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सत्यमेव जयते

भारत सरकार, रेल मंत्रालय,
अनुसंधान अभिकल्प और मानक संगठन,
लखनऊ–226011

Government of India - Ministry of Railways
Research Designs & Standards Organisation
LUCKNOW – 226011

अअमासं RDSO
रेल अग्रदूत Transforming Railways

No.: RDSO-SIG0SDAC(CEL)/1/2020

Date: As signed
By E-mail

M/s CENTRAL ELECTRONICS LIMITED-GHAZIABAD
781, Desh Bandhu Gupta Road, Karol Bagh,
Delhi - 110005, India
(E-mail: cel@celindia.co.in, snbhattacharya@celindia.co.in, spdmktg@celindia.co.in, himanshu.nagpal@celindia.co.in)

Sub/विषय:	Pre-commissioning Check List for Single-Section Digital Axle Counter and Single/Dual Sensor HASSDAC (Ver.: D01S007H04 for AM, & D01S007H05 for Phase Reversal type of SSDAC and D01S007H06 for HASSDAC) of M/s Central Electronics Limited, Sahibabad as per RSDO specification No. RDSO/SPN/177/2012 Ver. 3.0.
Ref/ संदर्भ:	ED (Sig)/Railway Board's letter (MoM) No. 2022/Sig/17-SigEquip/DAC dated 29.05.2025.

With reference to above referred letters, Pre-Commissioning Check List (SIG 0605 Ver. 6) for Single-Section Digital Axle Counter and Single/Dual Sensor HASSDAC (Ver.: D01S007H04 for AM, & D01S007H05 for Phase Reversal type of SSDAC and D01S007H06 for HASSDAC) of M/s Central Electronics Limited, Sahibabad as per RSDO specification No. RDSO/SPN/177/2012 Ver. 3.0 is revised to include the directives provided through Minutes of Meeting held for review of performance of M/s CEL make axle counters (SSDAC/HASSDAC/MSDAC) held on 07-05-2025 at Railway Board with minor corrections/additions/deletions. The revised PCCL No. SIG 0605 Ver. 7 (Date of Issue 12-12-2025) is being issued herewith for your kind information & further necessary action please.

DA: As above

12/12/25

(Triambak Tiwari)
Director/signal –II

Copy to: All PCSTEs, Indian Railways.
(Through E-mail)



RESEARCH DESIGNS AND STANDARDS ORGANISATION
MANAK NAGAR, LUCKNOW

SIGNAL DIRECTORATE

Pre-commissioning Check List for Single-Section Digital Axle Counter and Single/Dual Sensor HASSDAC (Ver.: D01S007H04 for AM, & D01S007H05 for Phase Reversal type of SSDAC and D01S007H06 for HASSDAC) of M/s Central Electronics Limited, Sahibabad

S. N.	Date of amendment	SSDAC Version	Page No.	Version	Reasons for amendment
1.	21.05.2007	S006	21 pages	1	First Issue
2.	03.03.2012	S006	26 pages	2	Inclusion of TAN 6001 and suitable for redundant system
3.	00.03.2013	S006	29 pages	3	Inclusion of Functionality of HASSDAC (Resetting& Relay logic) due to review of specification)
4.	22.09.2017	S007	21 pages	4	Due to implementation of S007 ver. of software cl 4.14 changed for software ver. & cl. 4.15 add for software checksum at pg. 10 Due to battery fitted problem cl.5.7 add at pg.11 & cl.6.4 add for OEM's certificate at pg.12
5.	15.01.2024	S007	32 pages	5	Due to inclusion of axle detector model No.AD-711 FS
6.	20.03.2025	S007	26 pages	6	Addition of SPD in page no. 3, 12 & 13, minor corrections/additions/deletions at page no. 1, 3, 4, 5, 6, 7, 11 & 20 – 26 according to firm's request and release of compendium TAN No. STS/E/TAN/7010 Ver. 1.0 dated 20.11.2024.
7.	12.12.2025	S007	29 pages	7	Modified as per MoM No. 2022/Sig/17-SigEquip/DAC dated 29.05.2025 issued by Railway Board. Corrections/additions/deletions at page no. 1 – 13, 16 – 21 & 25 according to MoM and firm's request.

Authors

Name & Signature	Function	Level	Signature
Ranjeet Singh (SSE (D)/S&T)	Member	Prepared	
A.K. Srivastava (ADE/Sig/VI)	Member	Checked	12/12/2025
Triambak Tiwari (Director/Sig-II)	Member	Issued	12/12/25

Approved by: Shri V.K. Prajapati(ED/Signal-I)

Pre-commissioning check list for Single Section Digital Axle Counter

SSDAC (MODEL: DACF-710A/710P/DACF-720P)

(AS PER RDSO/SPN/177/2012 Version 3)

0. General Information

1.	Station /Yard Name:	
2.	Section:	
3.	Division/Zonal Railway:	
4.	Contact Details of Railways at site:	
5.	Contact Details of Railways at HQ/Division	
6.	Contract No./P.O. No.	
7.	Application (Yard/ABS/IBS/BPAC)	
8.	Total Nos. Of Detections & Section:	
9.	Name and Address of manufacturer/supplier: (RDSO Approved vendor)	
10.	Serial number of the equipment.	
11.	SSDAC working on: OFC / Microwave / Quad Cable HASSDAC working on: Unit: A (Quad/Microwave/OFC) Unit: B (Quad/Microwave/OFC)	
12.	Date of installation:	
13.	Date of pre-commissioning inspection:	

Note: -

1. System should be installed and commissioned by authorized technical staff of manufacturer only.
   a) Installation practices of SSDAC model DACF 710P for Phase Reversal/DACF-710A for AM should be strictly adhered to and checked before commissioning covering all points in the following document.
   b) Installation practices of HASSDAC model DACF 720P for Phase Reversal should be strictly adhered to and checked before commissioning covering all points in the following document.
2. OEM shall certify that verification of system installation has been completed by OEM and all necessary arrangements meet the required standards of engineering for trouble free working of installed system.

(Ref: This office letter no.: STS.E.AC.Dig. Genl dt 21.06.2011)

SSDAC Unit Sl. No. (Entry end)---------- (Exit end) ----------

A- CATEGORY

(This part of work to be done before commissioning)

1. Outdoor (Location Box)

SI. No.	Item	Required	Observed		Remarks
			Entry end	Exit end	OK /Not OK
1.1	i. Relay used in SSDAC				
	for VR	QN1K 24V, 1000 Ohm, 6F-6B			
	for PR	QN1K, 24V, 1000 Ohm, 6F-6B			
	ii. Relay used in HASSDAC				
	for VR	QN1K, 24V, 1000 Ohm, 6F-6B			
	for PR	QNN1, 24V, Twin Relay, 6F-2B (each)			
	for RR	QN1K, 24V, 1000 Ohm, 6F-6B			
1.2	Diode across each relay coil in reverse bias	Should be provided with BY127/IN4007/IN5408			
1.3	Unused Quad pair	To be terminated on terminals. Annexure-I for Quad cable may be referred. Wiring practices should be adopted in accordance to TAN 7010 dated 20.11.2024 See Annexure -IV			
1.4	Dressing of Quad pair	To be properly dressed with insulated tape/cable tie			
1.5	Spiral before Termination	No individual conductor to be made spiral			
1.6	(1) Earthing of Location Box (2) Earth value	Should be properly connected with earth ≤1Ω			

1.7 SPD used in outdoor equipment

SN	Type	Description	Make	Quantity	Remark (OK/Not OK)
a)	SSDAC	SPD	Phoenix or OBO or CITEL or CEL or any other reputed make	8 numbers / set	
b)	HASSDAC	SPD	Phoenix or OBO or CITEL or CEL or any other reputed make	14 numbers / set	

2. Outdoor (track device)

SI. No.	Item	Required	Observed				Remarks
			Entry end		Exit end		OK /Not OK
			Unit A	Unit B	Unit A	Unit B	
2.1	Wiring of Tx/Rx coil & M S coupler cables	Wired on approved Spring Cage Type terminals					
2.2	Condition of worn out of Rail 60 Kg - 13 mm 52 Kg - 8 mm 90 R - 5 mm	Should be within vertical limit of worn out 159-172 mm 148-156 mm 138-143 mm					
2.3	Marking of holes on rail (From top of the rail) (for web type track device)	60 Kg 86 mm 52 Kg 86 mm 90 R 86 mm					

2.4	Drilling of holes in the web of rail	Should be of 14mm dia as per drawings on page no. D20 — D22 of installation's manual a. 710 A: Doc No.: CEL/DAC/IM-03 Ver. 1.2 dated: 31.08.2009 (Dwg No.: A007817, A007752, A007753) b. 710 P: Doc No.: CEL/DAC/IM-04 Ver. 2.1 dated: 19.02.2019 (Dwg No.: A008446, A008447, A008448) c. 720 P: Doc No.: CEL/HASSDAC/IM-01 Ver. 2.3 dated: 24.05.2025 (Dwg no.: A008446, A008447, A008448) should be circular in shape (perpendicular to the rail surface), should not be oblong.					
2.5	Torque applied to fix track device using Torque wrench (for web type track device)	Jaicom make JPR65 or equivalent - 88 Nm.					
2.6	Fixing of Tx	Outside the rail					
2.7	Fixing of Rx	inside the rail					
2.8	Fixing ofaxle detectors at entry & exit end	On the same rail as per drawing no.- I008072A4, page no.D28 of Installation's manual: a. 710 A: Doc No.: CEL/DAC/IM-03 Ver. 1.2 dated: 31.08.2009 b. 710 P: Doc No.: CEL/DAC/IM-04 Ver. 2.1 dated: 19.02.2019 c. 720 P: Doc No.: CEL/HASSDAC/IM-01, Ver. 2.3 dated: 24.05.2025					
2.9	(a)Measure Length of the track device (axle detector) cable	10m ± 0.3m & 15M±0.3M					
2.10	(b) Laying of axle detector cable	In corrugated/HDPE pipe as per drawing at page D2/D3 of installation's manual: a. 710 A: Doc No.: CEL/DAC/IM-03 Ver. 1.2 dated: 31.08.2009 (Dwg no.: L008453A4) b. 710 P: Doc No.: CEL/DAC/IM-04, Ver. 2.1 dated: 19.02.2019 (Dwg No.: L008453A4) c. 720 P: Doc No.: CEL/HASSDAC/IM-01 Ver. 2.3 dated: 24.05.2025 (Dwg No.: L008800A4, L008801A4)					
2.11	Screen of axle detector cable	Should be earthed					
2.12	Fixing of deflector plates	As per drawing at pageD2/D3 of installation's manual: a. 710 A: Doc No.: CEL/DAC/IM-					

		03 Ver. 1.2 dated: 31.08.2009 (Dwg No.: L008453A4) b. 710 P: Doc No.: CEL/DAC/IM-04 Ver. 2.1 dated: 19.02.2019 (Dwg No.: L008453A4) c. 720 P: Doc No.: CEL/HASSDAC/IM-01 Ver. 2.3 dated: 24.05.2025 (Dwg No.: L008800A4, L008801A4)					
2.13	Type of push trolley used in the section	As per RDSO's drawing no. RDSO/TM/05/10 dated 05.09.2011					
2.14	Rail section	60 Kg/ 52 Kg /90 R					
2.15	Nuts, bolts & washers for fixing rail contacts	Insertion of bolt from Rx coil side i.e. inside of the rail					
2.16	Clamp type track device (Installed as per CEL's installation manual)	Torque required: M10 Bolt Torque – 50 Nm M20 Bolt Torque – 140 Nm					
2.17	Handling of excess length of inbuilt cable with Axle Detector	Excess length of inbuilt cable with Axle Detector is to be kept in form of (8) or shape of infinite (∞) and not in form of loop (O) or circle.					
2.18	Height of deflector	Should not be higher than the rail					
2.19	Clearance between sleepers	400 mm between sleepers (Refer Drawing at Page D2/D3 of Installation Manual a. 710 A: Doc No.: CEL/DAC/IM-03 Ver. 1.2 dated: 31.08.2009 (Dwg No.: L008453A4) b. 710 P: Doc No.: CEL/DAC/IM-04 Ver. 2.1 dated: 19.02.2019 (Dwg No.: L008453A4) c. 720 P: Doc No.: CEL/HASSDAC/IM-01 Ver. 2.3 dated: 24.05.2025 (Dwg No.: L008800A4, L008801A4)					
2.20	Embossing on rail	Should not be covered by Track device					
2.21	Position of deflector	(a)30 cm away from Tx/Rx coils in the next sleeper					
For amplitude detection only							
2.22	Length of Trolley Protection circuit	(a) In Single line 5RL (b) In Double line 3RL					
2.23	Fixing of Axle Detectors	(a) In Single line should be fixed in center of 5RL. (b) In Double line Should be fixed at 33 meters from block joint in the direction of movement					

3 Outdoor Quad Cable

3. Outdoor (Quad Cable/PIJF twisted pairs telecom cable for Axle counter system working in station area, As per RDSO letter no. STS/E/SSDAC/SPN/177 dated-28/30.08.2006).

3.1. Test format for testing of QUAD cable/PIJF twisted pair telecom cable before commissioning of SSDAC/HASSDAC in Station area.

SL. NO.	ITEM	EXPECTED	MEASURED/ OBSERVED Entry	Exit	REMARKS (OK/NOT OK)]
3.1.1	Communication Media Type of Cable	Only Proper pair of wires of Quad cable is to be used for connectivity between field units. No Signaling Cable is to be used in totality / parts. Annexure-I for Quad cable may be referred. **Wiring practices should be adopted in accordance to TAN 7010 dated 20.11.2024 See Annexure –IV**			
3.1.2	Use of pair	Proper pair of wires to be used for connectivity. Annexure — I for quad cable may be referred. **Wiring practices should be adopted in accordance to TAN 7010 dated 20.11.2024 See Annexure –IV**			
3.1.3	Duplication of Wires	No wire to be Paralleled for reducing conductor resistance.			
3.1.4	Insulation Resistance of Quad cable	Shall be greater than or equal to 10 M ohm.			
3.1.5	Loop Resistance of designated pair	Not to exceed 56 ohm/Km for 0.9 mm dia and 23.2 ohm/km for 1.4 mm dia at 20° C. See Annexure — II for correction factor.			
3.1.6	Attenuation loss of cable between one SSDAC to other, measured at 2 KHz	Shall not be greater than 30.0 dB for Full Length of the cable (including tail cables) used.			
3.1.7	Near End Cross Talk (NEXT)	Shall be better than 55 dB for Quad cable.			
3.1.8	Far End Cross Talk (FEXT)	Shall be better than 55 dB for Quad cable.			
3.1.9	Continuity of cable armour	Continuity shall be there and armour of the cable must be earthed Wiring practices should be adopted in accordance to TAN 7010 dated 20.11.2024 See Annexure –IV			
3.1.10	Separate Earth of Quad/PIJF telecom	Shall be ≤ One ohm			.
3.1.11	Cable allocation table	Shall be filled up & attached			
3.1.12	Unused Quad pair	To be terminated on terminals.			
3.1.13	Dressing of Quad pair	To be properly dressed with insulated tape/cable tie			
3.1.14	Spiral before termination	No individual conductor to be made spiral			

3.2 Test format for testing of QUAD cable before commissioning of SSDAC/ SSBPAC (D) Used in between Station to station.

SI. No.	Item	Expected	Measured/ Observed	Remarks (OK / Not OK)
3.2.1	**QUAD / PIJF**			
3.2.1.1	Communication Media Type of Cable	Jelly filled telecom cable / Only Proper pair of wires of Quad cable is to be used for connectivity between field units & OFC Equipment room. Signaling Cable shall not be used at all. Wiring practices should be adopted in accordance to TAN 7010 dated 20.11.2024 See Annexure –IV		

3.2.1.2	Use of pair	Proper Pair of wires to be used for Connectivity. Annexure-I for quad cable may be referred Wiring practices should be adopted in accordance to TAN 7010 dated 20.11.2024 See Annexure –IV		
3.2.1.3	Duplication of Wires	No wire to be paralleled for reducing Conductor resistance.		
3.2.1.4	Insulation resistance of Quad cable	Shall be greater than /equal to 10 M ohm.		
3.2.1.5	Loop resistance of designated pair	Not to exceed 56 ohm/Km for 0.9 mm dia and 23.2 ohm/km for 1.4 mm dia at 20ºC for Quad cable &-_____* ohm / Km for PIJF telecom cable. See annexure —II for correction factor.		
3.2.1.6	Earth of quad cable	Shall be less **than One** ohm		
3.2.1.7	Cable Allocation table	Shall be filled up & attached		
3.2.1.8	Unused Quad pair	To be terminated on terminals		
3.2.1.9	Dressing of Quad pair	To be properly dressed with insulated tape/cable tie		
3.2.1.10	Spiral before termination	No individual conductor to be made spiral		

3.3 Test format for testing of local QUAD / PIJF twisted pair telecom cable & OFC before commissioning of SSDAC/BPAC/SSBPAC (D) on OFC in between station to station.

SI. No.	Item	Expected	Measured/ Observed	Remarks (OK/Not OK)
3.3.1.1	Communication Media Type of Cable	Only **Proper pair of wires of** Quad cable is to be used **for connectivity** between field units & Station room. Quad cable / PIJF twisted pair telecom cable is to be used between field unit to Reset Box.		
3.3.1.2	Use of pair	Proper pair of wires to be used for Connectivity. Annexure –I for Quad cable may be referred Wiring practices should be adopted in accordance **to TAN 7010 dated 20.11.2024 See Annexure –IV**		
3.3.1.3	Duplication of Wires	No wires to be paralleled for reducing Conductor resistance.		
3.3.1.4	Insulation resistance of Quad cable	Shall be greater than or equal to 10 M ohm.		
3.3.1.5	Loop Resistance of designated pair	Not to exceed 56 ohm/Km for 0.9 mm dia and 23.2 ohm/km for 1.4 mm dia at 20°C for Quad cable * Ohm/Km for PIJF telecom cable. See Annexure -II for correction factor.		
3.3.1.6	Earth of Quad Cable (Armor)	Shall be less than One ohm		
3.3.1.7	Cable allocation table	Shall be filled up & attached		
3.3.1.8	Unused Quad pair	To be terminated on terminals.		

3.3.1.9	Dressing of Quad pair	To be properly dressed with insulated tape/cable tie		
3.3.1.10	Spiral before termination	No individual conductor to be made spiral		
3.3.2.0	OFC			
3.3.2.1	Channel line up	For 0dB Trans signal level, the received signal level at other end shall not be more than-15dB.		

***PIJF telecom cable is available with three types of Conductor dia-**

SI. No	Conductor Dia used in PIJF cable	Resistance at $20^{O}C$	Loop Resistance /KM
1	0.50 mm	86 ohm +/- 6	172 ohm / Km
2	0.63 mm	58 ohm +/- 4	116 ohm / Km
3	0.90 mm	28 ohm +/- 2	56 ohm / Km

Note: Procedure for test-

Attenuation Loss: The output/Input impedance of signal generator/dB meter shall be 600 ohm.

Near End Crosstalk: Test tone of 150 KHz to be fed in the adjacent pair of the same Quad & NEXT to be measured at the same end on the other pair of the same Quad.

Far End Cross talk: Test tone of 150 KHz to be fed in the adjacent pair of the same Quad &FEXT to be measured at the far end on the other pair of the Same Quad.

4. Outdoor electronics

SI. No.	Item	Required	Observed		Remarks OK /Not OK
			Entry end	Exit end	
4.1	a) SI. No. of SSDAC/ HASSDAC units b) Details of Track circuit	Same serial no pairs. Example – 015A (entry), 015B (exit), Track circuit no.			
4.2	Placement of Cards/modules	Should be in proper position			
4.3	Firmness of card/Modules	Should be tightened with screw / clip provided			
4.4	MS Couplers/Spring Cage Terminals	Should be tightened properly			
4.5	MS coupler/Spring Cage cables	Wired properly as per colour code			
4.6	Earthing of SSDAC /HASSDAC units	Should be provided firmly through copper strips or standard copper cable to the Location Box earth			
4.7	Earthing of Vital Relay Box	Should be provided firmly through copper strips or standard copper cable to the Location Box earth.			
4.8	Fixing of SSDAC/HASSDAC unit	Should be firmly fixed using clamp			
4.9	Fixing of Vital Relay Box	Should be firmly fixed using clamp			
4.10	Cable for taking 24V D.C. From central Location to SSDAC/HASSDAC unit.	2 X 25 sq. mm Al.			
4.11	External Surge Protection Devices On input, output and power supply lines	Indicative type, plug able or easy to install on a DIN rail. Non plug able shall be connected in parallel			
4.12	Address of SSDAC/HASSDAC	Address pair should be different from any SSDAC/ HASSDAC system working on the same station / section			
4.13	Fuse	SSDAC for Unit: 2 Amp & For VR Box: 2 Amp HASSDAC for Unit A: 2 Amp, Unit B: 2 Amp for VR Box: 2 Amp			
4.14	Software version no.	S007			
4.15	Specified value of checksum	9664 7ED6 12C1 35DE 9D81 D9A9 2F83 CD4A AC24 369F 0000 5A51			
4.16	Input voltage with IPS ON	should not be more than 28.8 V DC			

SI. No.	Item	Required	Observed		Remarks
			Entry end	Exit end	OK/Not OK
4.17	Input voltage with Charger OFF (Keep Charger OFF for 15 Minutes before taking reading)/IPS Module	Should not be less than 23 V DC			
4.18	Ripple of Input Power Supply	Less than 10 mV rms / 50 mV peak to peak.			
4.19	Level of reset signal at SSDAC unit input.	42 V to 50 V DC			
4.20	Relay drive output to the **Vital Relay.** (This may be checked across **R1 & R2** of coil of relay/ **both vital** relays in vital relay box)		Unit A	Unit B	Unit A Unit B
4.21 a	Section is Clear	> 22V			
4.21 b	Section Occupied	< 2V			
4.22	Relay drive output to the **Preparatory** Relay. (This may be checked across **R1 &** R2 of coil of relay/relays)		Unit A	Unit B	Unit A Unit B
4.23 a	When preparatory relay is picked up.	> 22V			
4.23 b	When preparatory relay is dropped	< 2V			
4.24	Drive voltage of repeater relays in picked up condition, When charger is OFF for 15 minutes.				
4.25	VPR	> 22V			
4.26	PPR	>22V			

5.0 INDOOR (Reset Box Location)

SI .No.	Item	Required	Observed		Remarks
			Entry end	Exit end	OK /Not OK
5.1	Reset Box	Wired as per Drawings at Page No. D17, D18 & D19 —fixed firmly: a. 710 A: Doc No.: CEL/DAC/IM-03 Ver. 1.2 dated: 31.08.2009 (Dwg No.: W008444A4 & S008429A3) b. 710 P: Doc No.: CEL/DAC/IM-04 Ver. 2.1 dated: 19.02.2019 (Dwg No.: S008429A3 & W008444A4) c. 720 P: Doc No.: CEL/HASSDAC/IM-01 Ver. 2.3 dated: 24.05.2025 (Dwg No.: S008809A3 & W008808A4).			
5.2	Reset Box Earthing.	Connected to earth properly.			
5.3	Reset Function	a. Reset not possible when Axle Counter section is clear and healthy. b. Reset not possible when Axle counter section is in Preparatory reset mode.			
5.4	24 V D.C. level at Reset box input.	22V DC to 30 V DC			
5.5	Level of reset signal at reset box O/P.	44 V to 52 V DC			
5.6	Level of reset signal at SSDAC unit input.	38 V to 50V DC ± 2V DC			
5.7	Reset Box	Battery of the reset box is dully fitted in battery compartment & display shows the RTC stamping.			

6.0 COMMISSIONING

SI. No.	Item	Required	Measured / Observed	Remarks OK/Not OK)
6.1	Commissioning	System should be installed & commissioned by personal trained by the manufacturer.		
6.2	Training	Railway personnel should be trained before commissioning. (Please fill the details in Annexure-III)		
6.3	Verification of working	System to be monitored for 72 hours for trouble free operation before commissioning. During this period, effect of various trolley wheels used in the section should be checked as per para 7.0		
6.4	OEM's Certificate	Should be filled up & it should be available at site		
6.5	DAC Toolkit	Availability of DAC Toolkit at each station/BS		
6.6	Authorization for commissioning	Copy of authorization Certificate issued by the firm, confirming competency of the authorized engineer for quality check of installation and commissioning to be attached.		

B- <u>CATEGORY:</u>

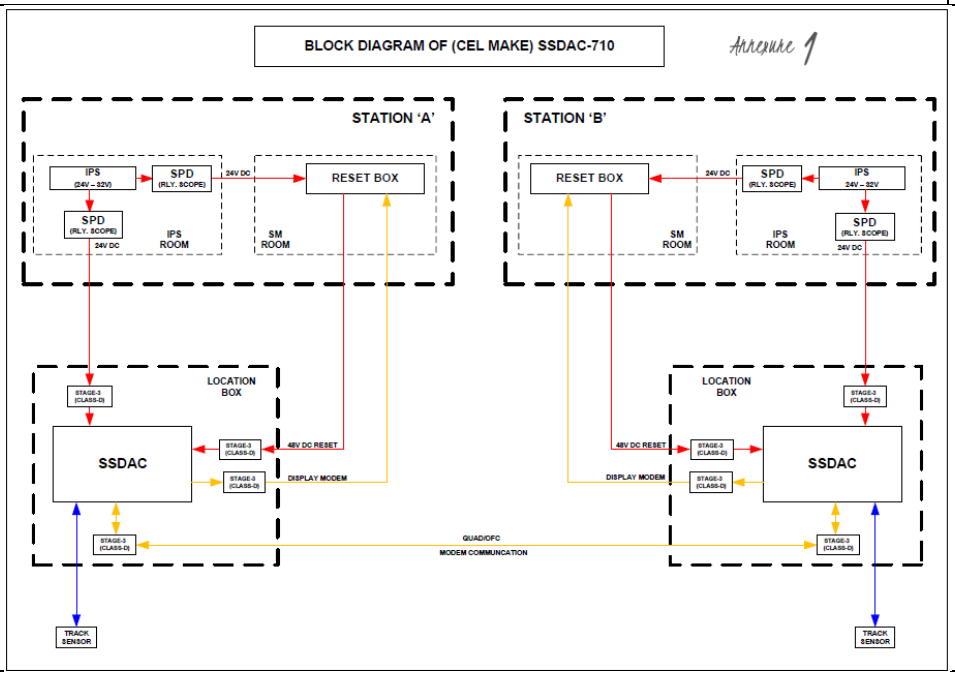
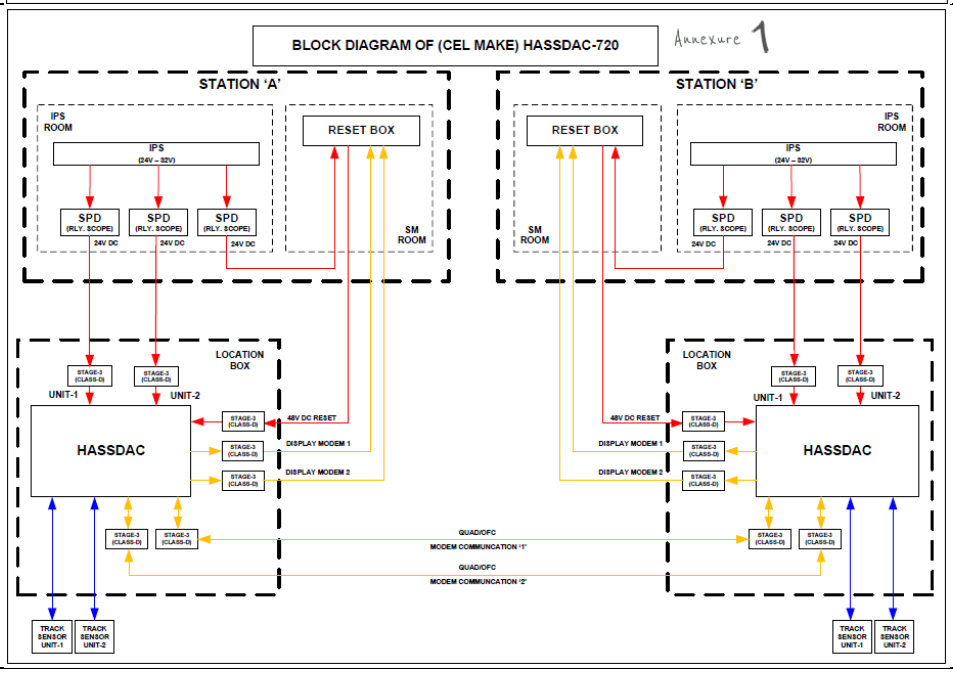
(PENDING ISSUES TO BE ATTENDED WITHIN 15 DAYS FROM THE DATE COMMISSIONING)

7.0 INDOOR POWER SUPPLY/CT RACK

SI. No.	Item	Required	Observed		Remarks (OK/Not OK)
			Entry end	Exit end	
7.1	PPR & VPR Relays	Shall be of Q type 24 V, 1000 ohms			
7.2	Fuse ratings	2.0 Amps/ 4.0 Amps			
7.3	(a) Power supply for axle counter. (b) Out voltage for SSDAC, with charger ON in Float mode. i) Out voltage for SSDAC Charger OFF. ii) IPS	7. (i) Charger should be fit for axle counter use. (ii) There should not be any other load on the power supply except axle counter. (iii) Class B&C types surge protection must be provided on 230 V mains line. (b) Should not be more than32 V DC. (c) Should be in between28V — 30V DC. (d) Should be adjusted in between 28 V- 30 V DC.			
7.4	Ripple of Input Power Supply	Less than 10 mV rms / 50 mV peak to peak.			
7.5	Glitch in Input Power Supply by putting ON/OFF the charger	No glitch should be there			
7.6	Drive voltage of the VPR. (This may be checked across R1 & R2 of coil of relay).	>22V			
7.7	Drive voltage of the PPR. (This may be checked across R1 & R2 of coil of relay)	>22V			
7.8	Diode across VPR and PPR relay	Should be provided with BY127/1N4007/1N5408			

8.0 Provision of SPD:

A. Provision of SPD has been done as per the following schematic diagram:-

SN	Type	Diagram	Remarks (OK/Not OK)
a)	SSDAC		
b)	HASSDAC		

B. Details of SPDs used in SSDAC:-

B.1. Details of SPDs used with SSDAC Entry/Exit Unit

SN	Make and model of SPD	Type of SPD	No. of used SPD	Remarks
1.	Phoenix or OBO or CITEL or CEL or any other reputed make	Class D	4	

B.2. Details of SPDs used in communication line, power line, reset line, display modem line

SN	Make and model of SPD	Type of SPD	No. of used SPD	Remarks
1.	Phoenix or OBO or CITEL or CEL or any other reputed make	Class D	8 number / set	

C. Details of SPDs used in HASSDAC:-

C.1. Details of SPDs used with HASSDAC Entry/Exit Unit

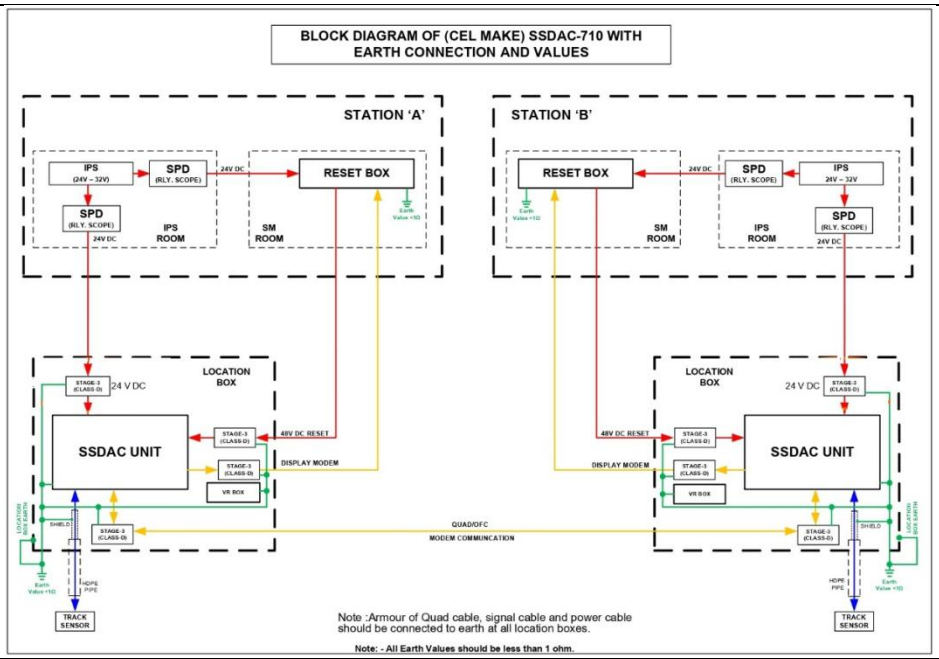
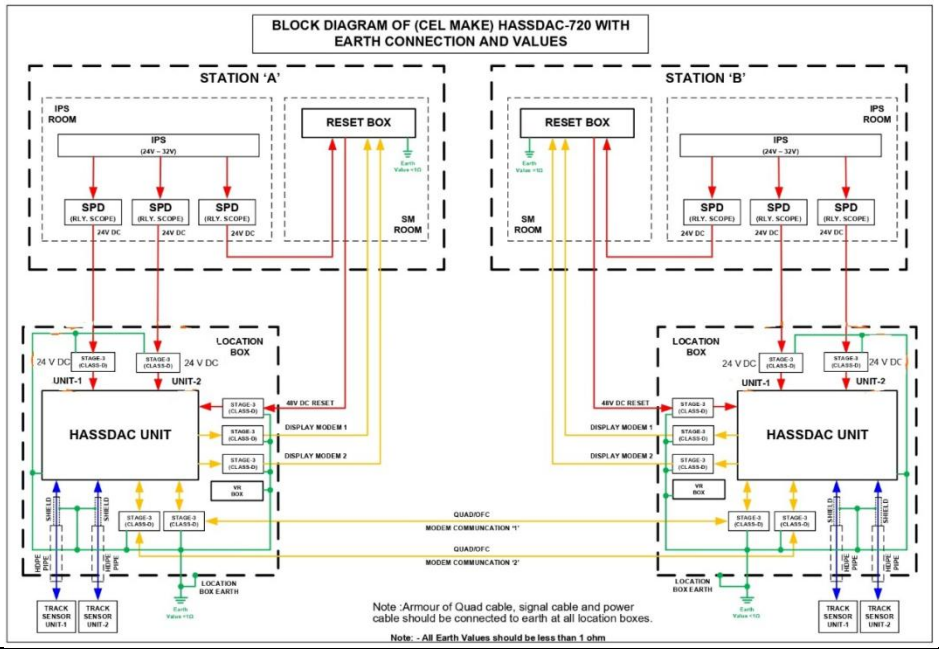
SN	Make and model of SPD	Type of SPD	No. of used SPD	Remarks
1.	Phoenix or OBO or CITEL or CEL or any other reputed make	Class D	7	

C.2. Details of SPDs used in communication line, power line, reset line and display modem line

SN	Make and model of SPD	Type of SPD	No. of used SPD	Remarks
1.	Phoenix or OBO or CITEL or CEL or any other reputed make	Class D	14 numbers / set	

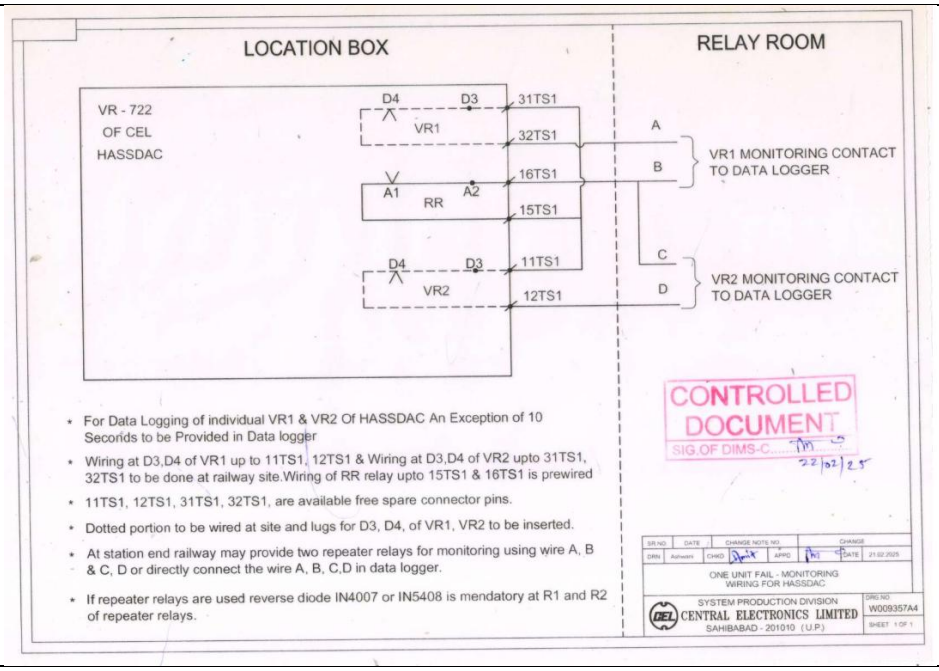
9.0 Provision of Earthing scheme:

Provision of Earthing scheme to be ensured along with the required values as per the following schematic diagram:-

SN	Type	Diagram	Remarks (OK/Not OK)
a)	SSDAC		
b)	HASSDAC		

10.0 Provision for scheme of monitoring status of individual Vital Relays:

The following schematic diagram shall be followed to get repeater at Relay Room for data logger:-

SN	Type	Diagram	Remarks (OK/Not OK)
a)	HASSDAC		

11.0 Response test of digital Axle Counter with standard Trolley Wheels (as per drawing no. RDSO/TM/05/10) done jointly with railways:

S. No.	Type of Trolley wheel	Observed Result(No influence / Goes to error / Counted / other)	Remarks
1	4 spoke wheel Wheel Dia with flange - 450mm Wheel Width - 100mm Flange width – 8mm Flange depth – 22mm Spoke width -8mm		

Maintenance log Sheet for SSDAC/HASSDAC (Entry end)……..

Sr. No.	Date	Battery (24V)	Tx1 Vrms / freq	Tx2 Vrms / freq	Rx1 Vrms	Rx2 Vrms	Modem Tx Level (Card 6) AC Vrms	SCC1 (Card 1) DC Volts		SCC2 (Card 2) DC Volts		With Push Trolley on axle detectors (4 spokes / 8 spokes)		DC-DC Converter DC Volts			
														5V	12V	24 V	15V ISO
Test Point		**TS1 1 & 5**	**TS4 1 & 2**	**TS4 3 & 4**	**TS4 5 & 6**	**TS4 7 & 8**	**TS2 7 & 8**	Red & Black Socket		Red & Black Socket		Red & Black Socket		Monitoring Sockets on card 8			
								Normal	**Dummy wheel**	**Normal**	**Dummy wheel**	SCC1	SCC2				
(Limit) for Phase		23-28.8V	30 to 40 V 20.8 to 21.2 KHz	30 to 40 V 22.8 to 23.2 KHz	275 to 600 mV	275 to 600 mV	>400 mv (-6dB) (approx.) When other end field unit switched off	2.0 to 2.5 V	<0.7 V	2.0 to 2.5 V	<0.7 V	> 1.7 VDC	>1.7 VDC	4.75 to 5.25V	11.50 to 12.5V	23.50 to 24.5V	14.50 to 15.50V
(Limit) for AM					750 to 1200mV	750 to 1200 mV											

Inspected by: Name & Signature of Railway Representative	Tested by: Name & Signature of firm's Authorized Engineer for Quality Check

Maintenance log Sheet for SSDAC/HASSDAC (Exit end)…….

Sr. No.	Date	Battery (24V)	Tx1 Vrms / freq	Tx2 Vrms / freq	Rx1 Vrms	Rx2 Vrms	Modem Tx Level (Card6) AC Vrms	SCC1 (Card 1) DC Volts		SCC2 (Card 2) DC Volts		With Push Trolley on axle detectors (4spokes/ 8 spokes)		DC-DC Converter DC Volts			
														5V	12V	24 V	15V ISO
Test Point		**TS1 1&5**	**TS4 1&2**	**TS4 3&4**	**TS4 5&6**	**TS4 7&8**	**TS2 7&8**	Red & Black Socket		Red & Black Socket		Red &Black Socket		Monitoring Sockets on card 8			
								Normal	**Dummy wheel**	**Normal**	**Dummy wheel**	**SCC1**	**SCC2**				
(Limit) for Phase		23-28.8V	30 to 40 V 20.8 to 21.2 KHz	30 to 40 V 22.8 to 23.2 KHz	275 to 600 mV	275 to 600 mV	>400 mv (-6dB) (approx.) When other end field unit switched off	2.0 to 2.5 V	<0.7 V	2.0 to 2.5 V	<0.7 V	>1.7 VDC	>1.7 VDC	4.75 to 5.25V	11.50 to 12.5V	23.50 to 24.5V	14.50 to 15.50V
(Limit) for AM					750 to 1200 mV	750 to 1200 mV											

Inspected by: Name & Signature of Railway Representative	Tested by: Name & Signature of firm's Authorized Engineer for Quality Check

Annexure-I

Precautions to be taken care during the wiring/connections are to be done at the time of commissioning of SSDAC/BPAC/SSBPAC (D).

Position of One Quad in Quad cable:

White
(A)
X

Red (C) X **X (D) Grey**

X
(B)
Quad colour

1st pair = White & Quad colour i.e. A & B Wires.
2nd pair= Red & Grey colour i.e. C & D Wires of designated colour of Quad.

Each Quad is binded by the respective Quad colour binder.

Table-1

Colour scheme of PE insulated Quads							
Quad Colour							
	Quad No	Pair No.	A - Wire	B -Wire	Pair No.	C- Wire	D - Wire
Orange	1	1A	White	Orange	1B	Red	Grey
Blue	2	2A	White	Blue	2B	Red	Grey
Brown	3	3A	White	Brown	3B	Red	Grey
Green	4	4A	White	Green	4B	Red	Grey
Yellow	5	5A	White	Yellow	5B	Red	Grey
Black	6	6A	White	Black	6B	Red	Grey

Precautions to be taken for using QUAD Cable:

- Designated pair of wire of the same Quad (mentioned in Table -1) should be used.
- Do not use one wire from one Quad and another wire from some other Quad.
- If any wire of a pair of the Quad is broken/Non functional, then use fresh pair of wire.
- Do not parallel wires of Quad cable.

Annexure-II

TEMPERATURE CORRECTION FACTOR FOR CONDUCTOR RESISTANCE FORANNEALED HIGH CONDUCTIVITY COPPER

Temp. Deg C	Corre. Factor	Temp. deg C	Corre. Factor	Temp deg C	Corre. factor	Temp. deg C	Corre. factor	Temp. deg C	Corre. Factor
5	1.0638	17	1.0122	29	0.9653	41	0.9225	53	0.8834
5.5	1.0618	17.5	1.0101	29.5	0.9634	41.5	0.9208	53.5	0.8818
6	1.0593	18	1.0081	30	0.9615	42	0.9191	54	0.8803
6.5	1.0571	18.5	1.0060	30.5	0.9597	42.5	0.9174	54.5	0.8787
7	1.0549	19	1.0040	31	0.9579	43	0.9158	55	0.8772
7.5	1.0526	19.5	1.0020	31.5	0.9560	43.5	0.9141	55.5	0.8751
8	1.0504	20	1.0000	32	0.9542	44	0.9124	56	0.8741
8.5	1.0482	20.5	1.9980	32.5	0.9524	44.5	0.9107	56.5	0.8726
9	1.0460	21.	0.9960	33	0.9506	45	0.9091	57	0.8711
9.5	1.0438	21.5	0.9940	33.5	0.9488	45.5	0.9074	57.5	0.8696
10	1.0417	22	0.9920	34	0.9470	46	0.9058	58	0.8581
10.5	1.0395	22.5	0.9900	34.5	0.9452	46.5	0.9048	53.5	0.8667
11	1.0373	23	0.9881	35	0.9434	47	0.9025	59	0.8651
11.5	1.0352	23.5	0.9862	35.5	0.9416	47.5	0.9009	50.5	0.8636
12	1.0331	24	0.9843	36	0.9398	48	0.8993	60	0.8621
12.5	1.0309	24.5	0.9823	36.5	0.9380	48.5	0.8977	60.5	0.8606
13	1.0288	25	0.9804	37	0.9363	49	0.896 1	61	0.8591
13.5	1.0267	25.5	0.9765	37.5	0.9346	49.5	0.8945	61.5	0.8576
14	1.0246	26	0.9766	38	0.9328	50	0.8929	62	0.8562
14.5	1.9223	26.5	0.974	38.5	0.9311	50.5	0.8913	62.5	0.8547
15	1.0204	27	0.9728	39	0.9294	51	0.8897	63	0.8532
15.5	1.0183	27.5	0.9709	39.5	0.9276	51.5	0.8881	63.5	0.8518
16	1.0163	28	0.9690	40	0.9259	52	0.8863	64	0.8503
16.5	1.0142	28.5	0.9671	40.5	0.9242	52.5	0.8850	64.5	0.8489

Annexure – III

Detail of the Railway personnel trained by the firm

Training of the following Railway personnel completed on dated _____:

S. No.	Name	Designation	Working Under	Signature

Annexure-IV

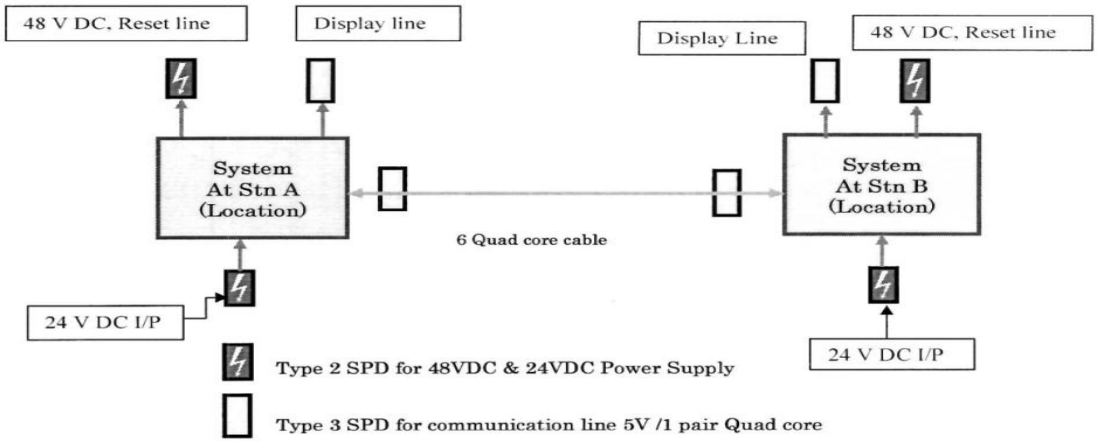
Compliance of Technical advisory Note no.STS/E/TAN/7010 Ver. 1.0 or latest which is reproduced below has been ensured during installation and commissioning of SSDAC/HASSDAC**:**

Technical Advisory Note- Compendium of Axle counter TANs			
Subject	Guidelines and precautions of installation of Digital Axle Counter		
Document Number	STS/E/TAN/7010	Version	1.0
Dated	20.11.2024		

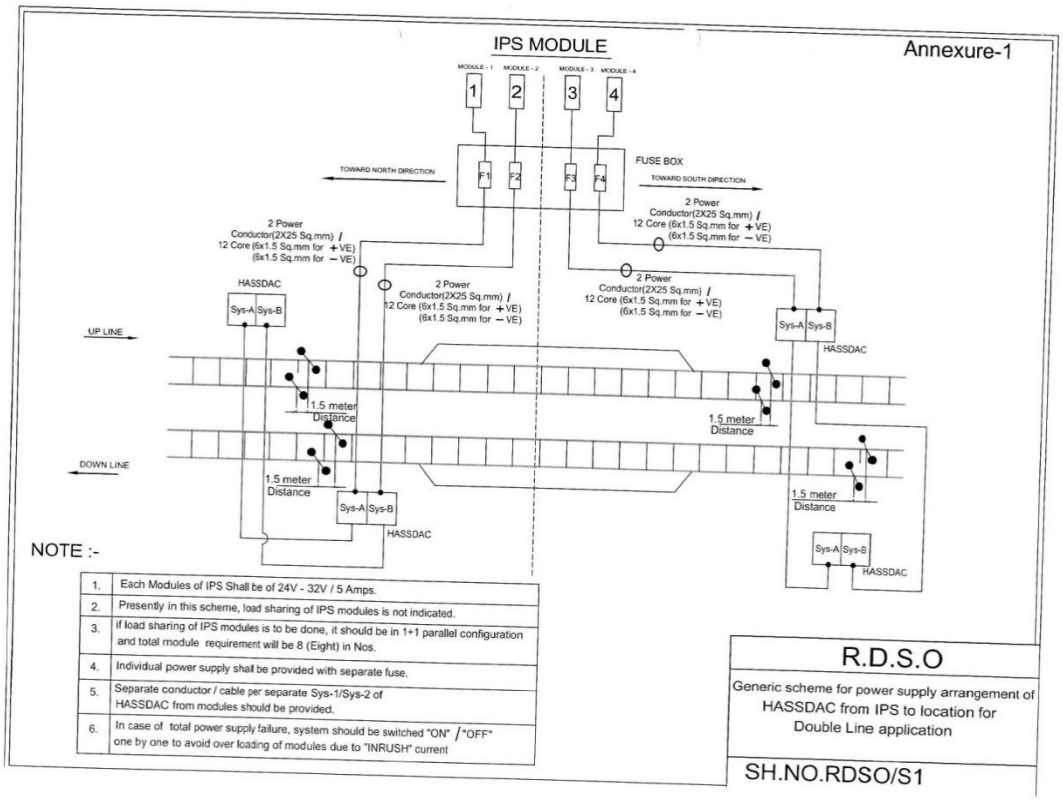
A compilation of instructions given in different advisories for digital axle counter systems is being published.

Sr. No.	Description
A.	**Indoor Installations**
1.	For MSDAC, Evaluators should be kept in dust free and ventilated rooms.
2.	For IBS/ABS installation using MSDAC, line wise electronics should be planned. In which, the requirement is that there shall be no single point of failure that can affect both the lines at the same time. MSDAC can provide multiple track section monitoring by single evaluator but it shall be ensured that one evaluator failure does not affect signals on both UP & Down lines. This primarily leads to provision of line wise evaluators with separate power supply modules.
3.	Line side portable cabins/relay huts etc. shall have sufficient space for keeping circuit books, manuals, and diagnostic PC on a table of adequate size and also for movement of staff during routine maintenance and fault finding.
4.	Battery shall not be installed in the same space where electronic systems are installed. Battery room shall be separate and sufficiently ventilated.
5.	These line side portable cabins/relay huts etc. shall be preferably located near Level crossings for quick access otherwise a suitable access route shall be identified and approved by open line.
B	**Outdoor Installations**
6.	Continuity of Traction bonds in the vicinity of the sensors (50m) should be ensured to keep earth potential rise near DP minimum.
7.	DP should be away from neutral section by 30m. Distance separation between 2 adjacent DPs should be min. 2m.
8.	Sensors should be sufficiently far away from rail joints
9.	As far as possible, TX/ RX coils need to be installed on non-cess rails. This will prevent failures due to movement of rail dolly etc.
C	**Wiring and Cabling Practices**
10.	Avoid bunching of power and DAC cables in relay room.DAC circuits in location shall also not be bunched along with parallel relay/power circuits. Relay circuits are known to generate switching transients that can couple enough energy in parallel circuits nearby and interfere with low power DAC data circuits.
11.	Only Shielded cable should be used in indoor wiring of DAC.
12.	Wiring and cabling shall not be bent abruptly and shall be given sufficient bending radius to ensure that conductors inside the cabling/wiring are not damaged due to bending.Wiring shall be properly supported by channels troughing, cable clamps and other means to ensure that connections are not under pressure due to wire hang.Wiring and cabling shall not be supported at any sharp-edged object to ensure that conductors are not damaged during their installation/ maintenance.
13.	Relay circuits shall preferably be not taken in same cable as DAC circuits. In unavoidable circumstances relay circuits shall be in furthest quad (spatially) from the one containing DAC

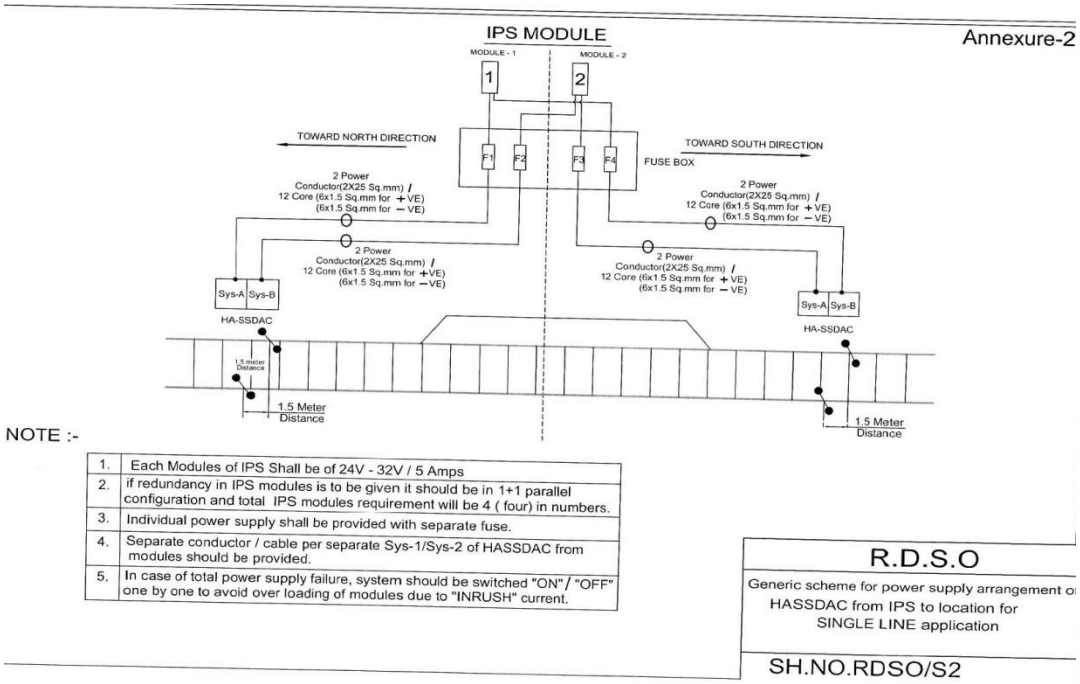
	circuits.
14.	Preferably, quad cable shall be terminated in cage clamp type terminals that provide solid 360 degree surface connection and sufficient pressure on the wire to make a good electrical contact. Any unused/spare conductor of the quad cable shall be terminated and tightened properly at CTR, Locations and in between junction boxes.
15.	Cables shall be terminated at the bottom portion of location keeping equipment and their wiring at higher level inside location. This will help in keeping wiring of different types segregated from each other. All earth wires and surge protection devices also shall be kept at the lower levels for the same reasons.
16.	Twisted pairs are required to avoid mutual interference between low level data signals. Even short lengths of non- twisting (few inches) can couple enough noise to interfere with low voltage DAC communication signals.
17.	Quad cable twisting shall be ensured during termination so that minimum one twist per inch is maintained till the last inch into terminations.
18.	Any wiring from quad cable terminations to equipment shall be done using twisted singles of indoor signalling cable (1 mm square) or any other approved indoor twisted pair cable.
19.	Signalling cable or any other untwisted cable pair shall never be used in DAC communication circuits to avoid intermittent type of failure.
20.	Requirement is that parallel circuits shall be as far spaced, spatially, as possible. Long parallel circuits shall be avoided in the same quad. So, one long and one short circuit can be accommodated in same quad but not both long circuits.
21.	DAC circuits in BPAC of up and down lines in double line sections shall be in separate quads and kept one/two quad distance away from each other to avoid mutual interference in long parallel circuits.
22.	Any other parallel wiring (relay circuits/power circuits/earthing wires etc.) shall cross DAC circuits at perpendicular and any parallel portion shall be kept at minimum 150mm (lateral distance) away from the wiring for DAC circuits.
23.	Cabling, as far possible, shall be planned line wise in such a way that single cable failure does not affect the signalling on other line and there are sufficient spares for concerned line.
24.	Periodic checking of Quad cable parameters including IR, Loop Resistance, attenuation and cross talk. Parameters are mentioned in PCCL also. IR should preferably be equal to or better than 10M ohms, Loop resistance should generally not exceed 56 ohms/km, attenuation loss should not be greater than 30dB, FEXT /NEXT should be better than 55dB. It should be ensured that line loss is not more than specified by OEM.
D	**Power Supply Installations**
25.	Power supply ripples shall be ensured to be less than 50 mv peak to peak as per IPS specifications. This should be part of routine maintenance measurements and records.
26.	Separate power supply/module for DAC to be used.
27.	To realise full advantage of line wise electronics provision, evaluator for each line shall be supplied from independent power supply module.
28.	Power supply for evaluator shall not be shared for anything else like cabinet fan or track section relays etc.
29.	Power supply module feeding external circuits shall never be used for feeding indoor electronic systems like evaluators that require separate isolated supply
30.	For taking full advantage of dual system and HASSDACs two pair of separate power conductors (2X25 Sq. mm Aluminium power cable/equivalent signalling cable) shall be provided for power. Each pair of such power conductor shall be connected to individual DC-DC converters in the IPS and power supply cards of dual system/HASSDAC.
E	**Earthing and Surge Protection Devices**
31.	Availability and intactness of Class B & C SPDs which are being supplied along with IPS in a separate wall mountable box should be checked and provided wherever not available.
32.	The equi-potential bonding of indoor signalling equipment including, IPS racks should be provided in the power room and connected to low resistance earth of less than 1 Ohm
33.	Earth connections shall be kept as short and as straight as possible because any loop or turns can create inductive elements that impede quick discharge of transients and surges to ground. The length of cables from SPDs to earth bus bar and from equipment to earth bus bar should be shortest possible without any bends Loops should not be present.

34.	The size of cable from SPD to earth bus bar should be minimum 16 sq. mm copper cable and the size of cable from equipment to earth bus bar should be minimum 10 sq. mm copper cable
35.	All connections from equipment or SPD to earth bus bar shall be exothermic welded or soldered.
36.	Suitable Class-C SPDs should be provided in the power line, communication line and reset line for surge protection in DAC's. In this way, it has to be ensured that wherever power cables/data lines go out of location/relay room, proper SPDs need to be provided at both ends.
37.	In quad cable, the armour, screen and sheath continuity should be maintained while jointing it. Screening of quad cable is effective only when sufficient induced current can flow in the screen thereby cancelling/reducing the induction from 25KV AC for the cable conductors. For adequate induced current to flow in screen, it is necessary that good earth connections are provided for cable screen & armour. Combined earth for armour and screen at intermediate locations shall have earth value as low as possible, but shall never be more than 5 Ω (Ohms).
38.	Low resistance earth of value less than 5 Ohms needs to be provided in the location boxes where field unit of Digital Axle Counter is provided.
39.	All equipments, cables in the location box need to be connected firmly to the earth bar inside location. Periodical checking of earth bus bar continuity and earth values should be undertaken and recorded.
40.	Screen of Sensor cables should be properly earthed at location end.
41.	High quality, high speed & self-diagnosing/indicative type SPDs should be used.SPD& their wiring — short and straight wire with low inductance away from other wiring of electronics, SPD of proper quality needs to be ensured. OEM shall select appropriate rating of SPD for use in quad cable considering effect of induced voltage
42.	OEM shall select appropriate rating of SPDs for use in quad cable considering effect of induced voltage. Intactness and availability of SPDs in DAC should be checked periodically and recorded in maintenance logbooks. To ensure their availability in the system, their health should be monitored /checked periodically, specially before monsoon, after every heavy rain/lightning, storm, and during maintenance/inspection. In case of failure or deterioration in performance, same should be replaced.
43.	Record of provision of SPDs with make and model details should be made in PCCL by OEM & Railways.
44.	For surge protection arrangement in HASSDAC a generic scheme is shown below:  The SPDs as indicated above shall be indicative type and provided by OEM of HASSDAC as stipulated in their user/installation manual.
45.	Earthing & Bonding arrangement to be ensured as per RDSO/SPN/197 Ver. 1.0 or latest.
46.	Generic scheme for power supply arrangement-

Use of HASSDAC for double line application:–



Use of HASSDAC for single line application-



F **Precautions during maintenance of DACs**

47.	Maintenance activity shall be done with utmost care and as per technical manuals of OEMs related to this subject. As a general rule, any maintenance activities in track device area, like, ballast packing & rail changing etc., that require disconnection of track devices and adjustments of axle counter parameters shall not be done in working system. If so required, maintenance staff shall take proper disconnection, duly de-energizing the related sections of SSDAC/HASSDAC/MSDAC from CT rack/disconnection terminals before starting indoor/outdoor maintenance activities.
48.	Once work is completed the section should be connected/ energized following all precautions related to resetting, checking of parameters as stipulated and physical clearance of track section before reconnection.
49.	**Routine Maintenance** Activities like measurement of parameters, cleaning etc. which does not interfere with working of system, may be carried without disconnection **Specific Checks on Track Device** Periodic preventive checks by maintenance staff to ensure that track device is properly fitted at site and fixing nuts/bolts are properly tight and intact_ Connections of track device cables are also proper. Any damage/irregularity noticed in nuts/bolts/cables near the trackside shall be immediately attended to duly disconnecting the associated track section while attending the same for damages/ irregularities. Fixing Nuts/Bolts shall be used as recommended by OEM
50.	Handling of Track Devices: 1 Wheel sensors / Track devices are the most sensitive element in DAC technology and these needs to be handled with utmost care. OEM instructions for removing, installing and adjusting shall always be adhered to. Any attempt to experiment with wheel sensors on an operational system can lead to unforeseen hazards. If there are any doubts, railways can always raise those to RDSO, in turn required testing and checks will be done and a mitigation for those doubts will be undertaken in RDSO without jeopardizing the working system on operational railway.
51.	Handling of Track Devices: 2 All Wheel sensor / Track devices installed so far on IR, work on principal of electromagnetic flux linking between transmitter and receiver coils. Electronics connected to these track devices keeps monitoring the track devices continuously for the changes in current/voltage induced in receiver coils due to change in flux linkage between transmitter and receiver coils. When a ferromagnetic metallic item is brought near to the track device, it influences the flux linking between the transmitter and receiver coils to a certain level and if this change is less than the set threshold level, then electronics ignores that change. This is how a trolley is, generally, suppressed, as the change in induced receiver voltage is less than set threshold for electronics to process that signal for wheel detection.
52.	Handling of Track Devices: 3 If the change in receiver voltage is beyond the set threshold level then associated electronics starts processing that signal for detecting and counting train wheels. Track devices detect the train wheel based on a specific pattern of flux changes in receiver coil. Any Receiver voltage change beyond the set threshold but not followed by specific wheel detection pattern will lead to the section going into occupancy as a failsafe response.
53.	Handling of Track Devices: 4 If any attempt is made to displace the track device components in a manner that flux linkage between transmitter and receiver coils does not result in threshold being crossed then it may lead to a situation where track device is no more installed in the manner specified by OEM. Such attempt may then create unwanted scenario of track section neither going to occupied condition nor the track device being able to count a train wheel. It is again reiterated that any such concern related to track device displacement shall be discussed and analyzed in lab environment and not in operational field conditions where it can impact signaling system in an undesirable manner.

54.	Intactness and availability of SPDs in DAC should be checked periodically and recorded in maintenance logbooks. To ensure their availability in the system, their health should be monitored /checked during maintenance/ inspections and after the events of heavy lightning.
G	**Dual Detection using DACs and HASSDACs**
55.	Track devices for both the DAC systems shall be provided on separate rails with specified staggering of minimum 1.5 meters.
56.	In dual system and HASSDAC, two DAC systems works in parallel. Health of individual systems to be monitored through Data logger and exception reports/ alarms to be generated for predictive maintenance
57.	For HASSDAC, the status of LR (logic relay)/RR relay (Reset relay) shall be connected in relay room using 2 cores of Signalling cable from location to relay room
58.	For M/s CEL HASSDAC, the information of LR/RR relay is available at pin 15, 16 of VR-Box. Normally there is no continuity between these two pins. When there is a failure in any of the system, pin 15 and 16 shorts. This information shall be provided to data logger and exception report/alarm needs to be generated when shorting continues for more than 10 seconds (10 second exception is compulsory to avoid false alarm)
59.	For M/s GG Tronics HASSDAC, repeater relays of the vital relays of each individual system are available in relay room also. Pick UP contacts may be used in data logger to monitor the status of individual systems and to generate exception report/alarm
60.	Two set of independent cables shall be provided between locations to station for individual systems.
61.	Diversity has to be built right from the stage of power supply and the connecting cables and the method of train sensing and train detection.
62.	Wherever Axle Counters have been used as one of the Train Detection Systems, the resetting shall invariably be activated automatically by the other train Detection Device. Resetting of Axle Counters shall always be in the preparatory mode.
63.	Each of these Train Detection Devices shall be separately monitored by the Data Loggers and Exception Reports/alarms be transmitted to Maintenance Team & Signal Control, in case of mismatch/failure of devices, Messages received about mismatch/failure of the devices should be promptly attended.
64.	During failure of any one device of Dual Detection, train shall be dealt on proper signal. Failed device shall be attended & rectified, where required, only under proper disconnection taken dung lean period of traffic
65.	In case of failure of both the devices, trains shall be dealt on written authority at restricted speed. Rectification and restoration work should be done after receipt of failure memo/under proper disconnection as required as per extant practice.
66.	Dual Train Detection Devices should be checked and inspected regularly as per the stipulated periodicity of maintenance and inspection.
H	**Communication**
67.	Redundancy in media can be planned where communication failures are high. Media changeover arrangement/ switch should be provided for this
68.	Use of High availability SSDAC in high density traffic areas can give more availability and reliability of system (BPAC applications).
69.	Communication Both the systems of HASSDAC systems shall be provided with media diversity for reliability i.e. one system on dark optical fiber or dedicated El channel (point to point) and the other system on 6 quad cable
I	**General Items**
70.	OEMs have been advised to give on-site training to staff as per requirement of Railway
71.	Implement effective Installation and Commissioning procedures as per PCCL. All columns of the PCCL should be filled in and only then signed.
72.	Person signing the PCCL should be different from installer so that additional check is enforced.
73.	Association of OEM during pre-commissioning check to be ensured.
74.	Monitoring of VRs of DACs shall be done through Data Logger.
75.	Methodology for calculation of FRPCPY of different types of DACs (MSDAC, HASSDAC and SSDAC) is prescribed vide the Railway Board letter no. 2022/Sig/19-FRPCPY/12 dated- 15.07.2022, same should be followed.

The sources of all these points are following-

1. TAN- STS/E/TAN/6001 for Digital Axle Counter- Wiring Discipline*
2. TAN- STS/E/TAN/6002 for ABS & IBS Scheme using MSDAC*
3. TAN- STS/E/TAN/7005 for Lightning protection for DAC in lightning prone area.*
4. TAN- STS/E/TAN/7006 for Technical Advisory for Digital axle counters*
5. TAN- STS/E/TAN/7008 for Installation of HASSDAC*
6. TAN- STS/E/TAN/7009for Axle counter*
7. RB letter no. 2012/Sig/M/DAC/DC dated: 31.12.2013
8. RB letter no. 2022/Sig/19-FRPCPY/12 dated- 15.07.2022

*Note- TANs mentioned vide sl. No. 1 to 6 are henceforth being withdrawn as all their points are covered in this documents number STS/E/TAN/7010.

For any issues related to this TAN (technical advisory note) please contact Director/Signal-II at RDSO, Lucknow (Rly phone- 032-42659, DOT-0522-2452332, Email: Triambak.tiwari@gov.in.

****