

Northeast Frontier Railway
Signal & Telecommunication Department
Technical Circular No. 04/2016

**Sub: Guidelines for Installation/maintenance and troubleshooting chart for
Push Button Type Tokenless Block Instrument.**

Tokenless block instruments conforming to Indian Railway Standard Specification No. S 32/66 are being manufactured at S&T Workshop, PODANUR, Southern Railway as per circuit diagram No. TLB 00101. These instruments are installed on single line sections in all over Indian Railways. This instrument does not have any mechanical moving parts and the safety in train working is achieved by Relay interlocking.

Guidelines for Installation and maintenance of Tokenless Block Instrument.

1. Line Circuit with EARTH RETURN shall not be used.
2. Local Battery voltage at the instrument terminals on load should not be below 24 Volts
3. Local battery voltage on load should not exceed a maximum of 29 V as it may affect the Zener diode working.
4. The difference between the local battery voltages of the interconnected instruments on load should be kept to a maximum of 4 volts.
5. The line battery shall be capable of supplying a minimum current of 60 mA on line but not more than 70 mA. Whenever Line Circuit is fed from IPS through separate DC-DC converter the DC -DC converter should be so adjusted that the line current remains in the range between 60 mA to 70 mA.
6. The line current shall be measured both at the transmitting and receiving end. There shall not be appreciable variations between the instruments.
7. Separate line battery should be provided for each instrument. Whenever the line battery is changed the line current should be checked. Where Line Circuit is fed from IPS through conventional DC-DC converter, the input 24V for conventional DC-DC converter (as per specification no. IRS: S 96- 2000) should not be fed from same DC-DC converter of IPS i.e. dedicated DC-DC converter of IPS (24 V output) shall be used for each conventional DC-DC converters (Specification No. IRS: S 96-2000) of line circuit for each Tokenless Block Instrument of a station.
8. The source of power for all the external circuit relays i.e. for SNR, ASTR and TAR should be form internal battery bank or from Internal DC-DC converter of IPS.
9. Maintain correct polarity while connecting HOOTER leads.
10. HMT cord should be connected to the respective terminals to ensure that no current is drawn from telephone battery when the HMT button is not pressed.
11. Oiling of Tokenless Block Instrument switch contact should be avoided.
12. Whenever the instrument fails, interchanging of Relays and units shall not be resorted to without ascertaining the actual cause.
13. Relays and timer units shall not be left without the Relay retaining clip.
14. Whenever the resistance or condensers are replaced in the units correct values have to be selected and soldered properly.

15. All units shall be replaced every three years.
16. All instruments should be paired with similar type only i.e. 'Q' series type TLBI shall be paired with 'Q' series type TLBI only.
17. All the latch relay Relays (QL1 Relays) should be in de-latched condition while commissioning the equipment.
18. Ensure all the removable connectors are locked perfectly in the plug board.
19. The Codal life of plug- in type relay is 10, 00,000 operation or 28 years for 'B', 'D and 30 years for 'E' route whichever earlier. (Reference Railway Board letter No. 2002/AC-II/1/10 dated 24/05/06.) Depending upon density of trains in a Block Section, the relays have to be changed as per Annexure - 1.
20. Maintenance schedule of Push Button Type Tokenless Block Instrument should be followed as per Annexure 28, Para 18.57 of SEM- Part II.

SN	Description of Maintenance Work	Schedule For Maintenance For		
		Signal Maintainer	JE/SE (Signal)	SSE (Signal)
1	Block Instrument should be free from mechanical damage, corrosion etc. All Nuts/bolts/screw shall be secured and complete. A legible wiring diagram should be available with the instrument.	F	M	Q
2	Relays, bell and buzzer should be free from mechanical damage to their parts. All components shall also be free from sulphation, corrosion etc.	F	M	Q
3	The seals of all relays and counters shall be intact.	F	M	Q
4	The push buttons and indicators shall be free from damage and be in proper working condition Push Button assembly should be changed periodically before failure.	F	M	Q
5	The telephone handset and telephone cord shall be complete, undamaged and in proper working condition.	F	M	Q
6	Check that shunting key is released in line closed or TGT position.	F	M	Q
7	Measurement of Insulation. All external connections to the block instrument shall be removed. Insulation resistance shall be measured between individual insulated circuits and earth. The minimum value between each individual insulated circuit and earth shall not be less than 10 MΩ.	Q	Q	Q
8	Measurement of line current.	Q	Q	Q

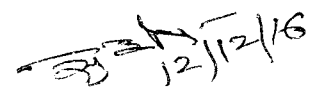
21. Intactness, cleanness and soldering of finger contacts at relay base to be checked and shall be made good if any deficiency observed. Finger contact to be replaced if required. (Frequency – Yearly).

22. Systematic flashing of Relays of Tokenless Block Instrument to be done to reduce failure due to contact high resistance. (Frequency – Yearly).
23. Spare Latch Relay and Biased relay should be available at the position provided in the block instrument.
24. All Relays of TLBI which have spare contact should be wired as digital input to Data logger. (Reference RDSO Letter No. STS/E/Data logger/Vol. XX dated 12.09.2011).
25. To reduce failure due to bobbing of Block release Track circuits:
- Track relay QTA2 with 4F/2B contact configuration can be used in block release track circuits.
 - Double jumpering to be done in all such track circuits.
 - Duplicate bond wire to be used in all such track circuits.
 - If axle counter is used as block release track circuit then dual axle counter to be provided.
 - The problem of ant ingress in track relays to be eliminated by following instruction of RDSO letter no. STS/E/Relays/Genl Misc. Dated 02.08.11.
26. To reduce failure due De-latching/non-picking up of TAR relay (QL1 relay) due to vibration:
- The retaining clip for this relay to be checked, if necessary, some arrangement have to be made to hold the relay tightly so that failure does not take place due to vibration.
 - The block instrument should be fixed on anti-vibration pad.

The Trouble Shooting Chart for Push Button Type Token Less Block instruments are attached as Annexure -2. However, the provisions mentioned in this technical circular does not supersede any provision in this regard given in Signal Engineering Manual or Telecommunication Manual. This technical circular supersede Technical Circular No. 14/98.

This has approval of CSTE.

DA: As above.


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Chief Signal Engineer
For GM/S&T/MLG

Dates: 12.12.2016

No. N/61/2/4/2

- CSTE/PLG.,CSE,CCE,CSTE/CON-I&II.
- DRM/KIR, APDJ, RNY, LMG, TSK.
- Sr. DSTE/KIR, APDJ, RNY, MLG, LMG, TSK- To circulate to all S&T officers and supervisors.
- All S&T Officers at HQ.
- Principal, STTC/PNO.
6. Technical Circular File No. N/245/1/5 Pt.III.

TLBI RELAY OPERATION TABLE

Relay	Number of operation for one pair of train	For 20 pair of trains number of operation per day	For 20 pair of trains per day number of operation per year	For 20 pair of trains per day life in yr for operational life 1000000	For 30 pair of trains number of operation per day	For 30 pair of trains per day number of operation per year	For 30 pair of trains per day life in yr for operational life 1000000
SNR	8	160	58400	17	240	87600	11
ASTR	2	40	14600	68	60	21900	46
TAR	1	20	7300	137	30	10950	91
CRR(N)	7	140	51100	20	210	76650	13
CRR(R)	9	180	65700	15	270	98550	10
TCKR	15	300	109500	9	450	164250	6
CTR	5	100	36500	27	150	54750	18
CTPR	5	100	36500	27	150	54750	18
PTR	6	120	43800	23	180	65700	15
NTR	9	180	65700	15	270	98550	10
RCKR	15	300	109500	9	450	164250	6
RDR	5	100	36500	27	150	54750	18
LR	30	600	219000	5	900	328500	3
LPR	7	140	51100	20	210	76650	13
1CR	10	200	73000	14	300	109500	9
2CR	10	200	73000	14	300	109500	9
3CR	10	200	73000	14	300	109500	9
P2R	3	60	21900	46	90	32850	30
N2R	2	40	14600	68	60	21900	46
TOLAR	3	60	21900	46	90	32850	30
PCR	1	20	7300	137	30	10950	91
ASR	1	20	7300	137	30	10950	91
TCFR	1	20	7300	137	30	10950	91
TCFPR	1	20	7300	137	30	10950	91
TGTR	1	20	7300	137	30	10950	91
TGTPR	1	20	7300	137	30	10950	91
TOLTR	1	20	7300	137	30	10950	91
LCCPR	3	60	21900	46	90	32850	30
CAR	0	0	0	#DIV/0!	0	0	#DIV/0!
TIMER	0	0	0	#DIV/0!	0	0	#DIV/0!
ASCR	1	20	7300	137	30	10950	91
SHKR	8	160	58400	17	240	87600	11
SCKR	8	160	58400	17	240	87600	11
BCBR	3	60	21900	46	90	32850	30
TGBR	1	20	7300	137	30	10950	91
LCBR	1	20	7300	137	30	10950	91

Trouble Shooting Chart for Push Button Type Tokenless Block Instruments

Sl. No.	Types of Failures	Observation	Causes
1	Bell Code failed	1. Bell Beats failed altogether both sides.	Due to twist on line or break fault CRR is not picking up. CTR back contact in CRR circuit not making.
		2. Outgoing bell beats only failed.	1. Disconnection of Line Battery at sending end. 2. Disconnection in 250 ohms resistance in Unit No. IV at sending end. 3. Disconnection of local battery in receiving end.
		3. Incoming Bell Beats only failed.	CRR is not energizing due to BCB normal contact No.15 not making.
2. a)	Generation of Code failed.	1. SHKR not picking up	Shunt Key IN contact inside EKT is not making properly.
		2. SCKR not picking up	Local Battery Weak.
		3. SNR not picking up	1. Disconnection in power supply source for External circuit. 2. Disconnection in SNR circuit due to controller contact not making. Home Signal Lamp, Advanced stater lamp fused etc.
		4.(a) CTR not picking up	1. Cancel Button developed high resistance fault. 2. BCB/TGB contact spring not making while buttons are pressed. 3. SNR-2A1 contact developed high resistance fault. 4. SHKR-4A3, SCKR-4A3 contact developed high resistance fault
		4(b) CTR not holding.	1. Condenser for the time lag arrangement of Unit-I defective. 2. CTR stick circuit contacts of TCKR 5A6, LR 7B8, LPR 2D1 relays missing or high resistance.
5. TAR not picking up on arrival of train.	1. Home signal knob/switch reverse contact defective or premature operation of Home Signal switch/disconnection in other contacts of TAR circuits(or) TOLAR-5A6 offer high resistance. 2. LVT track circuit failed.		
3. a)	Answer back code is received but TGTR is not picking up.	Instrument is not set to TGT even though TGT code is received.	1. ASR- 2C1 front contact in TGTR circuit is not making. 2. IN Unit IV 50 ohms resistance developed open circuit Fault 220 Mfd condenser punctured resulting in ASR not holding. 3. CTPR not holding due to 4700 mf condenser defective in Unit No.1. 4. ASTR not picking up due to failure of FVT.
b)	While taking line clear no TGT or TCF indication set up at sending station/receiving station.	TCFR not picking up at receiving end on receipt of the 3rd pulse of TCF code.	Disconnection in TCFR coil resulting in failure of reply code or answer back TGT code.
4	Both TCF & TOL indication appeared at Receiving End simultaneously while the other station is trying to take line clear.	TOLAR not holding at receiving end.	Local Battery at the receiving end is defective or momentarily interrupted (some time due to development of reverse polarity in one of the cells). Or TOLAR premature dropped after instrument setting to TCF due to TOLAR stick path failure.
5	When TGB & BCB are pressed. TOL code is transmitted instead of TCF Code.	TCKR contact No. 4A3 offered high resistance. Hence LR and LPR did not pick up. Hence 3CR did not pick up.	TCKR Defective.
6	In reply to the incoming TCF code, TOL code is transmitted as ' Answer Back' instead of TGT Code.	During the code progress TCKR contact No. 4A3 is not making. Hence LR is not picking up. 3CR is not picking up. Consequently NTR is not dropping while the instrument is 'Answering Back.'	TCKR Defective.

Trouble Shooting Chart for Push Button Type Tokenless Block Instruments

Sl. No.	Types of Failures	Observation	Causes
7	Transmission of reply code incomplete.	CTR is not holding CTR 2C1 is not available as the solder is given up.	Solder given up.
8	Failure of transmission of code.	CTR was not picking up and holding. LPR was not holding since the wire of condenser is given up. IN U-II(R3&R1).	Wire given up.
9	No Answeback for Line Closed Code.	This was due to LCCPR not holding in Line Closed code receiving instrument due to the 1A2 contact of SHKR was offering high resistance.	Relay contact not making.
10	While taking line clear TOL indication appeared immediately after getting TGT indication at the train sending station.	TOLAR not holding at sending end.	TOLAR Latch is not effective.
11	TOL indication appeared before the entry of train into the BloCK Section.	TOL indication appeared prematurely.	Failure of FVT after the instrument is set to TGT before the train passed over FVT.
12	TOL buzzer not stoping even after acknowledge.	TOL code transmission not stropped.	At train sending station TOLAR release coil R3-R4 does not get feed due to : 1. Premature dropping of CTPR before RCKR after transmitting 3 pulses. Or 2. RCKR is dropping after CTPR due to more time lag of RCKR after 3rd pulse. Or 3. At receiving end BCB cacontact broken.
13	TOL code not transmitting after train entered into block section (at TGT station)	CTR not picked up	1. TOLAR premature dropped. 2. TOLTR not picking up due to circuit trouble. 3. Contact high resistance fault in CTR circuit.
14	TOL indication failed.	No TOLK	Check the LED of 2.2 K ohms resistance.
15	TOL Buzzer failure	Buzzer is not sounding.	TOLTR not picking up at reciving station.
16	Train arrival buzzer failure.	- do-	TAR not picked up (or) not holding.
17	Normal cancellation not effective.	CAR not picking up.	1) CANCEL button contact not making. 2) CAR relay circuit fault.
		CAR not holding. Timer not picking up.	1. No feed to Timer Relay due to no SNR. 2. Timer Relay contact defective. 3. Timer Relay defective.
		PCR not picking up.	Timer Relay contact fault or PCR defective.