Final Drive ○ Traction Motor ● Train Electrical System ● Batteries ● Fire (not caused by vandalism) <p>Note this includes delays associated with known defective trains operating in service, including:</p> <ul style="list-style-type: none"> ○ Trains with part-defective traction systems ○ Tilting trains with defective tilt systems.
ME	Delays associated with Steam Locomotives	STEAM LOCO	<ul style="list-style-type: none"> ● Steam locomotive systems ● Fire (not caused by vandalism) ● Lineside fire caused by steam locomotive
MG	Engineering technical failures/defects associated with T+RS that has just come off depot	OFF DEPOT	<p>Technical failure off depot</p> <ul style="list-style-type: none"> ● Equipment left isolated from depot e.g. Door locked out of use, TPWS isolated, etc. ● Equipment fails off depot e.g. repeat failure of windscreen wiper or Loss of power
ML	Delays associated coaching stock (or wagons for freight trains)	WAGN / COACH	<ul style="list-style-type: none"> ● Coaches ● Parcels vehicles ● Wagons
MN	Delays associated with brake and brake system faults –	BRAKE/WHLS	<ul style="list-style-type: none"> ● Brake system <ul style="list-style-type: none"> ○ Air/pneumatic ○ Electrical/dynamic ● Wheel Slide Protection

	including Wheel Flats		<ul style="list-style-type: none"> • Wheel Impact Load Detection (WILD), WHEELCHEX or GOTCHA Activation • Poor brakes • Wheel Flats
MQ	Delays associated with faults with 3rd rail, shoe beam and train borne power switch over systems (DC)	SHOE/DC	<p>Delays associated with faults in the train borne power change over equipment. Confirmed shoe beam or associated system faults Incl. train borne power switch over systems (DC)</p> <ul style="list-style-type: none"> • 3rd Rail Collector Equipment: <ul style="list-style-type: none"> ◦ Shoe beam ◦ Slipper ◦ Shoe shunt ◦ Pedestal • Blown shoe fuse • Train borne power switch over systems (DC) <p>Note 1: Refer to Code 'NA' for balise controlled system failures</p> <p>Note 2: This code is used for balises that are defective or fail if the affected infrastructure mounted balise is the responsibility of the Train Operator and not Network Rail.</p> <ul style="list-style-type: none"> • Where two or more consecutive trains, that utilise the same Balise, fail to recognise that Balise (where Balise is the responsibility of the Train Operator and not Network Rail).
MR	Delays associated with train-borne sander or scrubber faults	SANDER	<ul style="list-style-type: none"> • Sanding system • Wheel scrubber
MT	Delays associated with train-borne Safety System Faults (Not Cab Based)	SYST FAULT	<ul style="list-style-type: none"> • Automatic Train Protection (ATP) • Automatic Warning System (AWS) • Hot Axle Box detection (HABD) e.g. confirmed hot axle box. • Wheel Impact Load Detector (WILD) • Track Circuit Actuator (TCA) • Train Protection Warning System (TPWS)
MW	Delays associated with the effect of non-severe weather on the train	WEATHR FLT	<p>Non severe weather causing problems to individual passenger Fleet equipment types.</p> <p>Note: 'VW' exception if there is severe weather affecting most modes of transport.</p> <ul style="list-style-type: none"> • Water Leaks (associated with precipitation) • Windscreen wipers • Frozen equipment – where prior mitigation has not been carried out, e.g. couplers; doors; air systems; etc. • TOC Directive preventing trains from passing through standing water at a level where the rule book allows movement of trains. • Running Brake Tests due to weather • Running at reduced speed due to frozen brakes • Fleet imposed restrictions due to weather e.g. reduced speed operation through flood water
MY	Delays associated with Coupler, Coupling system and	COUPLER	<ul style="list-style-type: none"> • Coupler mechanism • Coupler buttons • Coupler control system • Intercar Jumpers/connective cables

	jumper cable faults – excluding track or driver based issues		
NA	Delays associated with balise activated train-borne systems	TASS/TILT	<ul style="list-style-type: none"> • On-board Tilt Authorisation and Supervision System (TASS) • On-board Selective Door Operation (SDO) • On-board Correct Side Door Enable (CSDE) <p>Note: Incidents should be coded 'IM' if the infrastructure mounted equipment is defective.</p>

Note: The cause code 'MP' for rail-wheel interface adhesion problems (including ice on the running rail) falls under KPI category 750 "Low Adhesion inc. Autumn (Train Operator)".

2.2.1 Clarification on what should be included as a 701D incident:

- Incidents caused by the technical failure of a train component or system. This is regardless of whether that component or system is under any warranty.
- Incidents on empty stock moves caused by the technical failure of a train component or system, regardless of whether or not a passenger service has been affected.
- Incidents caused by the failure of a component or system caused by poor maintenance instructions or regime or by a maintainer incorrectly following the correct procedures.
- Incidents where delay has been exacerbated by operational error or inaction but where the root cause was technical or maintenance-related.
- Incidents caused by technical failure even in the event of adverse weather or other conditions.
- Incidents as a result of known defective trains being in traffic.
- Incidents where subsequent investigation cannot identify a technical fault e.g. No Fault Found / No Defect Found.
- 701D should include repeat failures of trains for the same technical defect. Note: Such incidents should be dealt with in accordance with the agreed procedures (described in sections E4.5-E4.7 inclusive) of the Delay Attribution Principles and Rules.
- Failure to stop incidents resulting in part or full cancellation or delay should be included if the root cause is the technical failure of a train component or system.

2.2.2 Clarification on what can be excluded (as a 701D incident) following successful reattribution:

- Train incidents caused by human vandalism.
- Train incidents caused by proven infrastructure defects.
- Train incidents caused by any external cause as per the Delay Attribution Principles and Rules, i.e. unrelated to a technical or maintenance-related train fault (for example, brake defect due to equipment damaged by suicide), or extreme contamination.
- Operational problems associated with stock availability, (i.e. provision of the wrong stock type or short-formed services), unless the operational problem has been caused by rolling stock that has become defective after having been declared fit for service to Operations (i.e. train has been prepped and a diagram allocated) or due to restricted train formations (i.e. multi-only operations).

2.2.3 Clarification on merging incidents:

Delay Attribution should be undertaken at Level 1, but where this has not been possible - for a train where multiple incidents have been created for a single train journey in TRUST, they can be combined. For example, if a long-distance train has a traction fault and as a consequence generates multiple TRUST incidents on its London-bound journey - then these incidents can be merged in accordance with agreed industry Delay Attribution processes.

However, if the TRUST incidents have been created on the same day for the same piece of rolling stock whilst working different trains/journeys, these incidents should NOT be merged and each incident must be treated separately for Mp701D reporting purposes.

2.2.4 No Fault Found:

Where a reported defect is No Fault Found, the 3 Minute Delay will remain, even if the problem has not been definitively understood or resolved, until it has been possible to prove beyond reasonable doubt that the defect did not occur and the associated delay has been reattributed to the party responsible (see 2.2.5 - Disputing incidents). Evidence from OTDR, TMS or similar analysis carried out using traditional fault-finding is acceptable.

2.2.5 Disputing incidents:

This applies when Fleet department believe an incident should be disputed and there is no initial evidence to indicate the incident was due to a technical failure, but there is evidence that this incident should be referred to another area of the business. It is worth bearing in mind two factors here:

- The purpose of delay attribution is primarily to collect data on asset failures - would your dataset be better or worse without the incident?
- Is any other party better placed to deal with (and prevent recurrence of) the incident than Fleet?

A flow chart was developed by a subgroup of Fleet Reliability Focus Forum members in the review of Issue 10 of the 20PP and is provided in Appendix A to aid decision-making.

2.3 Fleet Non-Technical TRUST Incidents - 701A

A non-technical incident is allocated to code 701A in TRUST when such an incident causes a total delay of 3 or more minutes, or a cancellation (or part cancellation) at any point for a single root cause where the root cause is related to 'fleet' management activities. Where applicable, this can be considered as an approximate measure of respective TOC depot performance.

Non-technical should not be used for incidents attributed to staff incompetence. [See Section 2.2.1.](#)

The number of incidents is aggregated over all fleets and depots that were impacted, along with the delay minutes.

Table 2 lists all the TRUST incident cause codes for a 701A incident.

Note: This table is fully aligned with the content of the latest version of the Delay Attribution Principles and Rules (DAPR) document available [from Network Rail](#).

Table 2 – 701A Applicable Cause Codes

Code	Description	Abbreviation	Use Cases / Delays and Cancellations associated with the following:
MF	Off depot non-technical fleet delay	NON TECH	<ul style="list-style-type: none"> Doors left isolated by cleaners Coolant checks by fitters Fuel checks by fitters Fitter completing other non-technical inspections Global System for Mobile Telecommunications – Railway (GSM-R) Railway Emergency Call (REC) initiated in error from a train cab that is on the Network Rail Network by a member of train maintenance staff or a train cleaner.
MS	Planned Underpowered or Short Formed Service and/or Vehicle – including Exam Set Swaps	ALOC STOCK	<ul style="list-style-type: none"> Shortage of serviceable rolling stock i.e. Availability shortage. Operating stock with a lower maximum speed to maintain the Sectional Running Times e.g. 75mph stock operating a 100mph service. Stock Change / Set swap as a result of a 'Fleet' request Operating a 'short-formed' service e.g. 4-car vice 8-car; 9-car vice 11-car Operating a 'long-formed' service e.g. 5-car vice 4-car; 11-car vice 9-car Operating 'non-tilting rolling stock' over a route that needs 'tilt' in order to meet the Sectional Running Times. <p>Note: PGD16 Stock Swaps Scenarios and Delay Allocation provides further detail</p>
MU	Depot Operating Problem	DEPOT OPS	<ul style="list-style-type: none"> Operating problem or mishap at an off-Network Rail network location affecting trains entering or leaving that location, including: <ul style="list-style-type: none"> Staffing problems Congestion Planning issues Shunting problems Problems with another Operator's train Operator of train waiting outside the location does not provide information on an incident

		<ul style="list-style-type: none"> ○ Parts of the depot unavailable to use e.g. defective track, defective pointwork, local power supply outage etc. ● Units late off maintenance ● A REC is initiated off Network Rail Network, in error from a train cab, preventing trains from accessing the network and/or the off-Network Rail network location, including where it has not been possible to identify the person initiating the REC. ● Objects that are thrown or fired at trains or Network Rail Infrastructure from depots. ● Non-severe weather causing passenger depot operating problems <p>Note: 'VW' exception if there is severe weather affecting most modes of transport.</p> <ul style="list-style-type: none"> ● Fire in depot (not caused by vandalism)
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2.4 Splitting incidents

Where an incident delay or cancellation has been attributed in a way such that it has been split between different Responsible Managers, the following applies:

If, following an agreed Responsible Manager 50:50 split of any incident – should the threshold of 3 minutes primary delay remain attributable to fleet for that incident (and by default any part cancellations) then that incident should be counted as a full 701D (or 701A) incident - as appropriate.

2.5 Data submission

RDG contacts fleet operators at the beginning of week 2 to request the data required to complete *Table 3* by the end of week 2 (Friday). Each TOC submits data for every vehicle they operate.

2.6 Data resubmission

No formal process is in place to refresh data post-TOC submission. However, amendments can be made at RDG's discretion. All amendments must be submitted to the RDG data analyst for approval. Resubmissions must be of significance to avoid continuous changing of TOC reports.

Table 3 – example of TOC report containing the new measures

<u>Toilet KPIs</u>		
	UAT	Non-UAT
Total Number of Toilets¹	4622	7536
Number Out of Use ^{2 3}		
Tanking	5	4
Others	52	19

¹Total number of toilets daily, put into service on all fleets, summed across the period

²Total number of "Out-of-use" toilets, daily, in service on all fleets, summed across the period

³Definition of "Out of use":
Tanking: Tanking unavailability (Refill water) or Emptying (CET)
Others: Door does not open, closes or locks
Toilet unit does not flushes or empties
Tap does not dispense water
Sink does not drains