Fax : (0522)-2452581
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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 Organization,
LUCKNOW - 226011

No. EL/11.5.5/4 Dated: 01.07.2014.

Chief Electrical Engineers,

- Central Railway, 2nd floor, Parcel Office Bldg., Mumbai CST-400 001
- East Central Railway, Hazipur – 844 101 (Bihar)
- Eastern Railway, Fairlie Place, Kolkata -700 001
- East Coast Railway, Railway Complex, Bhuvneshwar – 751 023
- North Central Railway, Allahabad – 211 001
- Northern Railway, Baroda House, New Delhi-110 001.
- North Eastern Railway, Gorakhpur – 273 001
- South Central Railway, Rail Nilyam, Secunderabad – 500 071.
- South East Central Railway, Bilaspur-495 004.
- South Eastern Railway, Garden Reach,Kolkata-700 043
- Southern Railway, Park Town, Chennai-600 003
- West Central Railway, Jabalpur 482 001.
- Western Railway, Churchgate, Mumbai –400 020

MODIFICATION SHEET NO. RDSO/2014/EL/MS/ 435, Rev. '0' Dated 06.06.2014

1.0 **Title**:
Modification sheet to avoid necessity of cab changing in case of failure of processor cards of VCU of three phase locomotive (WAP7).

2.0 **Object**:
Presently, in three phase locomotives provided with Vehicle Control Units based on MICAS-S2 communication protocol between different bus stations, it is not possible to have redundancy among VCU-1 and VCU-2 in case STB/HBB processors failure and cab changing is needed in some cases by driver to clear the section. However in TCN based VCU, this feature has successfully been implemented by M/s BHEL. Based on the experience gained, new wiring required for modification in locomotives provided with MICAS based VCUs was finalized by RDSO in association with CLW and MS-429 was issued to avoid necessity of cab changing in WAG9/WAG9H locomotives. Further similar modification has been implemented in one WAP7 locomotive (30381) by CLW. Based on above, this MS for WAP7 locomotives has been prepared to implement in all MICAS- S2 VCU based WAP7 locomotives.

3.0 **Existing Arrangement with cross-references of respective design document:** The existing arrangement of wiring for the input/output signals with related processors is given in Annexure-I for WAP7 locomotive with green colour.

4.0 **Modified Arrangement to replace existing arrangement as given above in 3.0:** The modified arrangement of wiring for the input/output signals with related processors for WAP7 is given in Annexure-I with red colour along with wiring details.

5.0 **Redundancy Status after modification:** The failed functions and other details after implementing the modification shall be as per Annexure-II.

6.0 **Trouble shooting directory for driver shall be modified as:** The existing content and modified content in TSD shall be as per Annexure-III.

7.0 The modified software to be down loaded in VCU1/VCU2 processors shall be issued to Electric Loco Sheds by CLW for modifications in existing locomotives.

8.0 **Application to class of locomotives**:
WAP-7 locomotives fitted with VCUs based on MICAS-S2 Communication Protocol.

9.0 **Material Required**:

(i) 0.5 sq.mm cable (as per CLW specification no. CLW/ES/3/0458 Alt.E) of approximately 60 m length and 1.5 sq.mm cable (as per CLW specification no. CLW/ES/3/0458 Alt.E) of approximately 50 m length per locomotive.

(ii) 6 Wago connector with 2 terminals per locomotive.

10.0 **Material Rendered Surplus**:

NIL.

11.0 **Reference**:

(i) Railway Board letter No. 2006/Elect(TRS)/441/8 dated 7-10-13.
(ii) CLW letter No. C-D&D/T/42 dated 20-05-14.

12.0 **Modification Drawing**:

The modified schematics are enclosed at Annexure-IV.

13.0 **Agency of Implementation**:

CLW, POH workshops and Loco Sheds holding WAP7 type three phase locomotives.

(A.K.Goswami)
for Director General/Elect.

Encl: As above,

Copy to:-

Secretary (Electric Traction), Railway Board, Rail Bhavan, New Delhi-110 001.	For kind information please.
1. Chief Electrical Engineer, Chittaranjan Locomotive Works, Chittaranjan-713 331. **2.** Chief Works Manager, Electric Loco Workshop, Central Railway, Bhusawal-425 201. **3.** Chief Works Manager, Electric Loco Workshop, Eastern Railway, Kancharapara, 24 Pargana (N) – 743145 (W.B.) **4.** Chief Works Manager, Loco, Carriage & Wagon Works, Western Railway, Dahod, P.O. Freeland Gank – 389160 (Gujrat) **5. Sr. DEE (TRS), Electric Loco Sheds,** ▪ Central Railway, Ajni (Nagpur)-440008. ▪ Central Railway, Kalyan-421304 (Maharashtra) ▪ East Central Railway, Gomoh-828 401 ▪ Eastern Railway, Howrah-711 106 ▪ Northern Railway, Ghaziabad (UP)-201 001. ▪ South East Central Railway, BMY Complex, Bhilai, Durg-490 025. ▪ North Central Railway, Fazalganj, Kanpur – 208 003 ▪ South Central Railway, Lallaguda, Secunderabad – 500 017. ▪ South Eastern Railway, Tatanagar-831 002. ▪ Southern Railway, Royapuram, Chennai-600 013. ▪ West Central Railway, Tughlakabad, New Delhi-110 044. ▪ Western Railway, Vadodara-390 002.	For information and necessary action please.

(A.K.Goswami)
for Director General/Elect

Encl: As above,

Annexure-I/1

REVISED CABLE INDEX FOR MICAS BASED VCU FOR AVOIDING CAB CHANGING FOR WAP7 LOCOS

INPUT REDUNDANCY

S. No	Signal Name	Existing processor	Redundant processor	Scheme No	Cable No	Size of cable	FROM			TO	
							Panel	Location	Wago No	To	SUB-D /Connector PIN
1	AMSB_0101-LBEDemand	HBB-1	STB-1	08C	2521A	0.5 mm	SB-1	XF22S:02	23	411	JD:03
2	AMSB_0101-LTEDemand	HBB-1	STB-1	08C	2520A	0.5 mm	SB-1	XF22S:02	22	411	JA:02
3	AMSB_0101-LT/BDem>1/3	HBB-1	STB-1	08C	2522A	0.5 mm	SB-1	XF22S:02	24	411	JD:11
4	AMSB_0101-LT/BDem>2/3	HBB-1	STB-1	08C	2523A	0.5 mm	SB-1	XF22S:02	25	411	JD:04
5	AMSB_0101-LPBFaultAck	HBB-1	STB-1	17A	5671A	0.5 mm	SB-1	XF22S:03	04	411	LA:04
6	AMSB_0101-LBEDemand	HBB-2	STB-2	08D	2521B	0.5 mm	SB-2	XF77S:02	02	412	JA:02
7	AMSB_0101-LTEDemand	HBB-2	STB-2	08D	2520B	0.5 mm	SB-2	XF77S:01	01	412	JA:01
8	AMSB_0101-LT/BDem>1/3	HBB-2	STB-2	08D	2522B	0.5 mm	SB-2	XF77S:02	03	412	JD:10
9	AMSB_0101-LT/BDem>2/3	HBB-2	STB-2	08D	2523B	0.5 mm	SB-2	XF77S:02	04	412	JD:04
10	AMSB_0101-LPBFAulAckt	HBB-2	HBB-1	17A	5671B	1.5 mm	SB-2	XF77S:03	04	SB-2	XK77V:03-21
						1.5 mm	SB-2	XK77V:03	21	SB-1	XK22V:03-21
						1.5 mm	SB-1	XK22V:03	21	SB-1	XF22S:02-51
						0.5 mm	SB-1	XF22S:02	51	411	OA:01
11	AMSB_0101-LActKD	STB-1	HBB-1	08A	2500A	0.5 mm	SB-1	XF22S:02	17	411	OA:09
12	AMSB_0101-LActKD	STB-2	HBB-2	08A	2500B	0.5 mm	SB-2	XF77S:03	20	412	OA:09
13	AMSB_0101-LSwComprDir	HBB-1	*****	06E	3035A	1.5 mm	****	172.2	Q4	SB-2	XK77D-14
						1.5 mm	SB-2	XK77D	14	SB-2	XF77S:01-49
						1.5 mm	SB-2	XF77S:01	49	SB-2	XK77V:03-22
						1.5 mm	SB-2	XK77V:03	22	SB-1	XK22V:03-22
						0.5 mm	SB-1	XK22V:03	22	SB-1	XF22S:03-28

14	AMSB_0102-LSwComprOff	HBB-2	STB-1	06E	3034B	1.5 mm	SB-2	XF77S:03	27	SB-2	XK77V:03-18
						1.5 mm	SB-2	XK77V:03	18	SB-1	XK22V:03-18
						1.5 mm	SB-1	XK22V:03	18	SB-1	XF22S:02-48
						0.5 mm	SB-1	XF22S:02	48	411	LA:12
15	AMSB_0102-LSwComprDir	HBB-2	STB-1	06E	3035B	1.5 mm	SB-2	XF77S:03	26	SB-2	XK77V:03-19
						1.5 mm	SB-2	XK77V:03	19	SB-1	XK22V:03-19
						1.5 mm	SB-1	XK22V:03	19	SB-1	XF22S:02-49
						0.5 mm	SB-1	XF22S:02	49	411	LD:12
16	AMSB_0102-MBrakElecOk	HBB-2	STB-1	06H	3008	1.5 mm	SB-2	XF77S:01	17	SB-2	XK77V:03-20
						1.5 mm	SB-2	XK77V:03	20	SB-1	XK22V:03-20
						1.5 mm	SB-1	XK22V:03	20	SB-1	XF22S:02-50
						0.5 mm	SB-1	XF22S:02	50	411	JD:12

OUTPUT REDUNDANCY FOR AVOIDING CAB CHANGING

S. No	Signal Name	Existing processor	Redundant processor	Scheme No	Cable No	Size of cable	FROM			TO	
							Panel	Location	Wago No	To	SUB-D:PIN
1	AMSB_0201-MLampFault	HBB-1	STB-1	17A	2099A	0.5	SB-1	XF22S:02	03	411	JJ:06
2	AMSB_0201-MLampFault	HBB-1	STB-1	17A	5673A	0.5	SB-1	XF22S:03	06	411	JJ:13
3	AMSB_0201-MLampFind	HBB-1	STB-1	17A	5672A	0.5	SB-1	XF22S:03	05	411	JG: 17
4	AMSB_0201-MLampFind	HBB-1	STB-1	17A	2099A	0.5	SB-1	XF22S:02	05	411	JG: 04
5	AMSB_0201-MLampFault	HBB-2	STB-2	17A	2099B	0.5	SB-2	XF77S:03	07	412	JG:03
6	AMSB_0201-MLampFault	HBB-2	STB-2	17A	5673B	0.5	SB-2	XF77S:02	12	412	JG:15
7	AMSB_0201-MLampFind	HBB-2	STB-2	17A	2099B	0.5	SB-2	XF77S:03	08	412	JG:04
8	AMSB_0201-MLampFind	HBB-2	STB-2	17A	5672B	0.5	SB-2	XF77S:03	11	412	JG:17

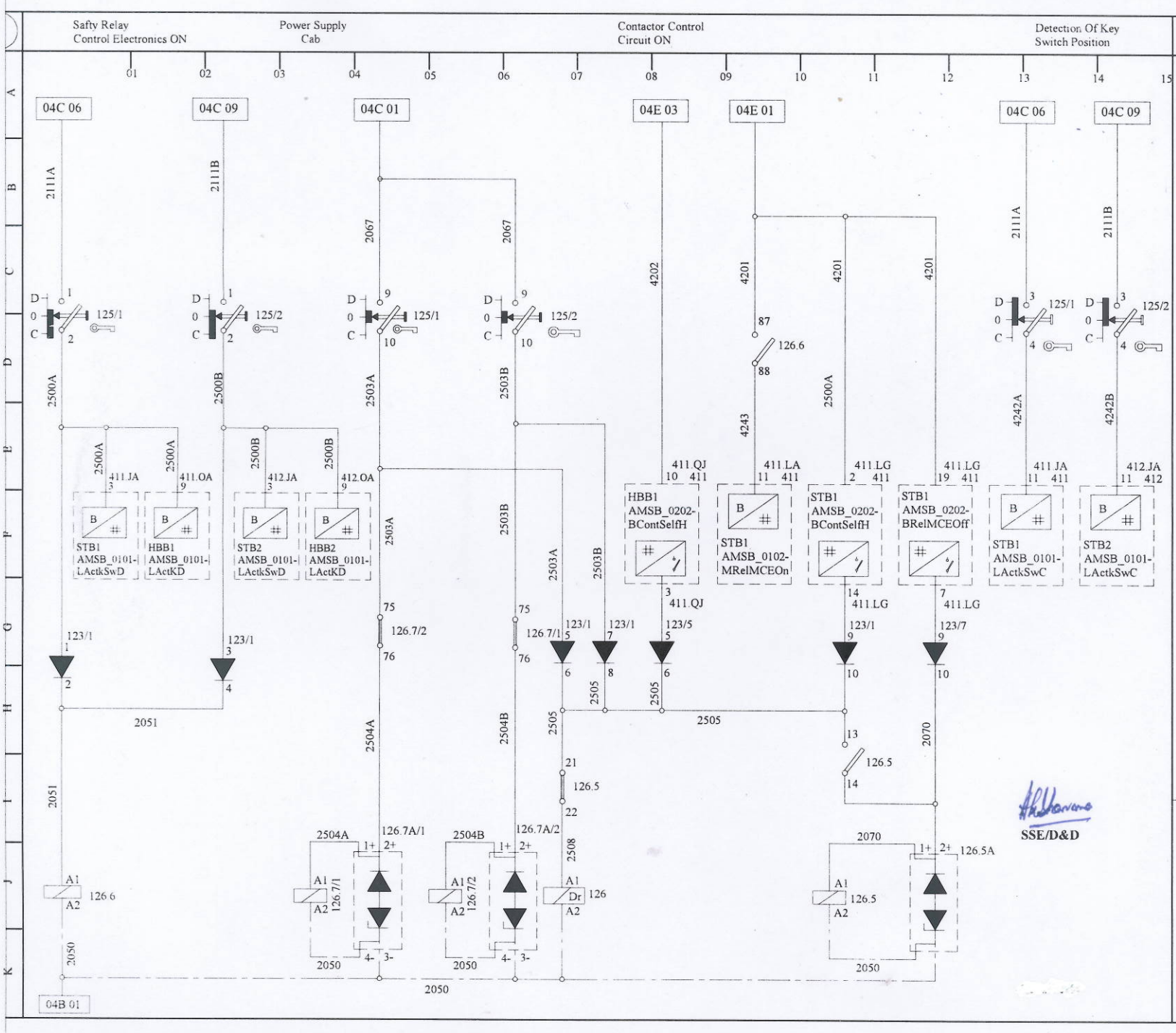
Annexure-II

REDUNDANCY CONCEPT IMPLEMENTED IN MICAS VCU

ISOLATION OF ANY ONE				
Process or	HBB1	HBB2	STB1	STB2
BEFORE MODIFICATION	CAB-1 WILL BE ISOLATED	CAB-2 WILL BE ISOLATED	CAB-1 WILL BE ISOLATED	CAB-2 WILL BE ISOLATED
	CAB CHANGE NECESSARY	CAB CHANGE NECESSARY	CAB CHANGE NECESSARY	CAB CHANGE NECESSARY
AFTER MODIFICATION	CAB-1 WILL NOT BE ISOLATED. Normal driving from CAB-1 & CAB-2	CAB-2 WILL NOT BE ISOLATED. Normal driving from CAB-1 & CAB-2	CAB-1 WILL NOT BE ISOLATED. Failure mode active for driving from CAB-1. CAB-1 meters not available.	CAB-2 WILL NOT BE ISOLATED. Failure mode active for driving from CAB-2. CAB-2 meters not available.
	FAILED FUNCTIONS	**FAILED FUNCTIONS**	**FAILED FUNCTIONS**	**FAILED FUNCTIONS**
BEFORE MODIFICATION	MCB not monitored	Parking Brake Manual Release	Air Dryer	Traction MCBs not monitored
	Earth Fault Relay 415/110V not monitored	Regenerative Brakes not available	Hotel load	Over speed 110% & 105%
	Aux. Contact FUSE 415/110V not monitored	Vigilance Control to be isolated manually	Anti spin valve Bg-1	Speedometer alarm output
		Pan-1 not available	Failure mode switch	Earth Fault Relay BUR not monitored
		Following pressure switches not monitored	Simulation mode switch	Slave (STB2 falls on the slave loco) loco fire alarm on master loco
		Direct Brake	Bogie cut out switch	Vigilance inputs for buzzer
		Pan-1 & 2		
		Flow indication		
		Main reservoir – 3 switches		
		Brake feed pipe		
		Brake Cylinder Bg-1 & Bg-2		
AFTER MODIFICATION	SAME AS ABOVE	SAME AS ABOVE	SAME AS ABOVE	SAME AS ABOVE

Annexure-III

			Existing content in TSD				Modified content in TSD			
SS:13 Cab-1	SS No.	Fault No.	Fault Message	Lamp	Effect	Action to be taken by Driver	Fault Message	Lamp	Effect	Action to be taken by Driver
	SS13	F1301P1	Loco XXX SS13: Cab 1 DISTURBANCE IN PROCESSOR HBB1 Cab 1 may get isolated, drive from cab 2 refer to driver's manual F1301P1	LSFI	Cab-1 may get isolated,	Switch OFF the Electronics and Switch it ON once again. Raise panto , close VCB and resume Traction.	Loco XXX SS13: Cab 1 DISTURBANCE IN PROCESSOR HBB1 "Cab 1 will not isolate, drive from cab 1/2; Press Fault ack. and proceed" F1301P1	LSFI	Cab-1 will not isolate	Cab 1 will not isolate, drive from cab 1 Press Fault acknowledgement button (BPFA) and proceed. Note: MCBs in HB-1 not monitored, Earth Fault relays 415/110, fuse 415/110 not monitored.
	SS13	F1302P1	Loco XXX SS13: Cab 1 DISTURBANCE IN PROCESSOR STB1 Cab 1 may get isolated, drive from cab 2 refer to driver's manual F1302P1	LSFI	Cab-1 may get isolated,	Switch OFF the Electronics and Switch it ON once again. Raise panto, close VCB and resume traction.	Loco XXX SS13: Cab 1 DISTURBANCE IN PROCESSOR STB1 "Cab 1 will not isolate, drive from cab 1/2; Press Fault ack. and proceed" F1302P1	LSFI	Cab-1 will not isolate	Cab 1 will not isolate, drive from cab 1. Press Fault acknowledgement button (BPFA) and proceed. When Bogie isolation needed, Isolate Bogie-1 by MCB 127.1/1, Isolate Bogie-2 by MCB 127.1/2. When MCE OFF required put BL key to OFF position and switch OFF MCB 112.1. Note: Air dryer not working Hotel load not working
			Existing content in TSD				**Modified content in TSD**			
SS:14 Cab-2	SS No.	Fault No.	Fault Message (Existing)	Lamp	Effect (Existing)	Action to be taken by Driver	Fault Message (Modified)	Lamp	Effect (Modified)	Action to be taken by Driver (Modified)
	SS14	F1401P1	Loco XXX SS14: Cab 2 DISTURBANCE IN PROCESSOR HBB2 Cab 2 may get isolated, drive from cab 1 refer to driver's manual F1401P1	LSFI	Cab-2 may get isolated,	Switch OFF the Electronics and Switch it ON once again. Raise panto, close VCB and resume Traction.	Loco XXX SS14: Cab 2 DISTURBANCE IN PROCESSOR HBB2 "Cab 2 will not isolate, drive from cab 1/2; Press Fault ack. and proceed" F1401P1	LSFI	Cab-2 will not isolate	Cab 2 will not isolate, drive from cab 2. Press Fault acknowledgement button (BPFA); Pan1 not available and isolate vigilance control equipment by switch 237.1(SB-1) put on '0' and proceed. Note: Regenerative brake not working.
	SS14	F1402P1	Loco XXX SS14: Cab 2 DISTURBANCE IN PROCESSOR STB2 Cab 2 may get isolated, drive from cab 1 refer to driver's manual F1402P1	LSFI	Cab-2 may get isolated,	1. Switch OFF the Electronics and Switch it ON once again. Raise panto, close VCB and resume traction.	Loco XXX SS14: Cab 2 DISTURBANCE IN PROCESSOR STB2 "Cab 2 will not isolate, drive from cab 1/2; Press Fault ack. and proceed" F1402P1	LSFI	Cab-2 will not isolate	Cab 2 will not isolate, drive from cab 2. Press Fault acknowledgement button (BPFA) and proceed. When MCE OFF required put BL key to OFF position and switch OFF MCB 112.1. Note: Following function failed MCB Monitoring (HB-2) Over speed of speedometer, Vigilance warning buzzer and Erath fault auxiliary.



Position	Function Description	Pin layout
123	Bloking Diods	26C
125	Cab Activating Key Switch BL	26B
126	Contactor Control Circuit ON	25C
126.5	Relay Control Electronics OFF	25C
126.5A	Snubber Circuit To Item 126.5	
126.6	Safty Relay Control Electronics ON	25C
126.7	Contractor Power Supply Cab.	25C
126.7A	Snubber Circuit To Item No. 126.7	
411	Central Electronics 1 (CEL 1)	
411.JA	Connector	28B
411.LA	Connector	28B
411.LG	Connector	28B
411.QJ	Connector	28B
412	Ctnral Electronics 2 (CEL 2)	
412.JA	Connector	28E

VCU Redundancy for WAP7

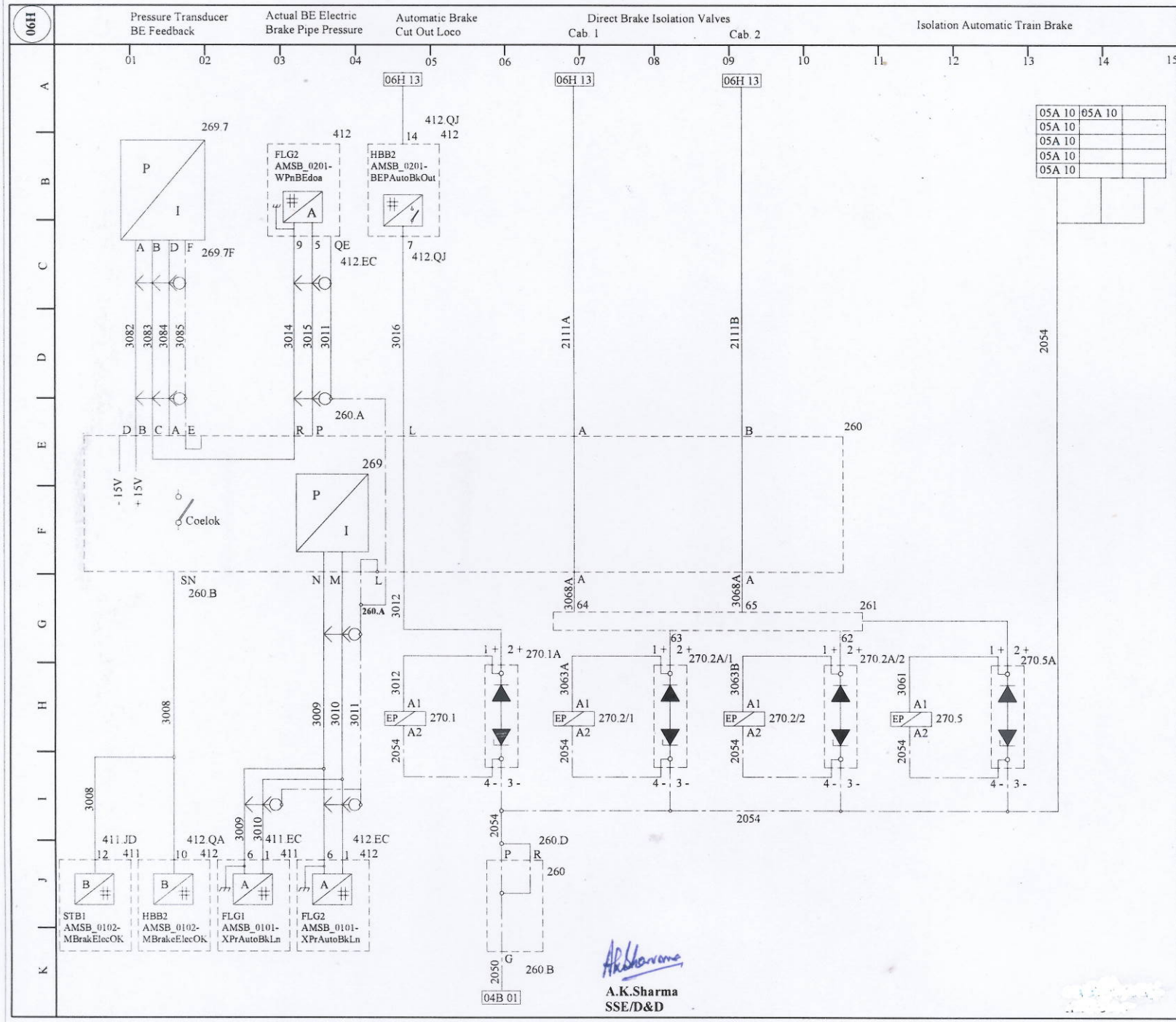
Dy.CEE/D&D

SSE/D&D

CHITTARANJAN LOCOMOTIVE WORKS
Chittaranjan
CENTRE FOR DESIGN AND DEVELPOMENT

08A

A.K.Sharma.SSE/D&D.



Position	Function Description	Pin layout
260	Control Electronics Pneumatic Manifold (45)	
260.A	Connector Control Electric Pneum. Manifold (173)	27.
260.B	Connector Control Electric Pneum. Manifold (172)	27.
260.C	Connector Control Electric Pneum. Manifold (173)	27.
260.D	Connector Control Electric Pneum. Manifold (172)	27.
261	Drive / Interlock Relay P.C.B.	
269	Pressure Transducer Automatic Brake Pipe (45)	
269.7	Pressure Transducer BE Feedback (EBC5) (55)	
269.7F	Connector Pressure Transducer BE Feedback (55)	
270.1	EP Valve Automatic Brake Loco Cut Out (55)	
270.1A	Snubber Circuit To Item No. 270.1 (52)	
270.2	EP Valve Isolation Direct Brake Handle (112)	
270.2A	Snubber Circuit To Iten No. 270.2	
270.5	EP Valve Isolation Automatic Train Brake	
270.5A	Snubber Circit To Item No. 270.5	
412	Central Electronics 2 (CEL 2)	
412.EC	Connector	28]
412.QJ	Connector	28]
412.QA	Connector	28]
411.LD	Connector	

VCU Redundancy for WAP7

Vipin Kumar
Dy.CEE/D&D

CHITTARANJAN LOCOMOTIVE WORKS
Chittaranjan
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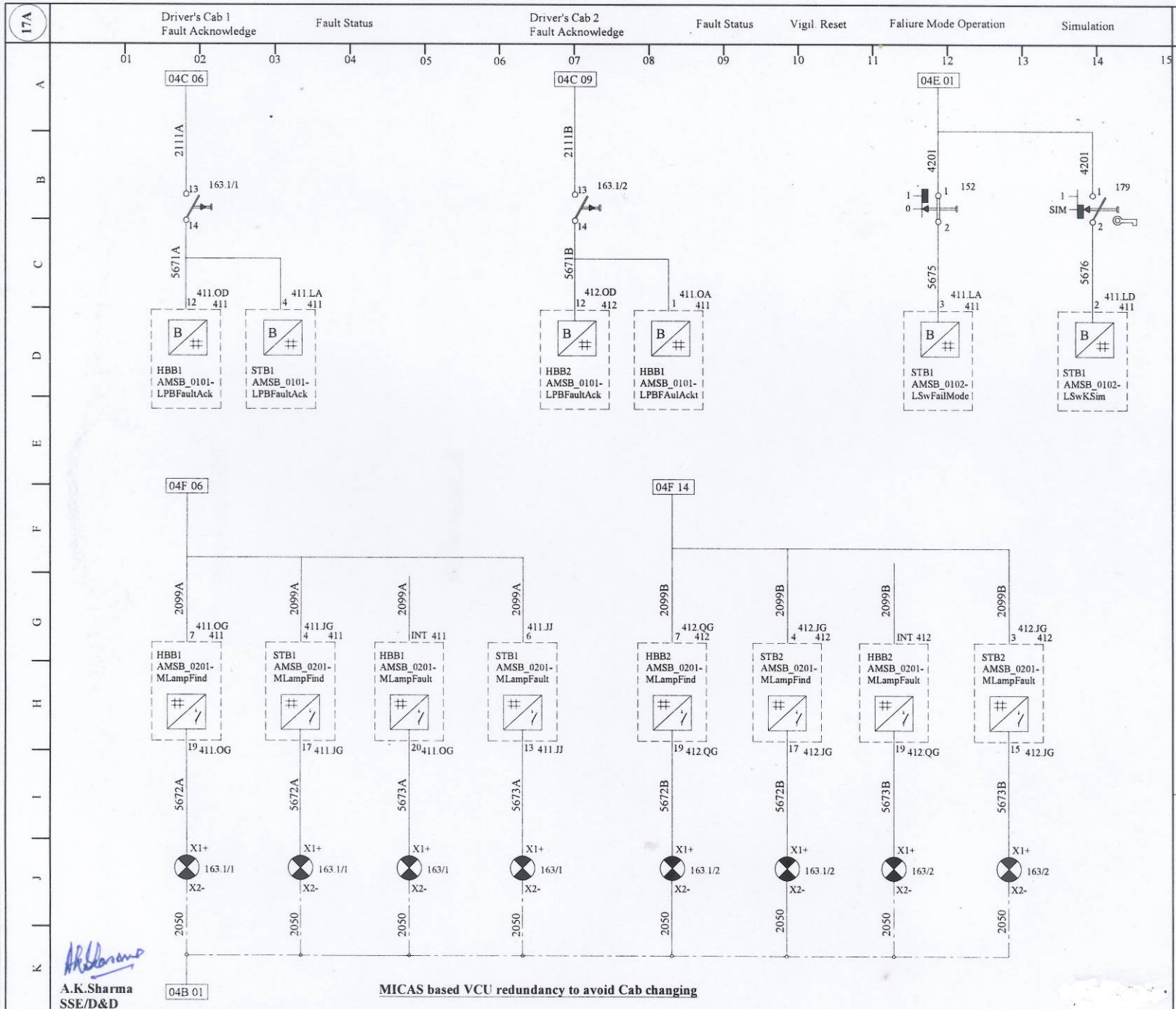
A.K.Sharma.SSE/D&D.

06H



A.K.Sharma
SSE/D&D

MICAS based VCU redundancy to avoid Cab changing

Position	Function Description	Pin layout
152	Rotary Switch Failure Mode Operation	
163	Fault Status Lamp	LSFI
163.1	Illum. Pushbutton Fault Indi./Act.	BPFA
179	Key Switch Simulation	
411	Central Electronics 1 (CEL-1)	
411.LA	Connector	
411.LD	Connector	
411.OD	Connector	
411.OG	Connector	
411.OA		
412	Central Electronics 2 (CEL-2)	
412.OD	Connector	
412.OG	Connector	

VCU Redundancy for WAP7

Vipin Kumar
Dy.CEE/D&D

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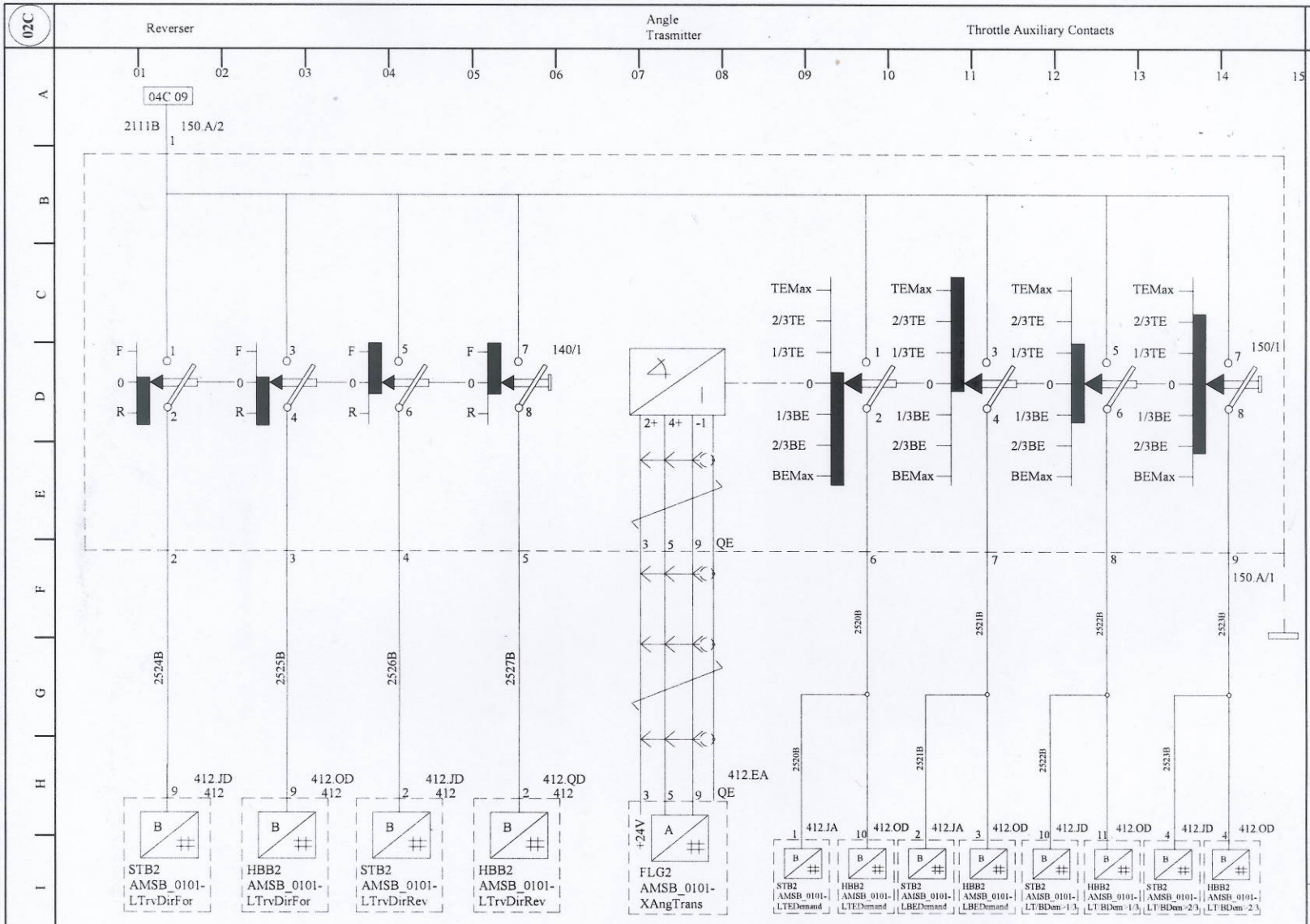
A.K.Sharma.SSE/D&D.

17A



Position	Function Description	Pin layout
140	Switch Travel Direction(Reverser)	
150	Throttle Tractive Effort/Regenerative Brak	
150.1	Angle Transmitter Drive Controller	
150.A	Connertor	
150.B	Connector	
411	Central Electronics 2(CEL-2)	
411.EA	Connector	
411.OD	Connector	
411.JD	Connector	
411.JA	Connector	

VCU Redundancy for WAP7

MICAS based VCUs redundancy to avoid Cab changing

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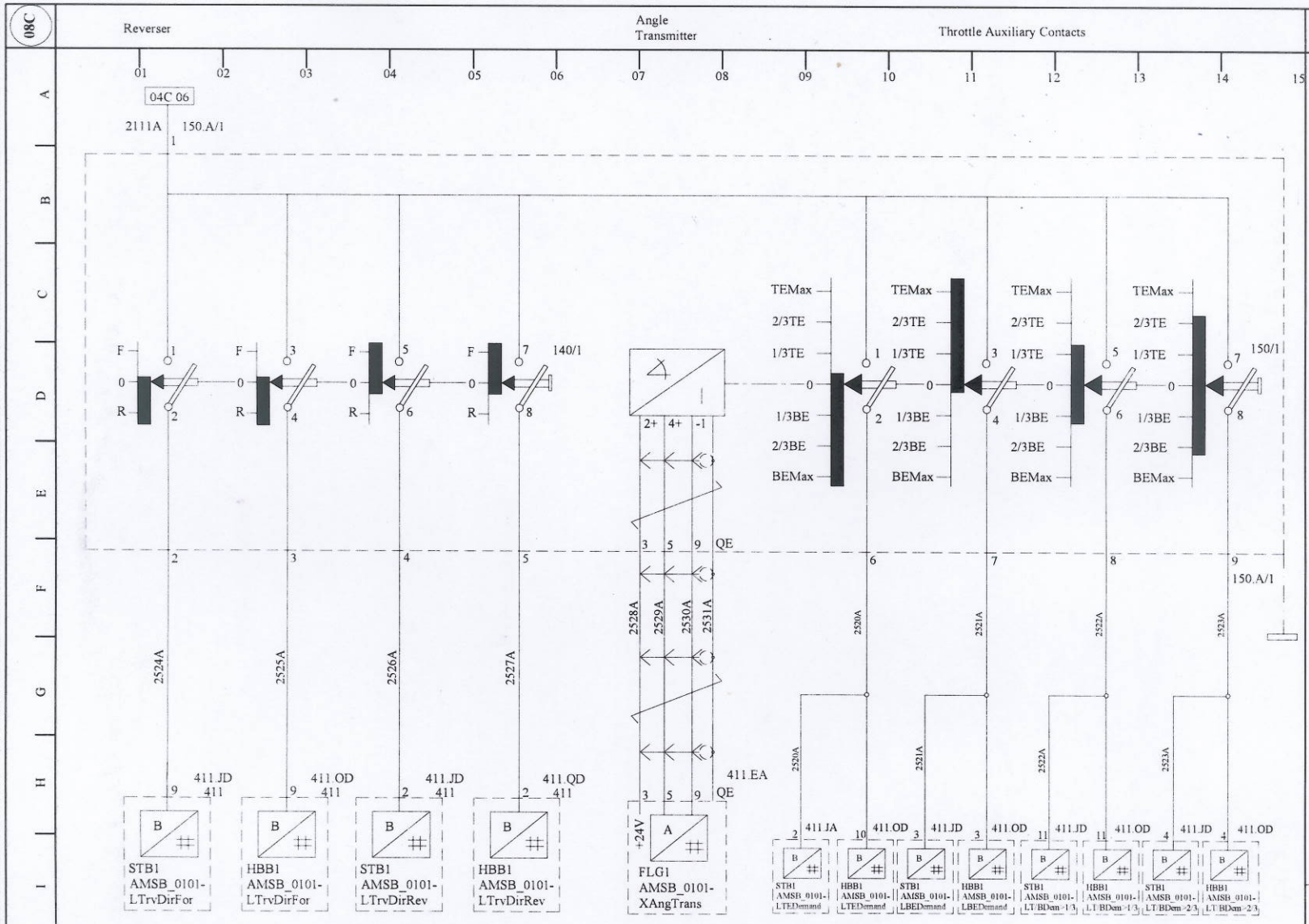

MICAS based VCUs redundancy to aviod Cab changing

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Position	Function Description	Pin layout
140	Switch Travel Direction(Reverser)	
150	Throttle Tractive Effort/Regenerative Brak	
150.1	Angle Transmitter Drive Controller	
150.A	Connertor	
150.B	Connector	
411	Central Electronics 1(CEL-1)	
411.EA	Connector	
411.OD	Connector	
411.JD	Connector	

VCU Redundancy for WAP7

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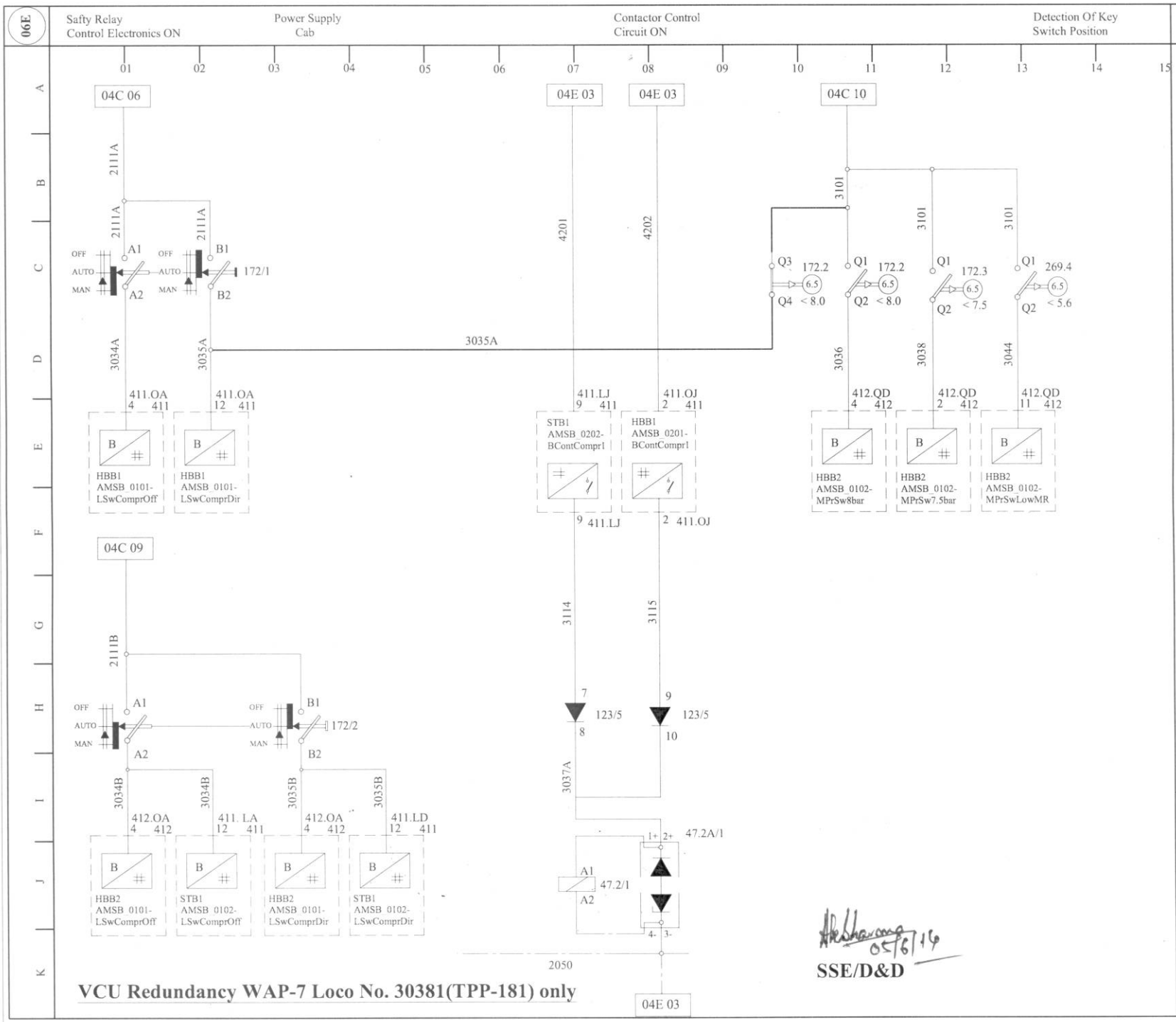
A.K.Sharma.SSE/D&D.



VCU Redundancy WAP-7 Loco No. 30381(TPP-181) only

Position	Function Description	Pin layout
47.2	Connector main compressor	25B
47.2A	Snubber circuit to item 47.2	
48	Auxi. Compresor unit	(17)
48.2	Contactor Auxi. compressor	25B
123	Blocking Diod	
172	Spring loded Sw. main compressor(BLCP)	
172.2	Pr. Sw. main compressor (35)	
172.3	Pr. Sw. main compressor (36)	
172.4	Pr. Sw. Auxi. compressor (26)	
260	Control Elect. Pneumatic manifold	
260B	Connector control Electro. Pn. manifold	
260D	Connector control Electro. Pn. manifold	
269.4	Pr. Sw. Low main reservoir	
269.42	Pr. Sw.Brake feed pipe	
411	Central electronics 1 (CEL-1)	
411.LJ	Connector	
411.OA	Connector	
411.OJ	Connector	
412	Central electronics 2 (CEL-2)	
412.JJ	Connector	
412.OA	Connector	
412.QD	Connector	
412.QJ	Connector	

VCU Redundancy for WAP7

Dy.CEE/D&D

SSE/D&D

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A.K.Sharma.SSE/D&D.