# Heavy-Duty J1939 and Vehicle Networks Functional Verification and Return-to-Service Checklist - Sensor or Feedback Anomaly

Heavy-Duty J1939 and Vehicle Networks | Sensor or Feedback Anomaly | Asset ID FIX-02-08-07

**Safety gate: Stop, isolate and verify before exposure to hazardous energy. Lockout/Tagout and live testing require the applicable site procedure, authorised controls and a qualified person. Never bypass a guard, interlock or protective device to complete this workbook.**

## How to use this field resource

This is an equipment-agnostic documentation workbook for heavy-duty j1939 and vehicle networks. It helps a trained team separate network, power, sensor and controller evidence without replacing a component by guesswork. It does not identify a fault by itself and does not replace the equipment-specific OEM manual, drawings, limits, permits or a qualified technician's judgement.

| Intake field | Record |
|---|---|
| Asset or equipment ID | _____ |
| Site and location | _____ |
| Reported by / time | _____ |
| Fault situation | Sensor or Feedback Anomaly |
| Operating state | Stopped / standby / starting / running / loaded |
| Safety owner | _____ |
| OEM reference used | Document number and revision: _____ |

## Evidence areas for this system

For a sensor or feedback anomaly, focus on evidence that can be dated, repeated and handed to another technician. Capture the as-found state before clearing alarms, changing settings or disturbing connections.

| # | Evidence area | First record |
|---|---|---|
| 1 | Spn and fmi event record | As-found note: _____ |
| 2 | Source address and reporting module | As-found note: _____ |
| 3 | Network power and ground | As-found note: _____ |
| 4 | Data-link condition | As-found note: _____ |
| 5 | Engine operating snapshot | As-found note: _____ |
| 6 | Active versus previously logged events | As-found note: _____ |

## Functional Verification and Return-to-Service Checklist

Use this section to compare the reported value with process state and an authorised independent reference. Record as-found value, location, conditions and reference status before choosing the next action.

| Function | Acceptance criterion | Observed result | Status |
|---|---|---|---|
| Spn and fmi event record | Acceptance: _____ | Result: _____ | Pass / fail / not tested |
| Source address and reporting module | Acceptance: _____ | Result: _____ | Pass / fail / not tested |
| Network power and ground | Acceptance: _____ | Result: _____ | Pass / fail / not tested |
| Data-link condition | Acceptance: _____ | Result: _____ | Pass / fail / not tested |
| Engine operating snapshot | Acceptance: _____ | Result: _____ | Pass / fail / not tested |
| Active versus previously logged events | Acceptance: _____ | Result: _____ | Pass / fail / not tested |

### Release sequence

- Account for tools, parts, temporary leads and materials.
- Restore guards, covers, labels, seals and safety devices.
- Clear Lockout/Tagout only through the authorised site process.
- Test at a controlled condition before normal duty.
- Record residual defects, restrictions and the person accepting the asset.

## Heavy-Duty J1939 and Vehicle Networks Evidence Map

**Evidence first: Preserve alarms, event history, settings, trends and the as-found physical state before reset, disconnection or adjustment. If safe access is uncertain, stop and refer the task to the authorised person.**

| # | System area | Evidence action | Trace | Record |
|---|---|---|---|---|
| 1 | Spn and fmi event record | Observe and identify | Evidence ID: _____ | Finding: _____ |
| 2 | Source address and reporting module | Record source and time | Evidence ID: _____ | Finding: _____ |
| 3 | Network power and ground | Compare with reference | Evidence ID: _____ | Finding: _____ |
| 4 | Data-link condition | State what it supports | Evidence ID: _____ | Finding: _____ |
| 5 | Engine operating snapshot | State what it rules out | Evidence ID: _____ | Finding: _____ |
| 6 | Active versus previously logged events | Choose the least invasive next check | Evidence ID: _____ | Finding: _____ |

## Scenario boundary

For this sensor or feedback anomaly, do not force or simulate a protective signal without an approved test procedure. Write the boundary before testing so urgency does not quietly change the rules.

| Boundary | Definition |
|---|---|
| Known good condition | _____ |
| Known failed condition | _____ |
| Difference between them | _____ |
| First missing evidence | _____ |
| Stop-work threshold | _____ |
| Escalation owner | _____ |

### Evidence labels

- FACT - directly observed and traceable.
- REPORT - supplied by another person; source recorded.
- INFERENCE - reasonable explanation that still needs a test.
- UNKNOWN - important gap that must not be filled by assumption.
- LIMIT - OEM, engineering or site acceptance value.

## Sensor or Feedback Anomaly Condition Workbook

The goal is to compare the reported value with process state and an authorised independent reference. Describe the failed state narrowly enough that another trained person could look for the same thing without being told your suspected cause.

| Question | Boundary prompt | Record |
|---|---|---|
| What changed? | Function, output, indication or behaviour | _____ |
| Where? | Asset, side, circuit, zone or process stage | _____ |
| When? | Sequence step, runtime, load or environment | _____ |
| How often? | Every cycle, random, once, or after delay | _____ |
| What restores it? | Nothing, time, reset, cooling or load change | _____ |
| What stays normal? | Unaffected systems or functions | _____ |
| What changed recently? | Work, software, settings, parts or operating duty | _____ |

## Controlled reproduction plan

| Plan field | Record |
|---|---|
| Safe starting state | _____ |
| One condition to vary | _____ |
| Conditions held constant | _____ |
| Evidence captured | As-found value, location, conditions and reference status |
| Maximum attempts | _____ |
| Immediate stop signal | _____ |
| Authorising person | _____ |

### Attempt notes

| Attempt | Starting condition | Result | Decision |
|---|---|---|---|
| 1 | State: _____ | Observed: _____ | Next decision: _____ |
| 2 | State: _____ | Observed: _____ | Next decision: _____ |
| 3 | State: _____ | Observed: _____ | Next decision: _____ |
| 4 | State: _____ | Observed: _____ | Next decision: _____ |

## Measurement and Evidence Register

**Measurement boundary: This page records an approved test; it does not authorise one. A qualified person must choose the method, instrument category, connection points, isolation state and protective controls from the applicable procedure.**

| ID | Evidence area | Traceable source | Result | When |
|---|---|---|---|---|
| 1 | Spn and fmi event record | Method / source: _____ | Value / state: _____ | Time: _____ |
| 2 | Source address and reporting module | Method / source: _____ | Value / state: _____ | Time: _____ |
| 3 | Network power and ground | Method / source: _____ | Value / state: _____ | Time: _____ |
| 4 | Data-link condition | Method / source: _____ | Value / state: _____ | Time: _____ |
| 5 | Engine operating snapshot | Method / source: _____ | Value / state: _____ | Time: _____ |
| 6 | Active versus previously logged events | Method / source: _____ | Value / state: _____ | Time: _____ |

## Instrument and reference record

| Control | Record |
|---|---|
| Instrument or data source | _____ |
| Identifier and range | _____ |
| Calibration / validation status | _____ |
| OEM or engineering reference | Document and revision: _____ |
| Equipment operating state | _____ |
| Uncertainty or limitation | _____ |

### Before using a value

- Check units, scale, timestamp and source identity.
- Keep raw evidence where practical; do not retain only a conclusion.
- Record values that disagree with the current theory.
- Compare only like operating conditions.
- Treat a single normal reading as one data point, not proof that an intermittent fault is absent.

## Cause and Evidence Matrix

List competing explanations before the team settles on one. A good next check separates hypotheses; a poor check produces the same answer no matter which cause is true.

| # | Hypothesis | Supporting | Contradicting | Discriminating check |
|---|---|---|---|---|
| 1 | Spn and fmi event record hypothesis | For: _____ | Against: _____ | Next evidence: _____ |
| 2 | Source address and reporting module hypothesis | For: _____ | Against: _____ | Next evidence: _____ |
| 3 | Network power and ground hypothesis | For: _____ | Against: _____ | Next evidence: _____ |
| 4 | Data-link condition hypothesis | For: _____ | Against: _____ | Next evidence: _____ |
| 5 | Engine operating snapshot hypothesis | For: _____ | Against: _____ | Next evidence: _____ |
| 6 | Active versus previously logged events hypothesis | For: _____ | Against: _____ | Next evidence: _____ |

## Five-why chain with evidence

| Level | Explanation | Proof or gap |
|---|---|---|
| Problem | Sensor or Feedback Anomaly | Evidence ID: _____ |
| Why 1 | _____ | Evidence: _____ |
| Why 2 | _____ | Evidence: _____ |
| Why 3 | _____ | Evidence: _____ |
| Why 4 | _____ | Evidence: _____ |
| Why 5 | _____ | Evidence: _____ |

### Cause confidence

- Confirmed - reproduced or directly measured against a valid reference.
- Probable - best fit, but one meaningful alternative remains.
- Possible - plausible and worth a safe test.
- Unrelated - contradicted by the evidence.
- Unknown - evidence is missing or unreliable.

## Repair Decision and Return-to-Service Gate

**Release authority: Completion of a repair is not permission to energise or operate. Restore energy and return equipment to service only through the site's authorised process, with guards and protective functions reinstated.**

| Decision field | Record |
|---|---|
| Confirmed problem | _____ |
| Evidence-supported cause | _____ |
| Approved repair reference | Document and revision: _____ |
| Work completed | _____ |
| Parts / settings changed | _____ |
| Residual defect or restriction | _____ |
| Person completing / checking | _____ |

## Controlled verification

| Verification | Acceptance basis | Status |
|---|---|---|
| As-found symptom | Sensor or Feedback Anomaly | Absent / present / not tested |
| Primary function | Spn and fmi event record | Pass / fail / not tested |
| Related function | Source address and reporting module | Pass / fail / not tested |
| Protection and alarms | Normal protective state retained | Pass / fail / not tested |
| Leak, heat, noise or damage | No new adverse condition | Pass / fail / not tested |
| Recorded operating condition | Load / mode / duration: _____ | Accepted / restricted |

### Release signatures

- Technical check by: _____ Date/time: _____
- Operations acceptance by: _____ Date/time: _____
- Safety or permit close-out by: _____ Date/time: _____
- Follow-up owner and due date: _____

## Handover, Follow-Up and Prevention Plan

Close the record so the next shift can understand the sensor or feedback anomaly, the evidence, the repair decision and any remaining restriction without relying on memory.

| Handover field | Record |
|---|---|
| Current equipment state | _____ |
| What was confirmed | _____ |
| What remains unknown | _____ |
| Operating restriction | _____ |
| Evidence location | Log / work order / folder: _____ |
| Next owner and action | _____ |
| Escalation trigger | _____ |

## Follow-up schedule

| When | Review | Record |
|---|---|---|
| Next shift | Confirm state and restriction | Owner: _____ Result: _____ |
| 24 hours | Review SPN and FMI event record | Owner: _____ Result: _____ |
| 7 days | Check for repeat events under comparable duty | Owner: _____ Result: _____ |
| 30 days | Review effectiveness and maintenance action | Owner: _____ Result: _____ |

### Prevention decision

- Update the task, limit, drawing or training only when the cause supports it.
- Remove any temporary control by its approved expiry point.
- Share the lesson without exposing private, security-sensitive or proprietary data.
- Record whether the action reduced repeat faults, downtime or diagnostic effort.
- Reopen the analysis if the symptom returns under the same conditions.

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