

**East Central Railway
Signal & Telecommunication Department**

TECHNICAL CIRCULAR NO. 19

Sub: Provision of Data Logger, their Functional Requirements & Exception Report.

Ref: (i) S&T Technical Circular No. - 03/2007, dated-16.07.07
(ii) S&T Technical Circular No.-12, dated-22.09.08
(iii) Data Logger system for Railway Installation, Specification No. IRS S 99/2006

1. Instructions already exist as Para 21.18.4 of the Signal Engineering Manual that all relay interlocking installations are required to be provided with Data loggers.
2. Further, Railway Safety Review Committee report has recommended that "IR should proceed with urgency to install digital data loggers that would not only record signal infractions but will also help in detecting SPADs, preventive maintenance and for ascertaining the status of signals in event of dispute."
3. In view of above the following decisions have been taken-
 - a. New Installations-
 - i. All new PI/RRI/EI/MACLS stations should be commissioned with Data logger.
 - ii. All new Automatic Signalling installations, Block Huts, IBH and Midsection interlocked level crossing gates should be commissioned with RTU unit of suitable capacity with connection to nearest station data logger unit.
 - iii. Wherever availability of communication channel like OFC, Micro wave and Quad Cable media available, Data Logger should be networked with Central Monitoring Unit at the S&T Control at the time of commissioning.
 - b. All existing PI/RRI/EI/MACLS stations installations where Data Loggers have not been provided, should be provided with Data Loggers of suitable capacity.
 - c. All existing Automatic Signalling installations, Block Huts, IBH and Midsection interlocked level crossing gates where Data Loggers have not been provided, should be provided with suitable RTU unit with connection to nearest station data logger unit.
 - d. Configuration of Data logger/RTU's at various signaling installations shall be as given below -

S.No.	Type of Installation	Equipment Recommended	No.of Digital Inputs	No.of Analog Inputs
A.	Relay Interlocking (British Design)			
	<= 75 routes	Data Logger	512	32
	<= 150 routes	Data Logger	1024	32
	<= 250 routes	Data Logger	1536	32
	<= 500 routes	Data Logger	3072	64
	> 500 routes	Data Logger	As required by the design.	

B.	Relay Interlocking (Siemens Design)			
	<= 75 routes	Data Logger	1024	32
	<= 150 routes	Data Logger	1536	32
	<= 250 routes	Data Logger	3072	64
	<= 500 routes	Data Logger	4096	64
	> 500 routes	Data Logger	As required by the design.	
C.	Electronic Interlocking	For EI installations, digital inputs are mostly given by EI to data logger through serial interface (RS 232 port of the system data logger). Analog inputs are required to be monitored separately along with certain minimal unforeseen external digital inputs for which configuration of 512 digital and 32 analog inputs are considered sufficient.		
D.	Other Installations			
i	Automatic signaling installations			
a)	Auto Signal location	RTU	64	32
b)	AFTC Hut	RTU	32	8
ii)	IBS	RTU	32	8
iii)	Mid section Interlocked LC gates	RTU	32	8

4. It should be ensured that all existing and new Data Loggers installations have been provided with-

- i. CMU and Printer at station.
- ii. All features for provision of Control charting/NTS integration.

5. System shall generate following faults alarms and their priority are-

S.No.	FAULT ALARM	PRIORITY
1.	Signal Bobbing	Medium
2.	Track Bobbing	Immediate
3.	Point Bobbing	Medium
4.	Point Failure	Immediate
5.	Point loose packing	Medium
6.	Timer Setting Less	Immediate
7.	Timer Setting More	Medium
8.	Check the Charger	Immediate
9.	Blanking of Signals	Immediate
10.	Fusing of Signal Lamp	Immediate
11.	Track Circuit Failure	Immediate
12.	Power Supply Failure	Immediate
13.	Power Supply Restored	Low
14.	Signal Flying back to danger	Medium
15.	Route section not released	Immediate
16.	Sluggish operation of Point	Medium

6. It shall be possible to monitor following unusual incidences-

S.No.	INCIDENCE	PRIORITY
1.	Late Start of Train	Medium
2.	Over speeding of train	Medium
3.	Clearing of signal without route bobbing	Immediate
4.	Signal assuming green aspect with one or more points in route in reverse condition	Immediate
5.	Home /main line starter signal assuming green aspect with advance starter danger	Immediate
6.	Point Burst	Immediate
7.	Check for passing of defective /danger signal	immediate

7. It shall be possible to monitor following unusual incidences-

S.No.	UNUSUL SEQUENCE	PRIORITY
1.	Picking Up of Track circuit when adjacent track circuits are Dn.	Immediate
2.	Route getting release without all the sequential route relays in the route picking Up	Immediate
3.	Block getting released without picking up of sequential train arrival relays	Immediate
4.	Advance Starter Off without Line Clear	Immediate

8. The Data Logger shall be capable of generating following daily reports-

- Log of Events.
- Fault Report.
- Unusual Incidences.
- Unusual sequences.

9. Following parameters which should be monitored by data logger for predictive maintenance-

9.1 Functions to logged by Data Logger at Relay Interlocking stations-
Non-Route Setting Type (British Design)-

- i. TPRs
- ii. NWKR/RWKR
- iii. WNRs/WRRs
- iv. UECPR
- v. LCP/LXPR
- vi. HRs/HHRs/DRs
- vii. UGRs
- viii. CHRs
- ix. NPR (Siding Control)
- x. WLR
- xi. ASRS/ASPRs
- xii. JSLRs

- xiii. NJPRs/ROHR
- xiv. LOVNJPR
- xv. SMR
- xvi. R/LVR
- xvii. CO.ERR
- xviii. All ECRs/ECPRs
- xix. TSRs
- xx. UCRs
- xxi. YRs (Slot circuits)
- xxii. UP/DN GXR
- xxiii. GFXR
- xxiv. Battery charger monitoring relay

9.2 Functions to logged by Data Logger at Relay Interlocking stations (Route Setting Type)-

A. British Design-

- i. TPRs
- ii. NWKRs/RWKRs
- iii. WNRs/WRRs
- iv. UECPR
- v. LCP/LXPR
- vi. HRs/HHRs/DRs
- vii. UGRs
- viii. CHRs
- ix. NPR
- x. WLRs
- xi. ASRS/ASPRs
- xii. JSLRs
- xiii. NJPRs/ROHRs
- xiv. LOHRs/ROHRs
- xv. LOVNJPR
- xvi. SMR
- xvii. R/LVR
- xviii. TRSRs/TLRs
- xix. LRs
- xx. URs
- xxi. CO.ERRs
- xxii. All ECRs/ECPRs
- xxiii. TSRs
- xxiv. UCRs
- xxv. YRs (Slot Circuit)
- xxvi. ASRs/ASPRs(last relay) ✓
- xxvii. NWKSRs/RWKSRs (last relay)
- xxviii. ZRs
- xxix. Up/DN GXR

Button relay

B. Siemens Design-

- i. TPRs
- ii. ECRs
- iii. WKR1
- iv. (N)/(R) WLR
- v. NWKRs/RWKRs
- vi. AU(R)S & BU(R)S
- vii. GR1/GR2
- viii. OVZU(R)R/OVU(R)R
- ix. Y(R) R
- x. COULR1
- xi. COULR2
- xii. CHKLCR
- xiii. EUUYNCR and all Cancellation Relays
- xiv. XKCRS
- xv. YR
- xvi. All direction Relays
- xvii. Z1URS/BZ1URS
- xviii. GZR
- xix. ZDUCRS
- xx. W(R)LR
- xxi. GLSR
- xxii. G(R) LR
- xxiii. CHY(R) R
- xxiv. AJTR1
- xxv. AJTR2
- xxvi. ZR
- xxvii. AUZ1UR
- xxviii. UNRs/GNRs/Common NRs
- xxix. DRs/GNRs/GR4/HHRs
- xxx. U(R) LR
- xxxi. Button Relay, UYR

9.3 Functions to be logged by Data Logger at EI stations – In electronic interlocking the logging of all the above events takes place in EI equipment itself. The EI equipment shall send the event log data of the inputs mentioned above in 9.1 & 9.2 in the common protocol format to external data logger through serial interface as already specified in the data logger specification.

9.4 Functions to be logged in auto section (unidirectional)-

- i. All TPRs
- ii. All HRs/HHRs/DRs
- iii. All ECRs/ECPRs

9.5 Function to be logged in automatic permissive block section (bi-directional automatic signaling section)

- i. FNPR
- ii. FRPR
- iii. FRZR
- iv. FRPR

- v. FLR
 - vi. FZR
 - vii. FZRR
 - viii. FKRN
 - ix. FKRR
 - x. TK1R
 - xi. TK2R
 - xii. BCR
 - xiii. HZR
 - xiv. Approach AR
 - xv. King Knob
 - xvi. AUM
 - xvii. ADM
 - xviii. LCPR
 - xix. HR/HHR/DR/ECR/LCR/MECR for open signal
- } Latched relay

9.6 Functions to be logged for block circuits-

- i. ASCR
 - ii. TAR
 - iii. LSSR/LSSRP
 - iv. ZR
 - v. LCPR
 - vi. LCZR
 - vii. TGTR
 - viii. ASR/HSR
- } - Push button token less block instrument
- } - SGE double line block instrument
- Neale's block instrument
- FM-Diodo type instruments.

9.7 Functions to be monitored in IPS

- i. Inverter 1 fail
- ii. Inverter 2 fail
- iii. FRBC output fail
- iv. DC-DC converter fail
- v. Mains fail
- vi. Call S&T Staff

9.8 Analog functions to be monitored-

9.8.1 All types of stations-

- i. UP/DN AT Supplies/DG supplies
 - ii. 110V AC for track circuit
 - iii. 110V AC for signal feed
 - iv. 110V DC point operation
 - v. Int. 24 V / 60 V
 - vi. 12 V DC Panel indication
 - vii. External (N) DC Voltage
 - viii. External (S) DC Voltage
 - ix. Repeating DC Voltage
 - x. Block Line battery DC Voltage
 - xi. Block local battery DC Voltage
 - xii. 400 V AC Supply
 - xiii. DC Supply for Data Logger
- 180-260 V
- 100-120 V
- 100-120 V
- 100-120 V
- 22-30V/54-66 V
- 10-13 V
- 24-30 V
- 24-30 V
- 22-30 V
- as applicable
- as applicable
- 380 V- 440 V

Alarm condition in case voltages drop below 5% of present value suddenly for more than 30 seconds.

Auto sections-

- i. AC 110 V
- ii. AC 400 V
- iii. DC 24 V-External
- iv. DC 24 V- Internal

10. Exception condition shall be stored in the Data Logger chronologically and displayed one by one on the front panel through a toggle switch.
11. Data Logger installations shall not be declared commissioned till all logic/reports to be generated from Data Logger and given in S.L.No.-4 to 9.82 have been implemented and verified.
12. Implementation of all the logics and generation of all exception reports/alarms etc. shall be jointly verified by firms, representative, construction & open line Supervisors and same shall be part of handling over document.
13. Contacts of the relays for data logger input must be indicated in the contact analysis chart.
14. All Data Loggers shall be networked with FEP and CMU in S&T control room.
15. For networking of data loggers and CMU communication channels should be earmarked in OFC/Quad cable channeling plan to avoid delay in networking.
16. All existing or new Data Loggers should be covered under warranty or suitable Annual Maintenance contract for the maintenance of software & hardware for data logger network to ensure high level of availability and to facilitate incorporation of modification and change in configuration as and when required.
17. In order to obtain reasonable rates AMC can be made a part of data logger supply/installation tender.
18. Opening/closing of relay room door must be proved in Data Loggers.
19. Reliable power supply to data logger must be provided with battery back up.
20. One SSE/SE/JE (Signal) should be exclusively posted round the clock in shift to give feed back and interact with line staff for effective predictive and preventive maintenance.
21. This technical circular supersedes the technical circulars No. - 03/2007 & technical circular No.-12, dated-16.07.07 & dated-22.09.08.

These issues with the approval of CSTE.

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21/4/09

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 14/10/09
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