

USER'S MANUAL
for
**BLOCK PROVING WITH
AXLE COUNTER USING UFSBI
(RDSO/SPN/188/2004)**

SINGLE LINE

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Abstract: This document described the functionality, installation & maintenance procedures of the equipment for Block Proving With Axle Counter using UFSBI manufactured as per RDSO/SPN/188/2004			

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FOREWORD

As the days are progressing the technological advancement is also taking place. With this advancement and from the experience, the Block Instrument Theory is also getting changed for high-speed traffic control. A system is required to grant the Line Clear to an approaching train within minimum possible lapse of time. As such Research Development & Standards Organisation of Railways formed a specification, which gives Line Clear to the approaching train with a flawless verification of the Block Section status by the help of the Axle Counter. The system also helps the verification of the parting of train inside the Block Section. The L.V.V helps the Stationmaster to give the Line Clear to the other Train. With this method of circuit designing Deltron Equipment & Systems Pvt. Ltd. has developed the Push Button type Block Instrument that could be commissioned with the Digital Axle Counter working with OFC. The detail of the system is described inside the manual.

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IV List of Annexure

- A. Address configuration jumpers
- B. Pre installation check-list
- C. Error Code List
- D. Details of quad cable connection

I BLOCK PANEL

1. Mechanical Structure

- The body of the Panel is made up of 18 SWG CRC-MS sheet (IS 513 Grade D) and is powdered coated with Siemens gray color. The mechanical dimension conformed to the Specification as laid down in RDSO/SPN/188/04.
- Proper gasketing is done wherever required to prevent the ingress of water, dust, insects/pests etc.
- Sealing arrangement with double locking is provided at the back door of the panel. The faceplate is made of MS 18 SWG (IS 513 Grade D) and is covered with anodized Aluminium facia with legends painted legibly on the faceplate as per specified in the drawing.
- Faceplate of the Block Panel is covered with transparent acrylic sheet of 4mm thickness.

2. Electrical Components

- The Panel is wired using 16/ 0.2 wire conforming to the specification IRS: S-76 / 89.
- Terminals used in the block panel are non-disconnecting type Polymer (6.6 Polyamide/Nylon 6.6/ Melamine) based terminals of make Phoenix / WAGO with DIN rail mounting arrangements.
- **Push Buttons:** The push buttons L&T make (ESBEE brand). Details of push buttons are given below:

Mushroom head push button actuator

- I. Red colour: Type- HD 55C 1
- II. Black colour: Type- HD 55C 3
- III. Yellow colour: Type- HD 55C 4
- IV. Green colour: Type- HD 55C 2

Contact Element for Push Button and key actuator

- I. Type- HC61A2 (1NO)
- II. Type- HC61B2 (1NC)

- **Keys & Switches:** The LCB key is L&T make (ESBEE brand) with catalog number HK85C3 for Key Actuator & HC61A2 (1 NO) / HC61B2 (1 NC) for Elements. The SM's key is Siemens make with catalog number CES1 & for actuator.3SB04 00-0B for element.
- **LED:**
LED's used are of high intensity super bright water clear type of Agilent make and have 5 mm diameter with a viewing angle of 15°.
- **Electromagnetic Impulse Counter:**
Electro magnetic impulse counter is of 6 Digit, 10 impulses per second minimum, 24V DC non-resetable type, Shinmei make, Type ECT-6A or Keltron Make, Type EM010 or , Fritz Kubler, Type W16.20

□ **Buzzers:**

Cedicom or Piezo make buzzers (Continuous and Intermittent) working at 24 volts (+20% -10%) DC for audio alarm is provided to register the BELL CODE sent by other end SM & to register the occupation and clearance of each Block Section. The buzzer for receive line is intermittent and for dispatch line is continuous type. Provision to mute the audio alarm by pressing an acknowledgement push button is provided. The Block buzzer works through block telephone line.

3. Block Telephone

This is provided for speech communication with SM at other end of Block Section. Separate block telephone is provided for separate block section. Block Panel has provision for hanging block telephone as shown in Drg. No. RDSO /S 32019 Sheet no 3 of 3.

4. Quad Cable Or Voice channel:

Provision for 2 quad or 3 voice channels (1 no. 4 wire & 2 nos. 2 wire) in OFC as shown in drg. No. RDSO/S32019 sheet no 1/3 are to be provided by the Railways. Cables will be as per specification TC 30/97.

5. Battery Set:

The Block Proving with Axle Counter system comprising of Block Panel, Universal Fail Safe Block Interface and the relays to work on 24 V D.C. with a maximum current consumption of 5A.

Railways need to provide:

- i. Separate power supply for Block Panel, UFSBI & relays
- ii. Separate power supply for Digital Axle Counter
- iii. Separate power supply for Block Telephone

(The complete power supply arrangement must be done in compliance with RDSO specification)

6. Charger / Module of IPS:

- The charger will be as per IRS S-86 / 2000 to cater 5A/24V DC load.
- The IPS module as per RDSO SPN 165/2004 to cater 5A/24V DC load.

7. Relay Rack & Signaling Relays:

All the relays used as per the circuit diagram are of RDSO approved make. Relay rack is housed inside the same UFSBI cabinet. The Electronic Fail Safe Timer (IRS: S 61/2000) is micro controller based. Relays are as per nomenclature described later in Para 8.

8. Nomenclature of relays for double line with UFSBI as per drawing number- RDSO/S-32018.

The nomenclature of various relays in the relay rack used at each station is given below:

SL. NO.	RELAY	TYPE AND NORMAL STATUS	DESCRIPTION
1.	TGTR	QL1, 11F.4B DROP	Train Going To Relay. Operates to pick up on receipt of LINE CLEAR at train sending station. Normalizes, when station in advance sets to Line closed after train arrival or cancellation of LINE CLEAR.
2.	TCFR	QL1, 11F.4B DROP	Train Coming From Relay. Operates to pick up on receipt of LINE CLEAR enquiry from train sending station. Normalizes after complete train arrival or cancellation of LINE CLEAR.
3.	ASCR	QN1, 8F.8B DROP	Advance Starter Signal Control Relay Picks up, when LINE CLEAR is available and necessary controls are reversed by SM. Drops in any of the under-mentioned cases: a) Entry of train in Block Section. b) Withdrawal of any SM control.
4.	TGTXR	QN1, 8F.8B DROP	Train Going To code Relay. Picks up at train sending station pressing of buttons for LINE CLEAR enquiry. Drops when train sending station releases buttons for LINE CLEAR enquiry or picking up of TGTR which ever is earlier.
5.	TCFXR	QN1, 8F.8B DROP	TRAIN COMING FROM code Receive Relay. Picks up on receipt of LINE CLEAR enquiry from train sending station. Drops when station in rear releases buttons for LINE CLEAR enquiry or TGTR pick up which ever is earlier.
6.	TGTYR	QN1, 8F.8B DROP	Train Going To code Receive Relay. Picks up on receipt of LINE CLEAR at train sending station Drops in any of the under-mentioned cases: a) Entry of train in Block Section. b) Cancellation of Line Clear.
7.	120 JPR	QN1, 8F.8B DROP	Timer mature repeater Relay. Picks up on maturity of Timer for cancellation. Drops when block status set to Line Closed.
8.	BPNR	QN1, 8F.8B DROP	Bell Push button Relay. Picks up on pressing of BELL push button with SM's Key IN, else drops.
9.	TGTNR	QN1, 8F.8B DROP	Train Going To button Relay. Picks up on pressing of TRAIN GOING TO push button else drops.

SL. NO.	RELAY	TYPE AND NORMAL STATUS	DESCRIPTION
10.	CNR	QN1, 8F.8B DROP	Cancel button Relay. Picks up on pressing of CANCEL push button else drops.
11.	FR1	QN1, 8F.8B DROP	Flash controller Relay No. 1. Toggles when Cancellation commenced or any other abnormal condition occur.
12.	FR2	QN1, 8F.8B DROP	Flash controller Relay No. 2. Toggles when Cancellation commenced or any other abnormal condition occur.
13.	TAR1	QNA1, 8F.8B DROP	Train Arrival First Relay. Picks up when control on Reception Signal is Reverse and HS AT occupied by train and HS BT clear. Drops when AT clear with a delay.
14.	TAR2	QN1, 8F.8B DROP	Train Arrival Second Relay. Picks up when control on Reception Signal is Reverse and HS AT is clear and HS BT occupied by train. Drops when block status set to Line Closed.
15.	CAR	QN1, 8F.8B DROP	Cancel relay. Picks up at Train receiving station on initiation of cancellation, provided all controls pertaining to Advance Starter and Reception Signal/Signals and signals controlled by them are at Normal at both the stations. Drops when cancellation matures and system goes to Line Closed condition.
16.	BTSR	QN1, 8F.8B PICK UP	Block Track Stick Relay. Picks up when Block status is LINE CLOSED and Block track is clear. Drops in any of the under-mentioned cases: a) Entry of train in Block Section. b) Cancellation of Line Clear.
17.	AZTR	QNA1, 8F.8B PICK UP	Block Section track Relay of dispatch line. Drops in the under mentioned cases: (a) Entry of train in block section, or (b) Axle Counter failure
18.	TGTZR	QN1, 8F.8B PICK UP	Advance starter signal normal checking repeater Relay. Picks up to repeat Line Closed condition at train receiving station after arrival of train or after a Line Clear cancellation has been initiated, else drops.

SL. NO.	RELAY	TYPE AND NORMAL STATUS	DESCRIPTION
19.	120 EJ	Electronic Time delay unit (Fail Safe)	Timer unit for cancellation time of 120 seconds.
20.	HS ATPR	QNA1, 8F.8B PICK UP	First track for direction proving repeater Relay. Picks up when HSAT track circuit is vacant else drops.
21.	HS BTPR	QNA1, 8F.8B PICK UP	Second track for direction proving repeater Relay. Picks up when HS BT track circuit is vacant else drops.
22.	AS GNCR	QNA1, 8F.8B PICK UP	Advance Starter Signal Normal Checking Relay. Picks up when Advance Starter Signal and all its controls are at Normal, else drops.
23.	HS GNCR	QNA1, 8F.8B PICK UP	Reception Signal Normal Checking Relay Picks up when Reception signal/signals and all its controls are at Normal, else drops.
24.	TCFCR	QN1, 8F.8B PICK UP	Train Coming From Cancellation Relay. Picks up at receiving station when CANCEL CO OP button is pressed at sending station else drops.
25.	TCFZR	QN1, 8F.8B PICK UP	Train Coming From Normal Proving Relay. Picks up at receiving station when TCFR drops, else drops
26.	TGTPR	QN1, 8F.8B PICK UP	Train Going To Normal Proving Relay. Picks up at train sending station when TGTR drops, else drops
27.	SHKR	QN1, 8F.8B PICK UP	Shunt Key Indicating Relay Picks up when EKT is "IN" & Shunt Release Key is "OUT", else drops
28.	AS GNCPR	QN1, 8F.8B PICK UP	Advance Starter Signal Normal checking (for other station) Relay Picks up when Advance Starter Signal and all its controls are Normal at the other station, else drops.
29.	BIPR1	QN1, 8F.8B TOGGLE	UFSBI health checks Relay.
30.	BIPR2	QN1, 8F.8B TOGGLE	UFSBI health checks Relay.
31.	BLR	QN1, 8F.8B DROP	Bell Relay Picks Up When Other Station Presses the Bell Button

9. Wiring of Relay Rack:

- I. The relay rack is wired using 16 / 0.2 wire conforming to specification IRS: S- 76 / 89 (latest).
- II. Every wire is terminated properly. Termination of wires is done on non-disconnecting type terminals of Phoenix / Wago make with DIN rail mounting arrangements.
- III. Individual termination is marked with a unique number for easy identification.

IV. Wiring of relay rack is properly bunched.

10. Indications on Block Panel:

SM's Block Panel for *Double Line* is provided with following illuminated indications

<p>LINE CLOSED Indication</p> <p>YELLOW</p>	<p>Circular indications (Two Numbers) in between the directional arrowhead.</p> <p>To indicate Block Section free from vehicles and LINE CLEAR not granted / received at train receiving / train sending station respectively.</p>
<p>TRAIN COMING FROM Indication</p> <p>a) GREEN</p> <p>b) FLASHING GREEN</p>	<p><i>In a directional arrowhead pointing downward for incoming traffic at train receiving station and a rectangular indication named TCF</i></p> <p>To indicate LINE CLEAR granted, when TRAIN GOING TO Button and BELL button have been pressed at sending station and the conditions for the granting of LINE CLEAR at receiving station have been complied with.</p> <p>To indicate:</p> <p>a) Block section clear after arrival of train, but associated Signals and their controls are not normal at either station or the LCB Key is OUT.</p> <p>b) Cancellation of LINE CLEAR before entry of train in Block Section.</p> <p>c) Block section clear after arrival of train, associated signals and their controls at normal at both stations but after unintentional insertion of Shunt Release Key "IN" when the train was in section</p>
<p>TOL indication</p>	<p><i>In a directional arrowhead pointing downward and a rectangular indication for incoming train at receiving station.</i></p>
<p>RED</p>	<p>To indicate TRAIN ON LINE on entry of incoming train on LINE CLEAR.</p>
<p>TRAIN GOING TO Indication</p> <p>a) GREEN</p> <p>b) FLASHING GREEN</p>	<p><i>In a directional arrowhead pointing upward for outgoing traffic at train sending station and a rectangular indication named TGT</i></p> <p>To indicate LINE CLEAR granted, when TRAIN GOING TO Button and BELL button have been pressed at sending station and the conditions for taking the LINE CLEAR have been complied with at both stations.</p> <p>To indicate:</p> <p>a) Block section clear after arrival of train, but associated Signals and their controls are not normal at either station or the LCB Key is OUT at receiving station.</p> <p>b) Cancellation of LINE CLEAR before entry of train in Block Section.</p>

TOL indication	<i>In a directional arrowhead pointing upward and rectangular indication for outgoing traffic at the train sending station.</i>
RED	To indicate TRAIN ON LINE on entry of outgoing train on LINE CLEAR.
Cancel CO-OP indication YELLOW	Indication to indicate co-operation extended by station at other end for cancellation of line clear by pressing Cancel Cooperation button.
CANCEL indication FLASHING YELLOW	Circular LED. To indicate progress of LINE CLEAR cancellation timer of 120 seconds. The indication lights up on pressing of CANCEL Button along with BELL button when, TRAIN COMING FROM displays with FLASHING GREEN indication.
SNK Indications YELLOW	Two such indications are provided. i) SNK: Yellow indication provided near TRAIN GOING TO directional arrowhead to indicate LAST STOP SIGNAL and its controls at ON / Normal.
SNOEK (SNK other end) YELLOW	i) Provided near TRAIN COMING FROM directional arrowhead to Indicate LAST STOP SIGNAL, Reception Signals and its controls at the station in rear are at ON / Normal. ii) Shunt Key of EKT at the other station is "IN"
Last Stop Signal (LSS) RED GREEN	Circular in monogram of signal. To indicate Last Stop Signal is at 'ON' To indicate Last Stop Signal is at 'OFF'
LINE FREE indication GREEN	An indication is provided near the arrowhead indication to show Block Section is clear of vehicles.
LINE OCCUPIED indication RED	An indication is provided near the arrowhead indication to show Block Section is occupied.
ACKN indication YELLOW	An Indication near ACKN button. To indicate SECTION buzzer ON status
SM KEY 'IN' indication GREEN	Indication near SM KEY. To indicate SM key "IN".
SHUNT Indication RED GREEN	To indicate Shunt Key of EKT is "OUT" To indicate Shunt Key of EKT is "IN"
UFSBI/MUX OK indication	GREEN when MUX is OK otherwise extinguished.
UFSBI/MUX FAIL indication	RED when MUX goes into a failure mode otherwise extinguished.
Communication LINK FAIL indication	Steady YELLOW when LINK FAILS else flickering.

11. Brief System Description & Working:

The Block Panel work in Absolute Block system incorporating Block Proving by Axle Counter to control the movement of trains on double line block section from one block station to another in a fixed direction. These working instructions are in conjunction with General Rules (GR) of 1976 and its amendment in 2002. These working instructions do not supersede any rule laid down in GR.

Principle of working

- The trains are worked on Absolute Block system
- Each block section is provided with an Axle Counter to verify the occupation or clearance of block section and indicated on Block Panel
- It is not possible to obtain Last Stop Signal to 'OFF' unless LINE CLEAR has been obtained from the station in advance
- It is not possible to take LINE CLEAR unless block section and an adequate distance beyond first stop signal of station in advance is clear of trains
- The Last Stop Signal assumes 'ON' aspect automatically on entry of train into block section and when so replaced, is maintained in its 'ON' position, till a fresh LINE CLEAR is obtained on block panel
- Block section show automatically Train on Line on panel when train enters into the block section on line clear.
- Train entry/exit buzzer, to/ from block section are provided and to be acknowledged
- Block section automatically closes on complete arrival of train at the receiving station
- A control to prevent the station in rear to take LINE CLEAR on its Block Panel without taking consent of receiving station.
- A control to cancel the LINE CLEAR, already taken by station in rear.
- It is possible to close the block section only, if no trains have entered the Block Section for at least 120 seconds after application of cancellation with co-operation from station in rear

12. Description of Block Panel for *Single line*

SM's Block Panel is provided with following **KEYS** for various functions.

SM key	SM/ASM/Switchman's control key. The key when out prevents the following operations: a) Transmission of BELL code b) Transmission of IS LINE CLEAR enquiry request c) Cancellation of LINE CLEAR
Shunt Release key	Shunt Release Key (normally OUT). The following operation is possible when IN, a) To take out SHUNT KEY from electric key transmitter (EKT), which serves as tangible authority for Driver to shunt beyond Last

	<p>Stop Signal up to First Stop Signal.</p> <p>b) The following operations are not possible when IN;</p> <p>(i) To take LINE CLEAR.</p> <p>(ii) Other side station to take LINE CLEAR.</p> <p>(iii) Closing of block.</p> <p>(iv) To take Last Stop Signal to "OFF".</p>
SM's Back Cover lock Key	To open or lock the back cover by SM/ASM/Switchman, when required by signal staff for maintenance or repairs.
Maintainer Back cover lock key	To open or lock the back cover by authorized signal staff, for maintenance or repairs, provided SM's back cover lock key.

SM's Block Panel is provided with following *PUSH BUTTONS* (non-locking type) & COUNTERS

BELL button (Black in colour)	<ul style="list-style-type: none"> To transmit BELL codes to station at other end of Block section. To take LINE CLEAR, when pressed along with TRAIN GOING TO button. <p>To cancel LINE CLEAR, when pressed along with CANCEL button.</p>
TRAIN GOING TO Button (Red in colour)	To transmit IS LINE CLEAR enquiry to station in advance for taking LINE CLEAR. It is used in conjunction with BELL button at train sending station to light up TRAIN COMING FROM (GREEN) indication on Block Panel of receiving station, which in turn automatically grants LINE CLEAR to light up and TRAIN GOING TO (GREEN) indication on Block Panel of sending station.
ACKN button (Black in Colour)	<p>Two such buttons are provided, one each for despatch line and receive line.</p> <ul style="list-style-type: none"> To mute the SECTION buzzer on occupation or clearance of block section.
Cancel Co-op Button (Green in colour)	To give co-operation from sending station to cancel the line clear at receiving station.
CANCEL Button (Yellow in colour)	<p>It is used in conjunction with BELL button at train receiving. Station under following conditions:</p> <p>a) There is no Train in the block section and Line clear cancellation needs to be done.</p> <p>b) Complete train has been pushed back at train sending station.</p>
Cancellation Counter	To register cancellation of line clear.

13. Method of Signalling Trains from Block Station to Block Station

- a) SM of the station intending to send a train from his station has to obtain verbal consent from station at other end before taking LINE CLEAR on its Block Panel.
- b) Before a request for IS LINE CLEAR is sent to station at other end, SM shall ensure the following on its Block Panel:
 - i) LINE CLOSED indication YELLOW &
 - ii) LINE FREE indication GREEN &
 - iii) SNK indication YELLOW &
 - iv) SNOEK indication YELLOW &
 - v) SHUNT KEY indication GREEN
- c) The station at other end while granting his consent shall ensure the following on its Block Panel;
 - i) LINE CLOSED indication YELLOW &
 - ii) LINE FREE indication GREEN &
 - iii) SNK indication YELLOW &
 - iv) SNOEK indication YELLOW &
 - v) SHUNT KEY indication GREEN
- d) Thereafter SM of sending station presses BELL & TRAIN GOING TO buttons.
- e) The directional arrowhead, TRAIN GOING TO/ TRAIN COMING FROM lights up green at sending/receiving station respectively.
- f) SM of sending station releases BELL & TRAIN GOING TO buttons on getting TRAIN GOING TO green indication.
- g) The sending station SM, after obtaining LINE CLEAR on its Block Panel, can send a train into Block Section by taking the LSS to 'OFF'. On entry of train into section, TRAIN ON LINE lights up at both the stations near arrowhead indication. The TRAIN GOING TO / TRAIN COMING FROM Arrow Head Indications turns RED in respective stations. SECTION buzzer sounds at both the stations along with ACKN indicator near ACKN button. Pressing of ACKN will turn off the buzzer and ACKN indicator.
- h) The train is received at receiving station on proper reception signals. On complete arrival of train, TRAIN COMING FROM indicator changes to FLASHING GREEN & LINE FREE indicator turns to GREEN at both the stations. TRAIN GOING TO /TRAIN COMING FROM indicator continues FLASHING GREEN at sending / receiving station respectively if reception & departure signals and their controls are not at normal or SHUNT KEY of EKT is 'OUT'. In case reception & departure signals and their controls are at normal & SHUNT KEY of EKT is 'IN' at sending/receiving station, TRAIN GOING TO/ TRAIN COMING FROM turns off and LINE CLOSED indicator lights up YELLOW.

14. Sequence of operations of signalling a train between two stations

If the block section is clear and the 'LINE CLOSED' indication is displayed on Block Panel at both the stations, the action is taken by the sending station SM as under:

SENDING STATION		RECEIVING STATION	
1.	SM ensures LINE CLOSED indication YELLOW, SNK indication YELLOW, SNOEK indication YELLOW, LINE FREE indication GREEN SM inserts SM key & turns to IN . a) SM sends 'Call Attention' signal to receiving station by pressing BELL button.	2.	SM inserts SM key & turns to IN (a) SM acknowledges the 'Call Attention' signal by pressing BELL button.
3.	SM sends 'Attend Telephone' signal by pressing BELL button.	4.	SM acknowledges by pressing BELL button and attends telephone.
5.	SM attends telephone and advises station at other end about the intended movement of the train on telephone & asks for LINE CLEAR after prescribed BELL code.	6.	c) Exchanges information regarding train movement and ensures LINE CLOSED indication YELLOW, SNK indication YELLOW, SNOEK indication YELLOW, LINE FREE indication GREEN & SHUNT KEY indication GREEN & d) Grants verbal LINE CLEAR.
7.	SM presses BELL & TRAIN GOING TO buttons until 'TRAIN GOING TO' arrowhead indication lights up GREEN. (If aforesaid indicator does not appear after 3 seconds (approx.) of pressing the buttons, SM releases the buttons and rechecks conditions at his station and asks station at other end to recheck the conditions for grant of LINE CLEAR.)	8.	'LINE CLOSED' indicator turns off and 'TRAIN COMING FROM' arrowhead indication lights up GREEN .
9.	'LINE CLOSED' indicator turns off. 'TRAIN GOING TO' arrowhead indication lights up GREEN. Releases BELL & TRAIN GOING TO buttons.		

	SENDING STATION		RECEIVING STATION
10	<p>Takes LSS to `OFF'.</p> <p>Train enters the Block Section.</p> <p>LSS replaces to `ON'.</p> <p>LINE OCCUPIED indicator turns to RED.</p> <p>SECTION buzzer starts ringing & `TRAIN GOING TO' arrowhead indication turns RED. ACKN indicator lights up.</p> <p>Acknowledges the buzzer by pressing ACKN button. ACKN indicator turns off.</p> <p>Puts back the LSS controls to Normal.</p> <p>Ensures SNK lights up YELLOW .</p>	11	<p>LINE OCCUPIED indicator turns to RED .</p> <p>SECTION buzzer starts ringing & `TRAIN COMING FROM' arrowhead indication turns RED. ACKN indicator lights up.</p> <p>Acknowledges the buzzer by pressing ACKN button. ACKN indicator turns off.</p> <p>SNOEK lights up YELLOW</p> <p>Takes reception signal `OFF' to receive the train.</p> <p>Train passes Home Signal.</p> <p>Home Signal replaces to `ON'.</p> <p>Train clears the Block Section.</p>
13	<p>SECTION buzzer starts ringing. ACKN indicator lights up .</p> <p>LINE FREE indicator turns to GREEN</p> <p>`TRAIN GOING TO' arrowhead indication turns to FLASHING GREEN.</p> <p>Acknowledges the buzzer by pressing ACKN button. ACKN indicator turns off.</p>	12	<p>SECTION buzzer starts ringing. ACKN indicator light up & LINE FREE indicator turns to GREEN. `TRAIN COMING FROM' arrowhead indication turns to FLASHING GREEN.</p> <p>Acknowledges the buzzer by pressing ACKN button. ACKN indicator turns off.</p>
15	<p>SNOEK lights up yellow.</p> <p>`TRAIN GOING TO' arrowhead indication turns off.</p> <p>`LINE CLOSED' indicator lights up.</p>	14	<p>Replaces all controls pertaining to reception of train to Normal.</p> <p>SNK lights up YELLOW.</p> <p>`TRAIN COMING FROM' arrowhead indication turns off.</p> <p>`LINE CLOSED' Indicator lights up.</p>

15. Refusal to 'Line Clear Enquiry'

When a block section is blocked by the presence of a train in the section or train parting or shunting or opening of level crossing in mid section or for any other reason, the SHUNT key of EKT shall be taken out and kept in safe custody.

If the block station at other end refuses the IS LINE CLEAR enquiry signal, no train shall be allowed to leave until a fresh IS LINE CLEAR enquiry signal has been given to block station at other end and accepted.

On removal of obstruction, the Shunt Key of EKT shall be inserted and turned to IN position and the Shunt Release Key should be taken OUT. SM shall immediately inform SM of other end about the fact, so as to enable him to send a fresh IS LINE CLEAR signal.

16. Closing of Block after a "Push Back" operation

After a train has been pushed back at the sending station, the sending station advises the receiving station. The receiving station can close the section by pressing BELL and CANCEL button after getting cooperation from the other end station.

17. Method of "Push back" operation

SENDING STATION		RECEIVING STATION	
1.	Train clears the Block Section. LINE FREE indicator turns GREEN. SECTION buzzer starts ringing. ACKN indicator lights up.	2.	Train clears the Block Section. LINE FREE indicator turns GREEN. SECTION buzzer starts ringing. ACKN indicator lights up.
	'TRAIN GOING TO' arrowhead indication turns to FLASHING GREEN.		'TRAIN COMING FROM' arrowhead indication turns to FLASHING GREEN.
	Acknowledges the buzzer by pressing ACKN button. ACKN indicator turns off.		Acknowledges the buzzer by pressing ACKN button. ACKN indicator turns off.
3.	Advises receiving end station SM about cancellation on telephone after prescribed BELL code.	4.	Agrees to request, ensures SNK indicator YELLOW, SNOEK indicator YELLOW, SHUNT KEY indicator GREEN and Gives consent on telephone after prescribed BELL code
5.	After verbal consent from other end SM Ensure SNK indication YELLOW, SNOEK indication YELLOW, SHUNT KEY indication GREEN	6.	

	Presses CANCEL CO-OP button and releases on receipt of BELL code.		CO-OP to light up YELLOW. Presses BELL & CANCEL button with SM key IN. CANCEL COUNTER increments. CANCEL indication lights up FLASHING YELLOW & continues flashing for 120 seconds.
8.	TRAIN GOING TO arrowhead indication turns off. LINE CLOSED indication lights up.	7.	On expiry of 120 seconds, TRAIN COMING FROM arrowhead indication and CANCEL indication turns off. `LINE CLOSED` indication lights up.

18. Block Back Operation

The SM, who intends to Block Back the line, shall inform the SM of station at other end on telephone for permission to Block Back, who will acknowledge the message and grant permission supported by a private number. SM takes SHUNT key of EKT OUT and keeps in safe custody. The SM will then issue necessary authority to driver of train to perform shunting in Block Section.

On completion of shunting, section clear message will be sent to SM of station at other end on telephone about obstruction removed supported by a private number, who in turn will acknowledge the same supported by a private number. Thereafter SM will insert SHUNT key of EKT and turn to `IN` position and takes out the shunt release key.

All the entries in Train Signal Register (TSR) for this operation should be make in RED ink. The reasons for Block Back shall be recorded in remarks column against each entry.

	Station in rear		Station intending BLOCK BACK
2.	Block Panel displays; LINE CLOSED - YELLOW LINE FREE - GREEN SNOEK - YELLOW SHUNT KEY - GREEN	1.	Block Panel displays; LINE CLOSED - YELLOW LINE FREE - GREEN SNOEK - YELLOW SHUNT KEY - GREEN
4.	Acknowledges call attention / attend telephone signal.	3.	Inserts SM key & turns, Gives call attention / attend telephone signal.
6.	Attends telephone.	5.	Attends telephone.
8.	Acknowledges & gives consent by private number.	7.	Inform intention to perform shunting in Block Section.
10.	SNOEK turns off.	9.	Takes Shunt Key 'OUT' from EKT and keeps in safe custody. Issue necessary authority to driver of train to perform shunting in Block Section. SHUNT KEY indication turns to RED.

	Station in rear		Station intending BLOCK BACK
12.	On entry of train in Block Section, SECTION buzzer starts ringing & ACKN indication lights up.	11.	On entry of train in Block Section, SECTION buzzer starts ringing & ACKN indication lights up.
	LINE OCCUPIED indication turns to RED. LINE CLOSED indication turns off.		LINE OCCUPIED indication turns to RED. LINE CLOSED indication turns off.
	Acknowledges the buzzer by pressing ACKN button. ACKN indication turns off.		Acknowledges the buzzer by pressing ACKN button. ACKN indication turns off.
14.	On clearing of Block Section. SECTION buzzer starts ringing & LINE CLOSED indication lights up. ACKN indication lights up.	13.	On clearing of Block Section. SECTION buzzer starts ringing & LINE CLOSED indication lights up. ACKN indication lights up.
	LINE FREE indication turns to GREEN. LINE CLOSED indication lights up YELLOW.		LINE FREE indicator turns to GREEN. LINE CLOSED indication lights up YELLOW.
	Acknowledges the buzzer by pressing ACKN button. ACKN indication turns off.		Acknowledges the buzzer by pressing ACKN button. ACKN indication turns off.
16.	Acknowledges call attention /attend telephone signal.	15.	On completion of shunting, SM verifies the line between opposite STARTER (if any)/ Shunt signal or Stop Board/ Fouling mark and FSS, free from any vehicle. Inserts SM key & turns, Gives call attention / attend telephone signal.
18.	Attends telephone.	17.	Attends telephone.
20.	Acknowledges supported by a private number.	19.	Inform shunting is completed supported by a private number.
22.	SNOEK lights up YELLOW.	21.	Inserts SHUNT KEY of EKT & turns to 'IN'. SHUNT KEY indication turns to GREEN.

19. Shunting of train

Where shunt signals are not provided for shunting on line leading towards Block section, the driver of shunting train shall be given shunting order at the foot of STARTER SIGNAL /STOP BOARD/FOULING MARK before allowing any shunting. While shunting, the LAST STOP SIGNAL should be kept at ON.

□ **Shunting of Train up to Last Stop Signal**

SHUNT KEY of EKT shall be taken OUT and kept in safe custody. The driver of shunting train shall be given shunting order to shunt up to LSS. On completion of shunting, the line between STARTER/ Shunt Signal/ Stop Board/ Fouling mark and LSS should be checked free from any vehicle. SHUNT KEY of EKT shall be inserted and turned to IN position.

When an IS LINE CLEAR enquiry is received from Block Station at other end of block section, permission for shunting up to LSS shall be granted only after compliance of GR 8.09 & 8.10 and as permitted by Station Working Rules (SWR).

□ **Shunting behind a train**

Shunting behind a train should be performed with message to station at other end. SM shall take out SHUNT KEY of EKT after entry of train beyond LSS and hand over to Driver of shunting train along with shunting order.

On completion of shunting, Driver of shunting train hands over SHUNT KEY of EKT to SM. SM ensures clearance of line between STARTER/ Shunt Signal/ Stop Board / Fouling mark and LSS from any vehicle. The message regarding completion of shunting shall be sent to station at other end.

SM inserts SHUNT KEY of EKT and turns to IN position.

In case train arrives at station at other end before completion of shunting, TRAIN GOING TO/ TRAIN COMING FROM arrowhead indication will remain at RED, till shunting train clears the section. During such period line shall be BLOCKED BACK as per procedure laid down in the specification (RDSO/SPN/188/2004) at Cl. 9.5.

□ **Shunting Of Train Beyond Last Stop Signal**

The shunting is done under protection of Block Forward only.

□ **Shunting Of Train in face of an approaching Train**

Shunting in face of an approaching train, towards LSS, where permitted in SWR by special instructions, can be performed. The driver of shunting train shall be given shunting order to shunt up to LSS. On completion of shunting, the line between STARTER/ SHUNT SIGNAL/ STOP BOARD / FOULING MARK and FIRST STOP SIGNAL should be checked free from any vehicle.

Shunting in face of an approaching train, beyond LSS and up to FSS can be performed only, when approaching train has been brought to a stop at FSS of the station. Whenever such shunting is to be performed, SM key shall be taken OUT and kept in safe custody. The driver of shunting train shall be given shunting order to shunt up to FSS. On completion of shunting, the line

between STARTER/ SHUNT SIGNAL/ STOP BOARD / FOULING MARK AND FSS SIGNAL should be checked free from any vehicle and only then SM key shall be inserted and turned to IN position.

- **Shunting of Train beyond LSS in cases other than shunting behind a train or shunting in face of approaching train**

The shunting should be done under protection of Block Back only.

20. Block failures and action to be taken:

The block failures can be categorized into the following:

- **Failure of BLOCK PANEL**

Block panel should be considered to be defective and should not be restored for normal working until tested by competent signal staff & certified fit by them for use after the under-mentioned cases except for the case of Communication Link Failure (steady yellow indication). After the Communication Link Failure indication becomes flickering again block panel operation can be restored.

	TYPE OF FAILURE	ACTION TO BE TAKEN
1.	When no indication of any sort, at all appears on the block panel or;	For case 1-11, Block Panel should be treated as defective block working suspended & trains should be dealt with by taking LINE CLEAR on the electrical communication equipment provided and by provisions of GR 14.13 & SR there under, if any.
2.	When the Bell Code signals are received indistinctly or;	
3.	Any damage is seen or reported to block panel or;	

	TYPE OF FAILURE	ACTION TO BE TAKEN
4.	When no train has entered into the block section but the 'LINE FREE/OCCUPIED' indicator changes to RED and this indication persists even after Resetting of Axle counter has been tried or;	
5.	When 'TRAIN GOING TO' or 'TRAIN COMING FROM' arrowhead indications does not appear by appropriate action though condition for asking 'LINE CLEAR' and granting permission to approach are available and LINE CLOSED 'YELLOW' is maintained or;	
6.	When a train arrives at the receiving station or pushes back at sending station, but Block Panel still shows 'TRAIN COMING FROM & TRAIN GOING TO' RED arrowhead indication or;	
7.	TRAIN GOING TO or TRAIN COMING FROM arrowhead indication does not turn to RED to give TRAIN ON LINE on the entry of train into Block Section at either of the stations or;	
8.	When a train has arrived at the receiving station but the Block Panel shows FLASHING GREEN indication even after ensuring SNK , SNOEK & SHUNT key indicator GREEN or;	
9.	When, after a Line Clear cancellation, CANCEL indicator does not light up FLASHING YELLOW or lights up steady YELLOW after appropriate actions or;	
10.	When UFSBI/Mux Fail indication appears.	
11.	When Communication Link Fail indication becomes steady yellow.	

	TYPE OF FAILURE	ACTION TO BE TAKEN
12.	When LSS cannot be kept at 'ON' during its suspension /disconnection. or;	In addition to action taken for case 1-11, all efforts should be made to keep the LSS at ON position. If it is not possible, then a competent railway servant should be deputed with RED hand signal at the foot of the LSS to warn the drivers of approaching trains.
13.	When LSS of the station does not go back to 'ON' position on the entry of a train into the Block Section	In addition, all trains in the relevant direction should be stopped at Home signal and after ensuring that they have come to a stop, the Home signal should be cleared to caution aspect only.
		To dispatch a train, STARTER signal should not be taken OFF until issue of relevant authority to pass LSS & Caution order should also be issued to the driver about the defect of LSS.
14.	Total failure of communication during which train shall be worked as per extent rules in force on the Railway	In addition to action taken for case 1-13, the trains should be dealt with under the extent rules as laid down in GR 14.13 & SR there under

□ **Failure Of Last Stop Signal & Action To Be Taken**

	Cause of failure of the LSS	Action to be taken
1.	When it cannot be taken OFF even though LINE CLEAR has been obtained; or;	The LSS should be considered to have failed & failure shall be informed to Signal staff immediately. The LINE CLEAR shall be obtained on the BLOCK PANEL & Line Clear ticket/Paper line clear as prevalent on railway shall be issued to driver of train
2.	When it can be cleared without obtaining LINE CLEAR; or;	The LSS should be considered to have failed & failure shall be informed to Signal staff immediately and follow Cl. 9.7.1. 13 - 9.7.1.14
3.	It does not restore to ON position on entry of train into Block Section	

□ Suspension Of Block Working & Action To Be Taken

	Cause of Suspension	Action to be taken
1.	When material lorry, Rail-cum-Road vehicle, Motor trolley, Tie-tamping machines, Rail Motor/Bus or Tower wagon (4 wheeler) has to run in the section.	BLOCK PANEL shall be suspended. These vehicles shall be worked on PAPER LINE CLEAR.
2.	An accident takes place in the mid section.	BLOCK PANEL shall be suspended, if any line adjacent to line controlled by it is reported to be infringing, till the infringement exists. LSS shall be treated as INOPERATIVE & FAILED.
3.	When any part of Block Panel is opened or removed for repairs under duly accepted disconnection notice.	BLOCK PANEL shall be suspended. LSS shall be treated as INOPERATIVE & FAILED.
4.	When LSS of the station has been taken by Signal staff for repairs.	LSS shall be treated as INOPERATIVE & FAILED.
5.	During Block FORWARD.	LSS shall be treated as INOPERATIVE & FAILED.

When the cause of suspension of BLOCK PANEL and/or LSS is removed, SM shall restore the normal working of BLOCK PANEL / LSS, as the case may be.

c) Technical details of Block equipment working with UFSBI: TO DISPATCH A TRAIN

AT SENDING STATION		AT RECEIVING STATION	
<p><i>The following relays are normally energized in LINE CLOSED</i> ASGNCR↑, AZTR↑, B TSR↑, ASGN CPR↑, SHKR ↑, HSGNCR↑ <i>The following indications are ON</i> LINE CLOSED – Yellow, SNK-Yellow, SNOEK-Yellow, LINE FREE – green, Shunt Key Green, Last Stop Signal – Red</p>		<p><i>The following relays are normally energized in LINE CLOSED</i> B TSR↑, HSATPR↑, HSBTPR↑, HSGNCR↑, AZTR↑, ASGNCR↑, ASGN CPR↑, SHKR ↑ <i>The following indications are ON</i> LINE CLOSED –Yellow, SNK-Yellow, SNOEK-Yellow, LINE FREE-Green, Shunt Key Green, Last Stop Signal – Red</p>	
1	<p>d) The SM at sending station inserts its SM key and turns to IN position. SM Key – Green. b) Presses BELL button. BPNR↑ and TRAIN GOING TO button. TGTNR↑. c) TGTXR relay picks up, provided the conditions for receiving LINE CLEAR exist and transmits LINE CLEAR enquiry. Waits for 'TRAIN GOING TO' Indication to light up GREEN.</p>	2	<p>a) TCFXR picks up. b) TCFR operates and latches, provided the conditions for granting LINE CLEAR exist. c) 'LINE CLOSED' turns 'OFF'. d) TCFK (G) "TRAIN COMING FROM" indication GREEN turns 'ON'. e) Sends LINE CLEAR granted code.</p>
3	<p>a) TGTYR picks up. b) TGTZR↓. c) TGTR picks up and latches and TGTXR↓. d) "LINE CLOSED" indication turns 'OFF'. e) TGTK (G) "TRAIN GOING TO" indication lights up GREEN. f) Releases BELL and TRAIN GOING TO buttons. BPNR↓ TGTNR↓. g) Advance Starter signal can be taken 'OFF' by SM control. ASGNCR↓, ASCR↑, SNK OFF, LSS – Green.</p>	4	<p>TCFXR↓. ASGN CPR↓, SNOKE turns OFF.</p>

AT SENDING STATION		AT RECEIVING STATION	
5	<p>a) Train enters Block Section ASCR↓, AZTR↓, BTSR↓.</p> <p>b) LINE OCCUPIED indication turns RED.</p> <p>c) TGTK (G) indication changes to TGTK®. LSS – Red.</p> <p>d) SECTION Buzzer sounds with indication near ACKN button.</p> <p>e) SM presses ACKN to silence the SECTION buzzer and turn 'OFF' aforesaid indication.</p> <p>f) TGTYR↓.</p> <p>g) Restores all Signal controls to Normal. ASGNCR↑, SNK-Yellow</p> <p>h) Train in section.</p>	6	<p>a) Train enters Block Section.</p> <p>b) AZTR↓, BTSR↓.</p> <p>c) LINE OCCUPIED indication turns RED.</p> <p>d) TCFK (G) indication changes to TCFK®.</p> <p>e) SECTION Buzzer sounds with indication near ACKN button.</p> <p>f) SM presses ACKN to silence the SECTION buzzer and turn 'OFF' aforesaid indication.</p> <p>g) ASGNCR↓, SNOKE- YELLOW.</p> <p>h) Train in section.</p>
		7	<p>a) Train is received by reversing the Home Signal Lever, HSGNCR↓, SNK- 'OFF'.</p> <p>b) Train occupies HSAT, HSATPR↓, TAR1↑ and sticks.</p> <p>c) Train occupies HSBT, HSBTPR↓ and clears HSAT, HSATPR↑ TAR2↑ and sticks.</p> <p>d) TAR1↓.</p> <p>e) AZTR↑, Line Free Green.</p> <p>f) SECTION Buzzer sounds with indication near ACKN button.</p> <p>g) SM presses ACKN to silence the SECTION buzzer and turn 'OFF' aforesaid indication.</p> <p>h) FR1 and FR2 operate to give flashing indications.</p> <p>i) TCFK® changes to TCFK (flashing green).</p>
8.	<p>a) AZTR↑.</p> <p>b) LINE FREE indication turns GREEN.</p> <p>c) FR1 and FR2 operate to give flashing indications.</p> <p>d) TGTK® changes to TGTK (flashing green).</p>	9.	<p>a) Normalizes all controls to pick up HSGNCR.</p> <p>b) Waits for TGTZR to pick up and on its pick up, de-latches TCFR.</p> <p>c) BTSR↑.</p> <p>d) LINE CLOSED indication turns ON.</p> <p>e) TCFK (flashing green) turns OFF.</p>

AT SENDING STATION		AT RECEIVING STATION	
10	a) TGTR↓, TGTZR↑. b) LINE CLOSED indication turns ON. c) TRAIN GOING TO (Flashing Green) indication turns OFF.		

22. Method Of Line Clear Cancellation

After a train sending station has taken line clear, the receiving station can carry out line clear cancellation with the consent of other end station. Sending station puts back LSS to "ON", if already taken "OFF" and its control to normal ensures SNK at "YELLOW". Sending station extends co-operation by pressing CANCEL CO-OPERATION button.

On receipt of co-operation indication, receiving station presses bell and cancel button with SM KEY "IN". Receiving station observes cancel indication to light up flashing yellow and releases the buttons. TRAIN GOING TO/ TRAIN COMING FROM Arrow Head Indication turns to flashing green at sending/ receiving station respectively. After 120 seconds LINE CLOSED indication lights up "YELLOW". TRAIN GOING TO/ TRAIN COMING FROM Arrow Head Indication and cancel indication extinguishes.

Method of Cancellation

SENDING STATION		RECEIVING STATION	
1.	PUTS back LSS to `ON`, if already taken `OFF, ensures SNK at YELLOW, Advises receiving end station SM about cancellation on telephone after prescribed BELL code.	2.	Agrees to request, ensures SNK at YELLOW and SNOEK at YELLOW and gives consent on telephone after prescribed BELL code.
3	After verbal consent from other end SM, presses cancel co-operation button and releases on receipt of bell code.	4.	Waits for co-operation light up yellow and presses, bell & cancel button with SM key IN. Cancel counter increments. TRAIN COMING FROM indication turns to flashing green. Cancel indication lights up flashing yellow & continues flashing for 120 seconds.
5.	'TRAIN GOING TO' indication turns flashing green.		
7.	'TRAIN GOING TO' Indication turns off LINE CLOSED indication lights up.	6.	On expiry of 120 seconds, TRAIN COMING FROM Indication & cancel indication turns off. LINE CLOSED indication lights up.

II) UNIVERSAL FAIL-SAFE BLOCK INTERFACE (UFSBI)

1. System Description

The system requirement specification of the "Universal Fail-safe Block Interface (UFSBI)" equipment has been described in RDSO specification SPN/147/97 (Annexure A). The functionalities are elaboration of the general requirements contained RDSO specification SPN/147/97.

The environment conditions under which the system will operate are described in SPN/147/97.

□ **General:**

The UFSBI system acting as multiplexer for communicating the commands to one block panel to other in a fail safe manner to transfer block instrument signals (DC and analog FM signals converted to status) to the other end. The communication is full duplex. The medium of communication is digital channels of Optical fibre or copper cable.

The mux with its accessories, Interlocking relays and power supply are housed in a cubicle, called UFSBI-Cubicle.

□ **Technical:**

- a) The equipment is capable of driving safety-signaling relays conforming to specification BRS: 930 (Q – Series relays).
- b) The equipment is capable of working on Telecom Cable as well as Voice/Data Channel provided over Optical Fibre.
- c) The coding of signal transmission takes care of types of noise generally encountered in the transmission system and ensures safety of operation against these noises.
- d) Each equipment in the section has a unique address, which is settable through back-panel jumpers. Please refer "UFSBI Address Configuration Jumpers" given later in this manual.
- e) The information exchanged between the pair of the interface equipment contains the source & destination address.
- f) Wrongly addressed information packets are promptly rejected by the system and frequent receipt of such packets is detected as link failure by the system.
- g) The bell of the Block Instrument work on voice channel i.e. block telephone. Alternatively, the bell may be worked through the MUX terminal. Please refer relay logic diagrams.
- h) The telephone will work on a separate voice channel.
- i) The system works on 24V DC + 20% - 10%.
- j) A push button is provided for resetting UFSBI inside the cubicle on a reset box. The resetting system is provided with a veeder counter to count the number of reset action.

□ Internal Power Supply specifications

DC-DC Converter is provided to derive the necessary voltages to operate the UFSBI from the external 24V source. These internal power supplies are in hot standby mode.

The system operates with nominal 24V DC input supply. DC-DC Converter derives different supplies from the input. The specifications for the power supply are shown in the

Table below:

Input	V DC \pm 20% - 10%
Output	a) 24V DC 4 Amps b) 5V DC 4 Amps c) +12V DC 1.5 Amps d) -12V DC 1 Amp

The features of the power supply are:

- i) Input-output isolation.
- ii) Input over voltage and under voltage protection.
- iii) Output short circuit and over load protection.
- iv) 24V DC output is isolated from other outputs.
- v) Ripple is less than 50mv at rated value.
- vi) Efficiency is more than 70%.
- vii) Is capable to work in "HOT STAND-BY" mode.

□ Modem Specifications

Asynchronous 2400 bps, V.22 BIS, 4 wire, leased line modem is used to interface UFSBI-MUX serial data to voice-channel provided by the Railway.

- Allowable Channel Loss: 25 dB (max.) between 2 modems
- Transmit Power: -5 dBm (maximum)
- Receive Level: -30 dBm (minimum)

2. Hardware Architecture

The following figure shows the front and back views of the Block Proving with Axle Counter using UFSBI along with its components.

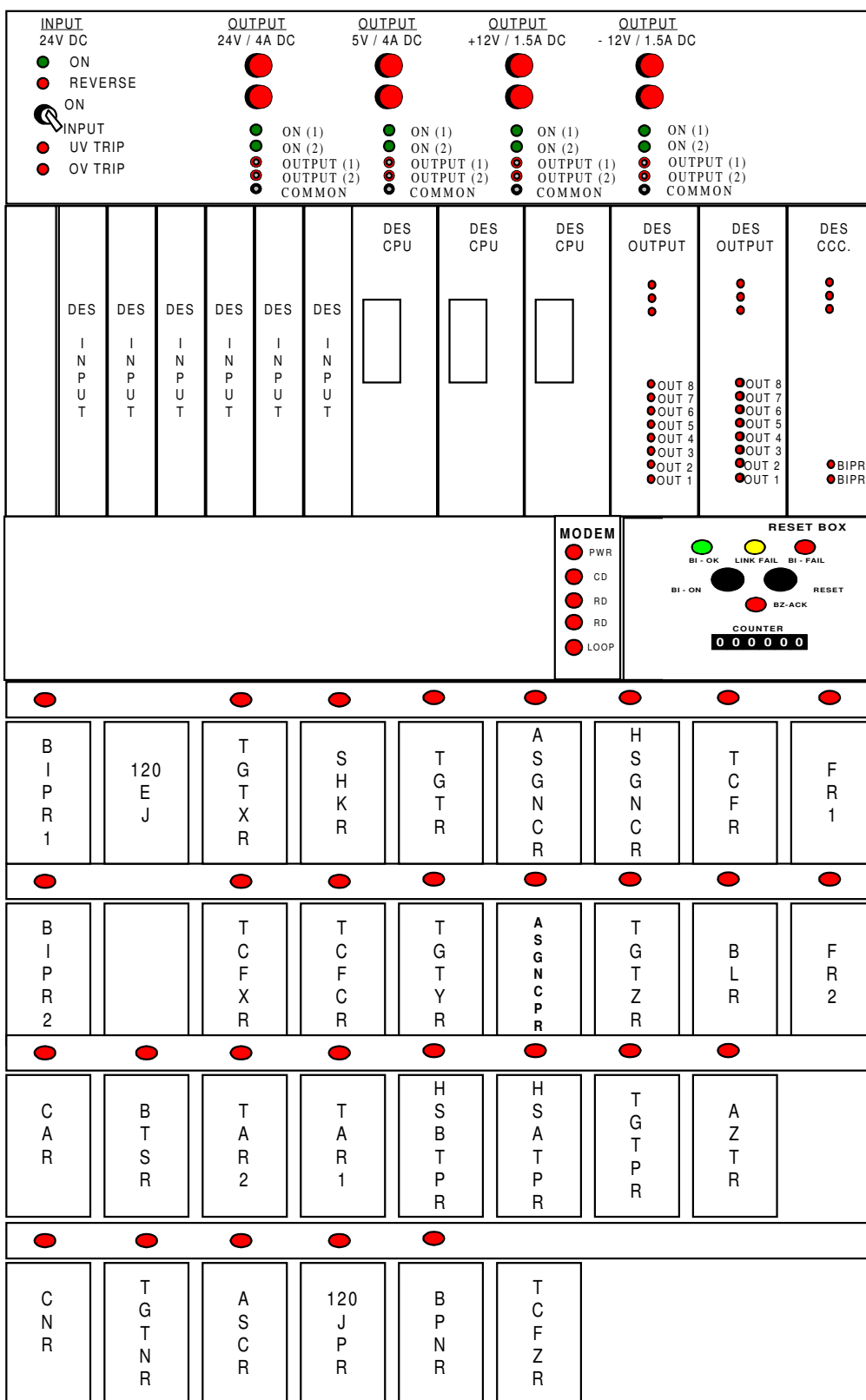


Fig. Front View of Relay Rack with UFSBI For Single Line

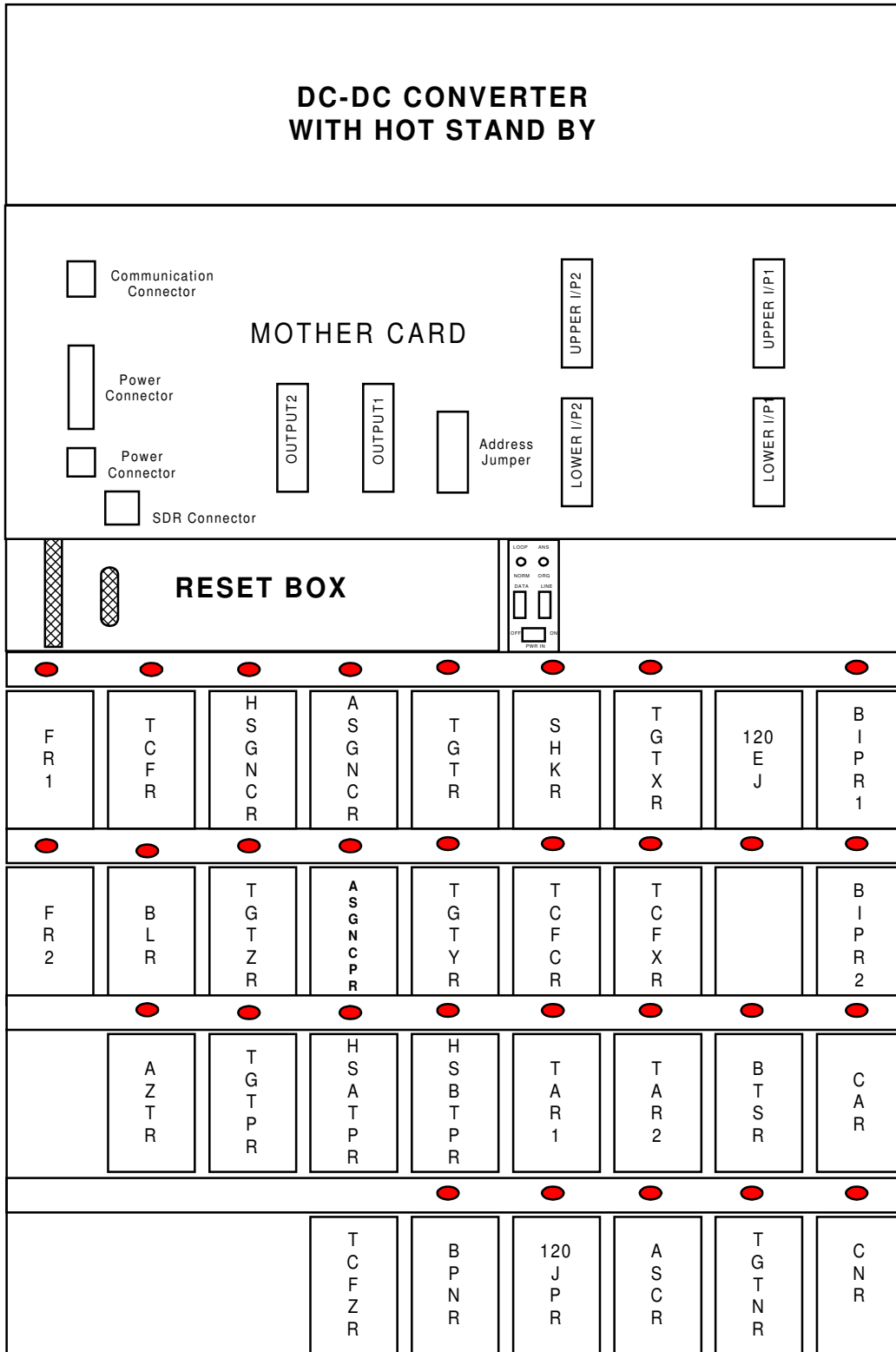


Fig. : Backview of Relay Rack With UFSBI For Single Line

3. Identification of Electronic Cards

The system consists of 6 Input Cards, 3 CPU Cards, 2 Output Cards and 1 Control & Communication Card. All these cards are mounted inside a 6U rack. The mounting arrangement and identification of the respective cards are shown in the fig. 1.3 given below:

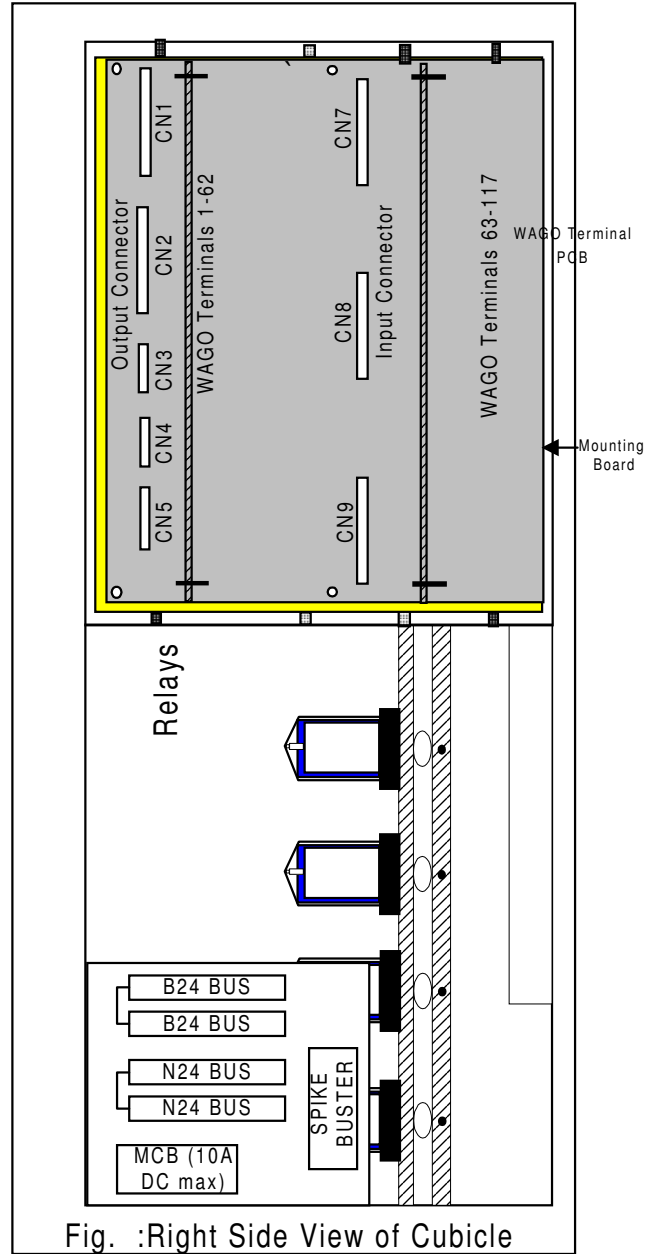
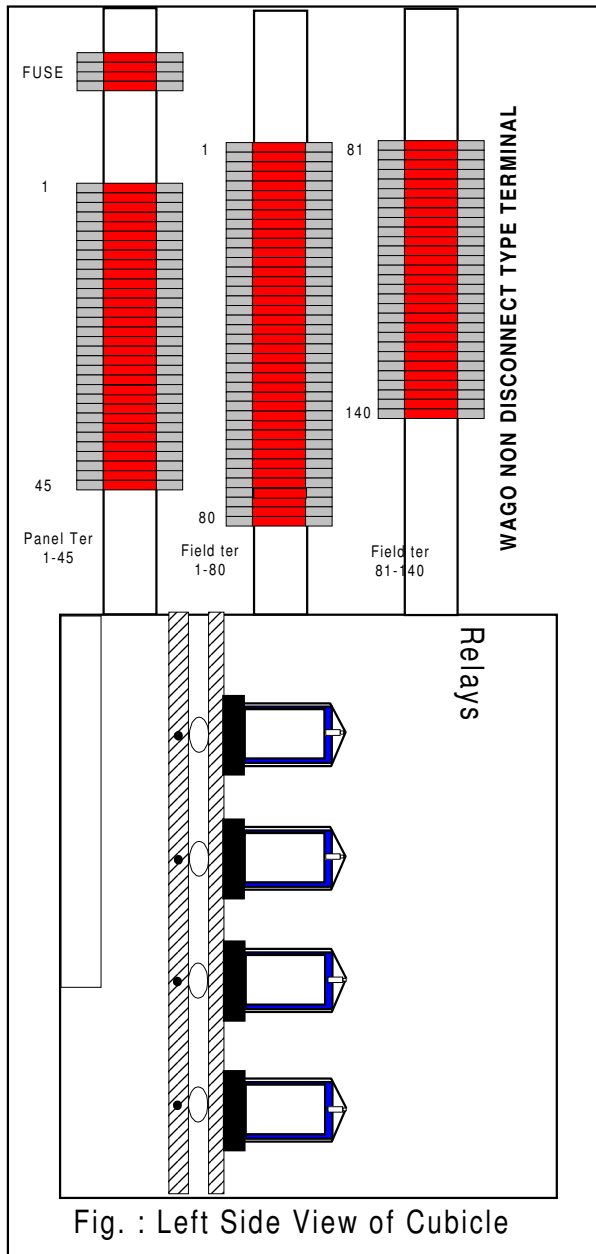


Fig.: Identification of Cards in 6-U Rack

Legends Used	Description
A	Input Card1 for CPU-A
B	Input Card2 for CPU-A
C	Input Card1 for CPU-B
D	Input Card2 for CPU-B
E	Input Card1 for CPU-C
F	Input Card2 for CPU-C
G	CPU – A
H	CPU – B
I	CPU – C
J	Output Card1
K	Output Card2
L	Control & Communication Card

4. Identification of Terminals and Connectors

The identification of Terminals and Connectors as seen from the right and left side respectively are given below in the following figures:



5. Connectivity

Back panel Connectors to Wago Terminals

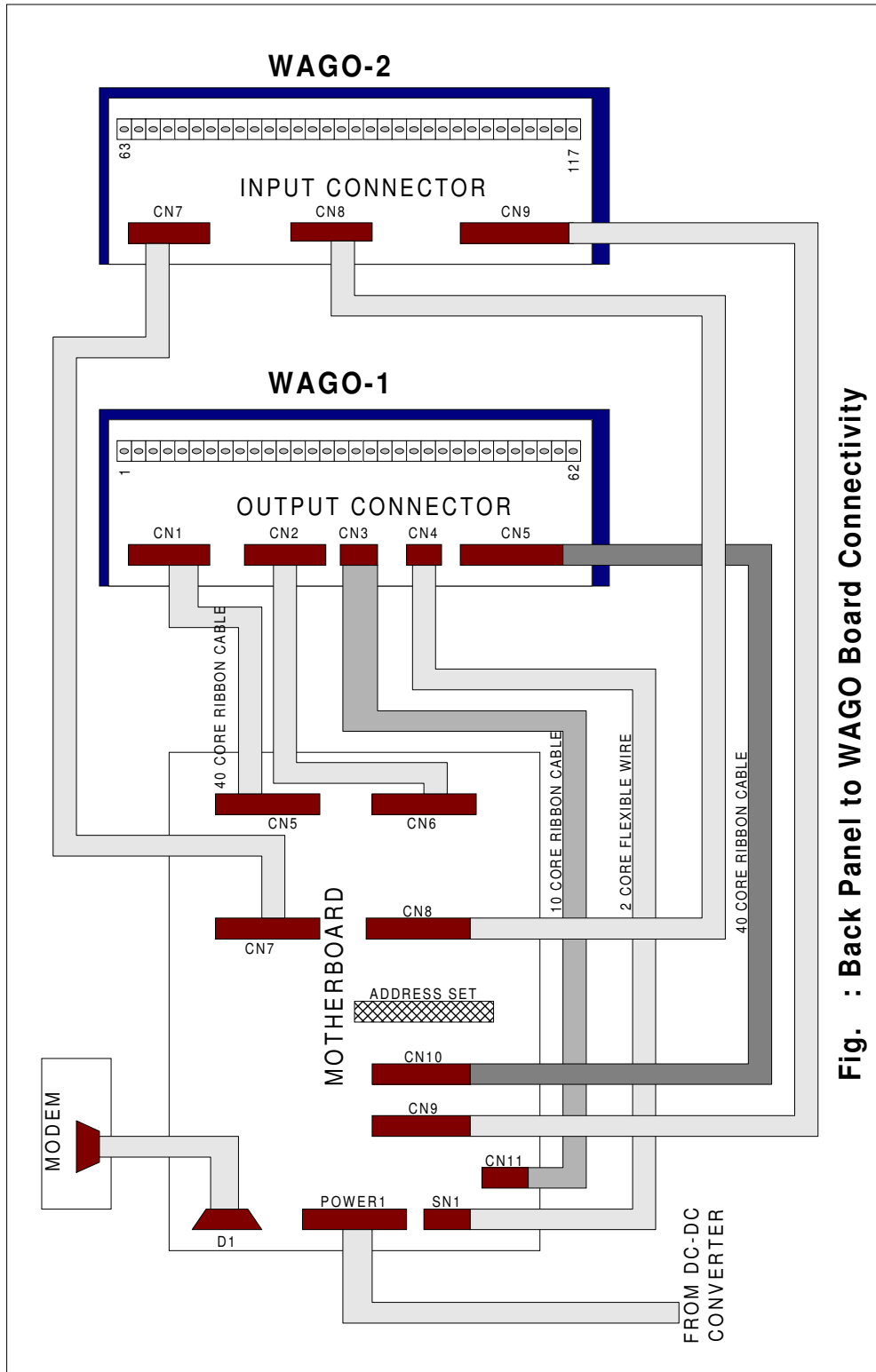
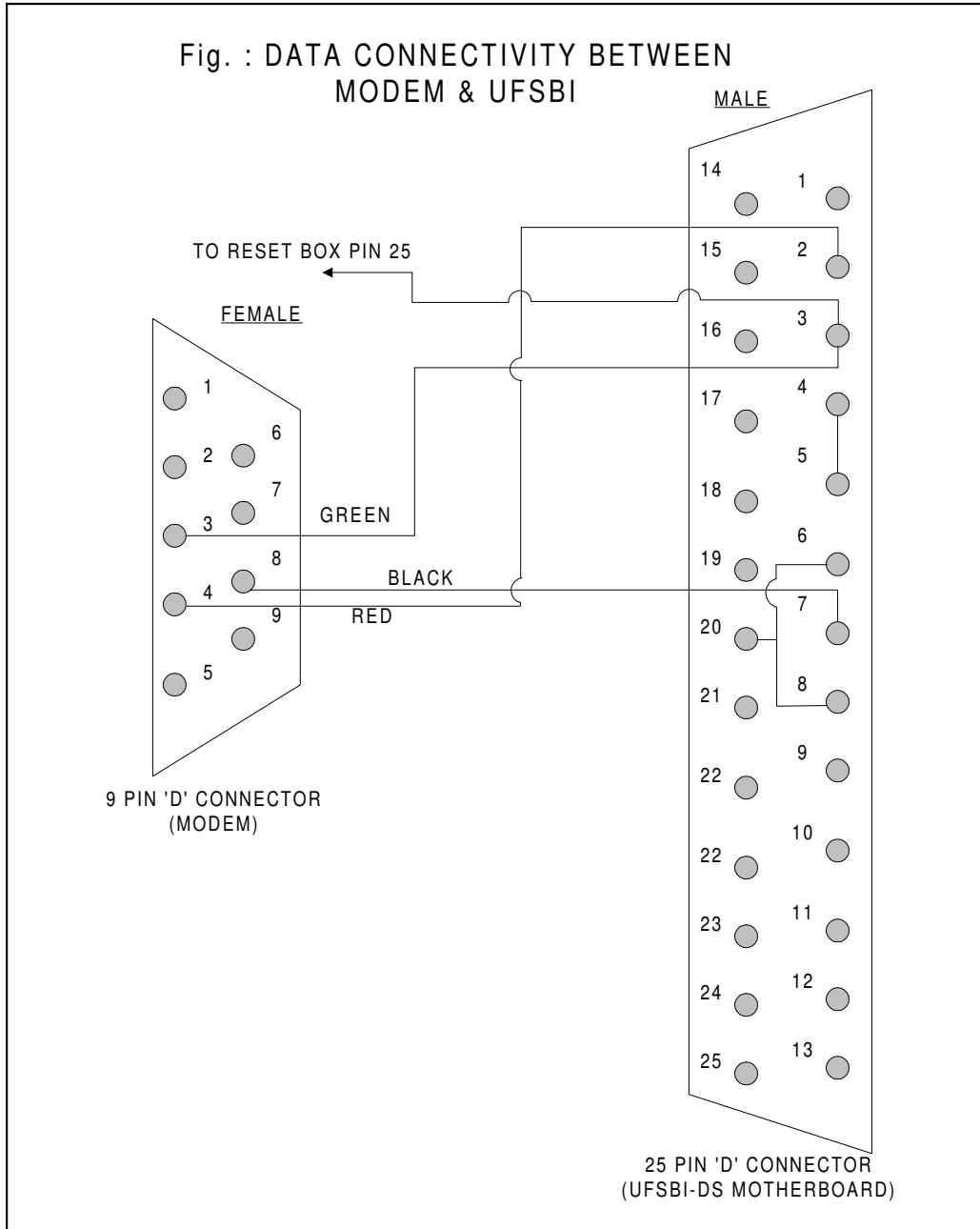
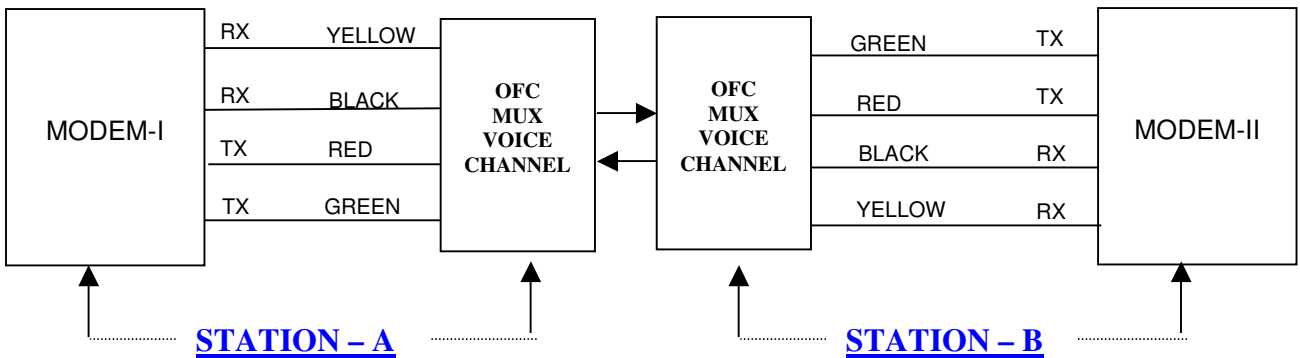
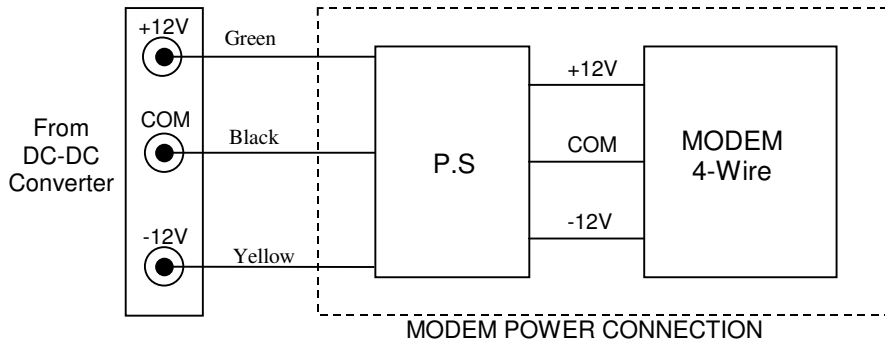


Fig. : Back Panel to WAGO Board Connectivity

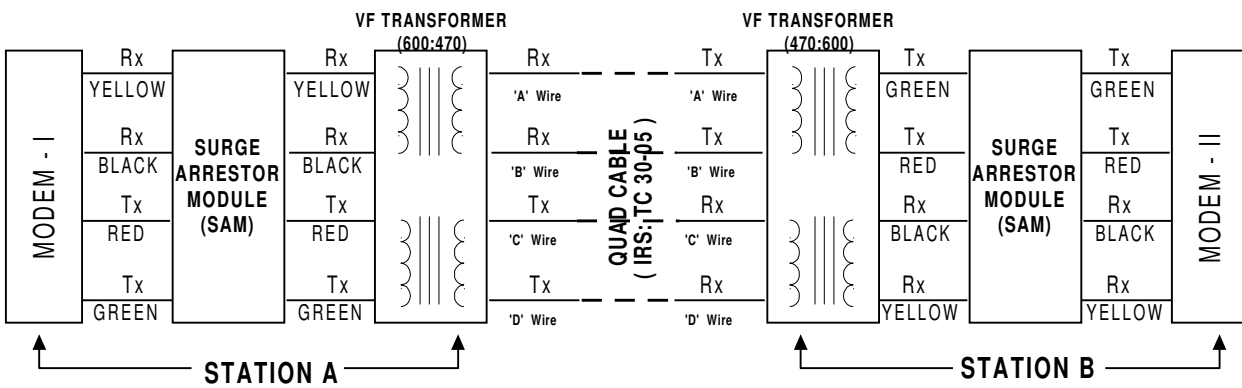
6. Modem Connections



7. UFSBI Configuration Details



CONNECTIVITY BETWEEN TWO MODEMS THROUGH VOICE CHANNEL OF OPTICAL MUX



CONNECTIVITY BETWEEN TWO MODEMS THROUGH COPPER CONDUCTOR OF QUAD CABLE

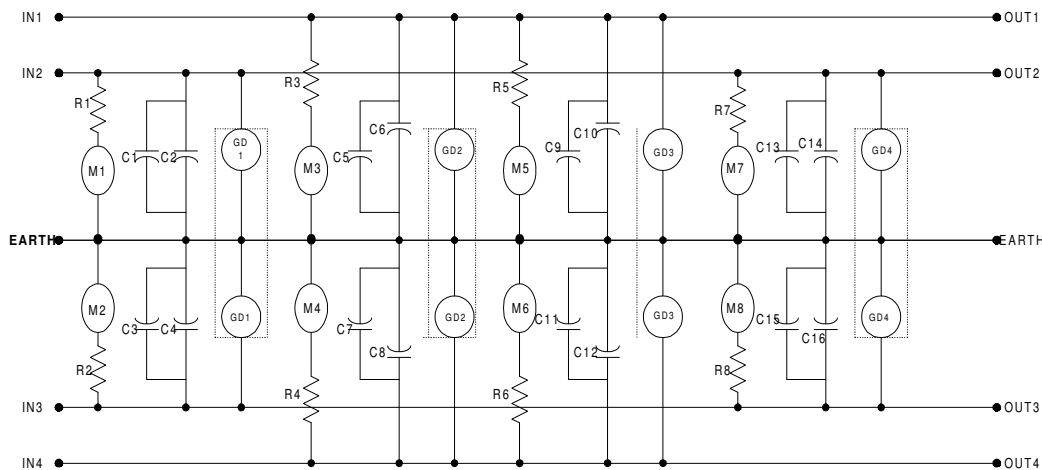


Fig: Circuit for Surge Arrester Module (SAM)

8. UFSBI Address Configuration Jumpers

The Address Configuration jumpers are set in the Connector side of the motherboard. A pattern of this jumper setting is shown below:

	Left	Center	Right		Left	Center	Right
	TX				TX		
				1			
				2			
				3			
				4			
				5			
				6			
				7			
				8			
	RX				RX		
				9			
				10			
				11			
				12			
				13			
				14			
				15			
				16			

The TX Address of one unit should correspond with the RX Address of other unit. The same type of settings should not be used in the adjacent pair of units.

NOTE: 9 unique Address Configuration Jumpers are given in Annexure A.

9. UFSBI installation guide

The following practices is to be observed in installing UFSBI at site:

- a) **Battery:** As per Item No. 1.5 of this manual.
- b) **Battery Charger:** As per Clause No. 1.6 of this manual
- c) **Earthing:** Good earthing is to be provided preferably less than 2Ω
- e) **Communication Channel:**
 - Allowable Channel Loss: 30 dB (max.) between 2 modems
 - SNR: 20 dB (minimum)

- Transmit Power: -2 dBm (maximum at modem Tx pin)
- Receive Level: -32 dBm (minimum at modem Rx pin)

The channel should be of good quality and must have steady performance for at least 72 hours before commissioning

NOTE: A list of commissioning pre-requisites in the form of a check sheet is provided in Annexure B.

10. Installation Procedures

□ Installation & Testing Guidelines

All the units including the modules, connectors and other accessories are factory-checked. However, after unpacking, following pre-installation test schedule is being recommended to examine if any kind of damage has occurred during transshipment.

□ Physical Examination required for

- a) Connectors
- b) Relays and Relay-bases
- c) All the PCB modules
- d) Rack and the mainframe
- e) Card Guides
- f) Motherboard
- g) Interconnecting ribbon cables and wires
- h) Reset Box
- i) Modem

NOTE: Pre-commissioning observation must be carried out as per Annexure B and Annexure D and the data should be recorded as directed. If any major damage is found it is to be brought to the notice of site supervisor.

□ Power Supply

- a) Battery Voltage should not exceed the range: 19.5V to 28.8V DC.
- b) Ensure that the above supply is not arbitrarily grounded.
- c) Before insertion of other modules, DC-DC converter is to be connected to the Battery Supply and its correct output levels should read as:
 - i) 5V (+/- 3%)
 - ii) +12V (+/- 2%)
 - iii) -12V (+/- 2%)
 - iv) 24V (+/- 5%)

□ Starting the UFSBI

Installation of system is kept very simple; as such no elaborate procedure is required except those given as under:

- a) Plug in all the relays to the respective relay bases as per Relay disposition chart.
- b) Insert all the PCB's in the 6U Rack.
- c) Plug in all the connectors to their matched counter part. As the length or wire groups corresponding to each counter part are optimally fixed, probability of wrong connection is ruled out. Refer interconnection drawings (Pg 35/62) for proper connections.

WARNING: For removing and fitting PCB in the unit, please switch off the power supply.

Now switch 'ON' the power supply of the unit and check for:

- a) All the indications in DC-DC converter.
- b) Red indication in Reset Box and Buzzer sounds.
- c) Press the RESET switch and wait for 5 seconds.
- d) Press the BIPR ON switch. BIPR1 and BIPR2 relays will pick up.
- e) Buzzer stops and red indication in reset box changes to green.
- f) All CPU's will display "00" indicating UFSBI is normal.
- g) Connect an auto simulator.
- h) Now UFSBI starts functioning in loop.

Railways are to provide the following facilities for installation and commissioning of block panel with UFSBI

- ❑ Battery Charger
- ❑ Battery
- ❑ Terminal Block for field connections.
- ❑ Earthing: A good earthing for termination of the equipment
- ❑ A 4 wire full duplex OFC Voice Channel or Quad cable
(Refer to the Pre-Installation Check list in Annexure B for details of the above)
- ❑ A "TEST SIGNALLING ROUND" involving at least 10 operations needs to be performed before the real operations or the trial run starts. The block operation through **Block Proving With Axle Counter using UFSBI** is to be kept under observation at least for three up and three down movements of trains.
- ❑ A close monitoring of the train movements through **Block Proving With Axle Counter using UFSBI** to be done at least for 48 Hrs after immediate installation and commissioning of the system.

11. Maintenance

Preventive maintenance

- ❑ **Power supply:** In tropical countries power supply unit of any type is the single source responsible for most of the equipment faults and malfunctioning. A regular check on power supply units such as battery banks, battery charger and DC-DC converters is mandatory.
- ❑ **Relays:** UFSBI has used most reliable type of relays, but special care and testing is required for those to be used after long storage. No attempt is to be made to repair a relay. Use a new one.
- ❑ **DO's and DON'T's** given at page 41/62 can be a formidable guideline for Preventive Maintenance.

Maintenance of Communication Link

- ❑ Telecom cable is to be protected from injury during other kinds of installation at its vicinity.

- If disconnection of cable is required, the cable terminal is to be refitted firmly.
- The loss of signal due to lossy cable is to be kept under check.
- The display indication "33" indicates link failure. If the modem is found to be O.K, next to be checked is the telecom cable.

Maintenance of Equipment

- a. UFSBI unit will automatically trip-off if the Battery supply goes below 19.2V & above 28.8V DC. In case of repeated trip-off, both the DC supply level and the loading are to be checked. A healthy UFSBI should not draw more than 1.8 Amp DC.
- b. No attempt of "resetting" is to be made in case of supply impairment or link failure.
- c. If a faulty UFSBI system is not brought back to normal after "resetting" one must check:
 - i) If there is any loosely fitted connector or improperly pressed PCB module.
 - ii) Connecting leads inserted in Terminal.
 - iii) The DC supply levels of the DC-DC converter.
- d. For specific information on faults, refer "**UFSBI Error Code List**".
- e. Once a fault is found, the user should not attempt repairing at component level. The impaired module / PCB needs to be replaced by a spare one.

12. Do's & Don'ts

- UFSBI system is to be operated or maintained only by trained persons
- No attempt is to be made to operate the equipment at Battery Voltage ranging bellow 19.2V and above 28.8V DC.
- Connectors or PCBs is to be plugged in or out after switching off the Power Supply.
- "RESET" should not be applied in case of "Link Failure" or "Supply" Break Down.
- Replacement of components or modules is to be done with spares supplied / prescribed by the manufacturer.
- While plugging in / out a PCB, care is to be taken to avoid application of excessive force.
- Arbitrary grounding should not be done to any "common" terminal inside the equipment.
- Relay testing should not be performed involving forced 'pick-up' or 'drop' while the instrument is "ON".
- Standard restrictions against mishandling and opening of Block Instrument are applicable also to UFSBI.

WARNING: No violation of above "MESSAGE OF CAUTION" is desirable for safe & reliable signalling operation.

13. Error code list & recommended actions

GENERAL INSTRUCTION

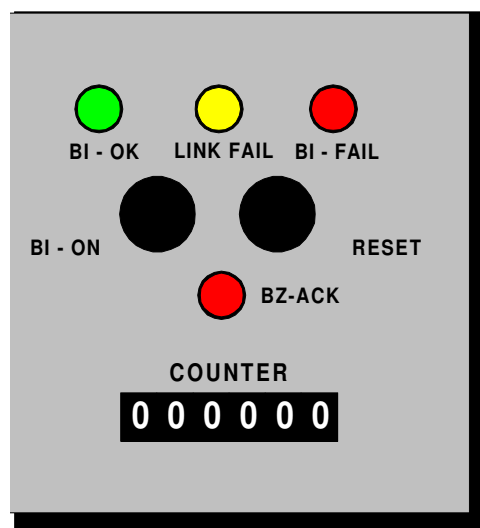
In case of any fault, please follow the steps in the order as stated below:

1. Note the codes shown on the CPU and the LED on the Output cards and the Control & Communication card.
2. It should also be recorded that under which condition the failure occurs, i.e. whether it occurs repeatedly during a certain operation or is it flitting in nature.
3. Perform a Power-On-Reset following the steps given in the item II.15 of Block Panel with UFSBI, Users Manual.
4. In case the problem persists or recurs even after Power-On-Reset then follow the "Fault finding Procedure" as stated in Annexure C
5. During troubleshooting, whenever directed to check the effect of any change or replacement of card, please perform Power-On-Reset as stated in the item II.15 and observe the system for sometime.

NOTE: REFER ANNEXURE C FOR DETAILED ERROR CODE LIST ALONG WITH RECOMMENDED REMEDIAL ACTIONS

14. The RESET BOX

The RESET box consists of the following components as shown in fig. 4.1. The functions of all the components are given below:



RESET BOX

Component Name	Function
1. Counter	It keeps track of the number of Reset operations taking place. The counter is non-resettable type i.e. the readings of this counter cannot be altered.
2. RESET Button	Sometimes the power-off and power-on sequence may not lead to display "0b" (ready to press BI- ON button) on all CPUs. In that case press the RESET button so that the CPUs again resets itself to show "0b" (ready to press BI-ON button) on all CPUs.
3. BI-ON Button	This button is required for starting the system. Whenever all the CPUs display "0b", it indicates that it is ready for start. The user has to press this button for starting the system.
4. BZ-ACK Button	This button is required for acknowledging the buzzer whenever it sounds due to dropping of "Shut down relays" (BIPR1 & BIPR2).
5. BI-OK IND.	This indication (green) glows when the Block Interface is in working condition. Normally on indication.
6. BI-FAIL IND.	This indication (red) glows when the Block Interface is in failure mode. Normally off indication.
7. LINK FAIL IND.	This indication (yellow) glows steadily when the modem fails to receive any data form remote station. In normal working condition, when the modem receives data from remote station, this indication (yellow) will flicker continuously.

15. The POWER-ON-RESET Operation

The following steps are to be performed for carrying out the RESET operation of the UFSBI:

- ❑ Turn off the system power.
- ❑ Wait for 1 minute.
- ❑ Power-on the system.
- ❑ Check the display of the CPU.
- ❑ Wait till the display on all the CPUs display "0b"
- ❑ If "0b" is not displayed, try by pressing the RESET button. If the problem persists check corresponding codes in the error code list and take appropriate action as suggested in the remedial action column.
- ❑ If all the CPUs display "0b" then press the BI-ON button.
- ❑ Observe that both BIPR1 and BIPR2 pick up immediately after BI-ON is pressed.
- ❑ Once BIPR1 and BIPR2 pick up, BI fail (Red) indication goes off and BI OK (Green) indication comes on.
- ❑ Link fail (Yellow) steady indication goes off & starts flickering as soon as the modem starts communicating with remote station modem and all the CPU's display "00"

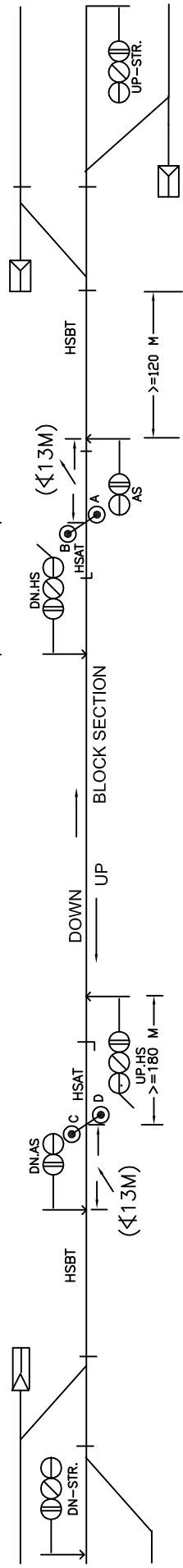
16. The RESET Operation

The following steps are to be performed for carrying out the RESET operation of the UFSBI:

- Press the Reset Button and see that the display in all 3 CPU's becomes "--"
- Wait till the display on all the CPUs display "0b"
- If "0b" is not displayed, try by pressing the RESET button. If the problem persists check corresponding codes in the error code list and take appropriate action as suggested in the remedial action column.
- If all the CPUs display "0b" then press the BI-ON button.
- Observe that both BIPR1 and BIPR2 pick up immediately after BI-ON is pressed.
- Once BIPR1 and BIPR2 pick up, BI fail (Red) indication goes off and BI OK (Green) indication comes on.
- Link fail (Yellow) steady indication goes off & starts flickering as soon as the modem starts communicating with remote station modem and all the CPU's display "00"

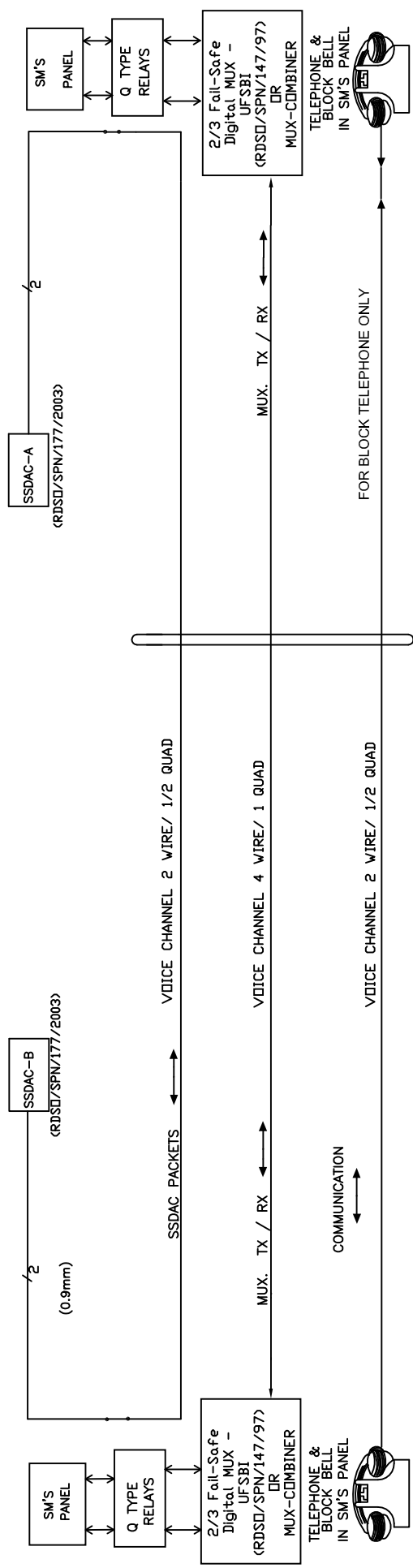
STATION B

STATION A



POWER CABLE

POWER CABLE



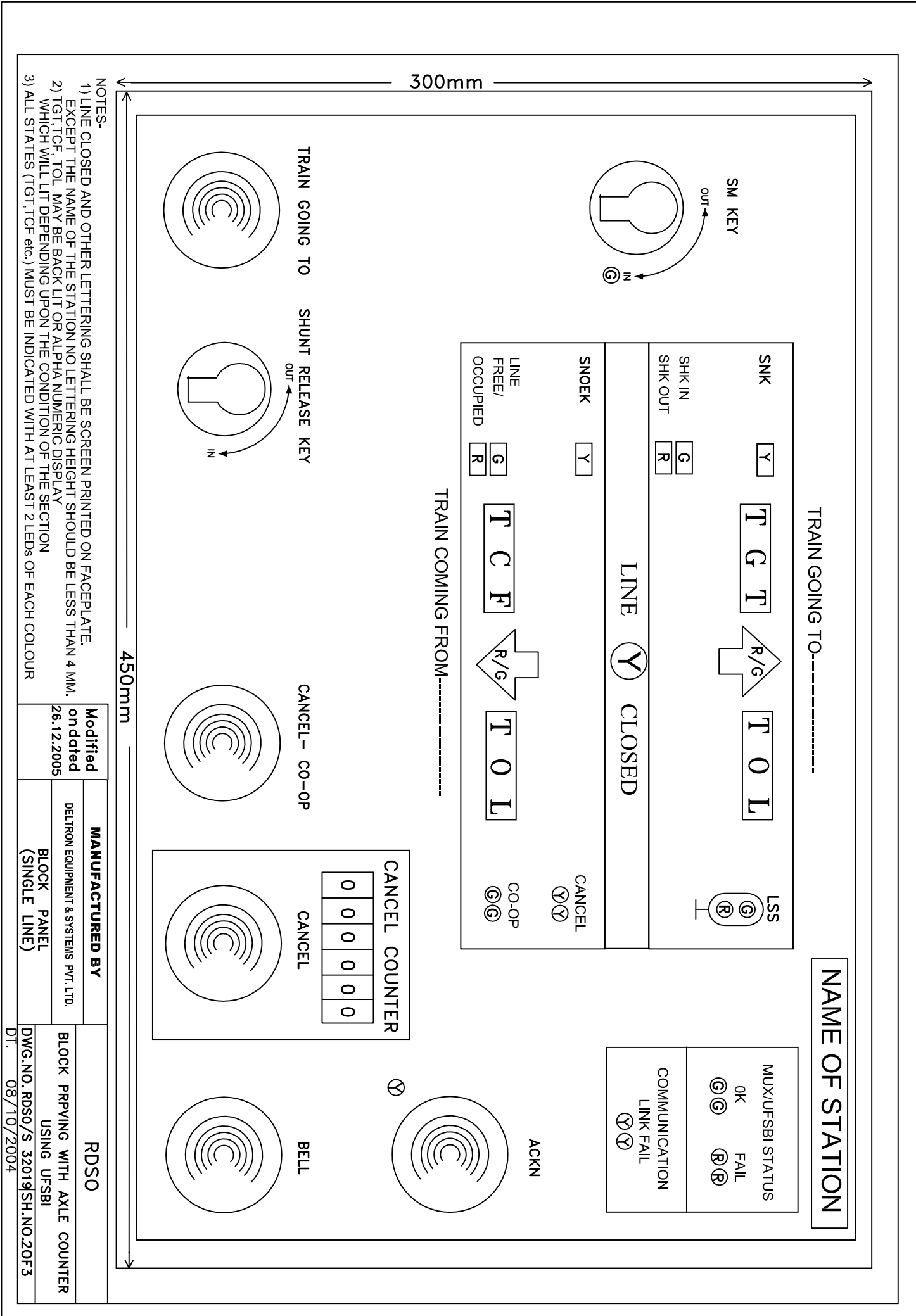
1) THE CIRCUITS ARE SHOWN FOR ONE BLOCK STATION ONLY.
 2) LEGEND:-

- SIGNAL LOCATION BOX SHOWN THUS
- RAILWAY SIGNALLING TERMINALS SHOWN THUS:- 1 E1
- AXLE COUNTER TERMINALS SHOWN THUS:- 2 E2
- RELAY RACK TERMINALS SHOWN THUS:- 2 P2
- PANEL TERMINALS (MS COUPLER SHOWN) THUS:- 2 P2

3 VOICE CHANNELS / 2 QUAD

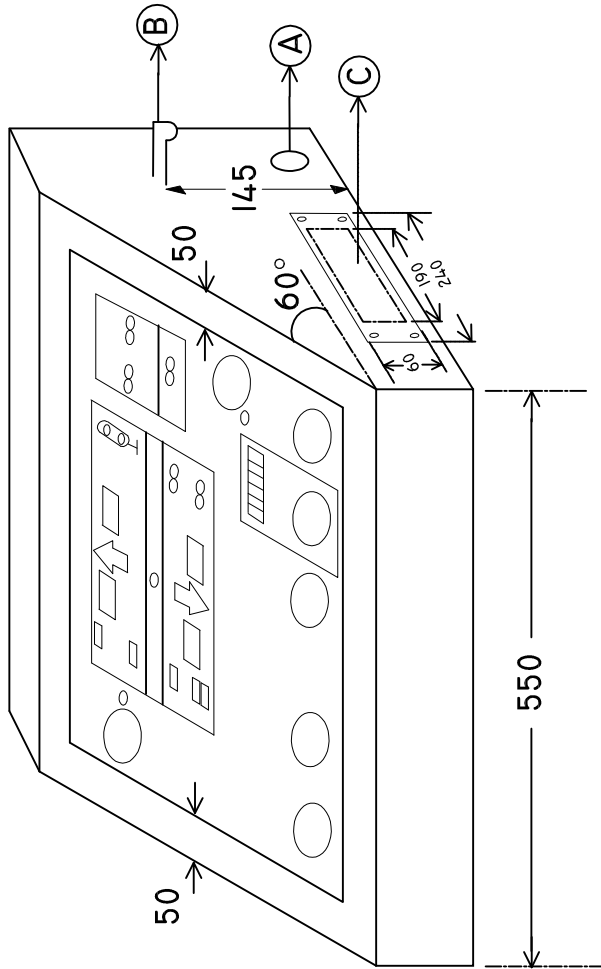
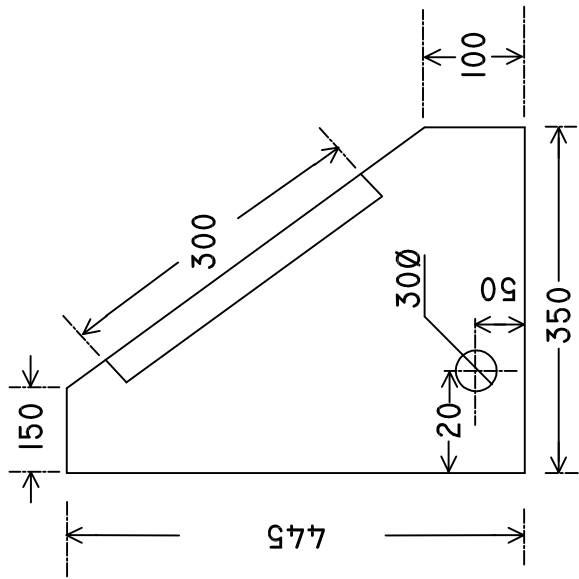
MANUFACTURED BY	RDSO
DELTRON EQUIPMENT & SYSTEMS PVT. LTD.	BLOCK PROVING WITH AXLE COUNTER USING UFSBI
BLOCK SECTION & CABLE PLAN SINGLE LINE (NOT TO SCALE)	DWG.NO. RDSO/S 32019SH.NO.10F3
	DT. 08/10/2004

(MODIFIED ON DT.26.12.2005)



- NOTES-**
- 1) LINE CLOSED AND OTHER LETTERING SHALL BE SCREEN PRINTED ON FACEPLATE. EXCEPT THE NAME OF THE STATION NO LETTERING HEIGHT SHOULD BE LESS THAN 4 MM.
 - 2) TGT, TCF, TOL MAY BE BACK LIT OR ALPHA NUMERIC DISPLAY WHICH WILL LIT DEPENDING UPON THE CONDITION OF THE SECTION
 - 3) ALL STATES (TGT, TCF etc.) MUST BE INDICATED WITH AT LEAST 2 LEDS OF EACH COLOUR

Modified on dated 26.12.2005	MANUFACTURED BY		RDSO
	DELTRON EQUIPMENT & SYSTEMS PVT. LTD.		
	BLOCK PANEL (SINGLE LINE)	BLOCK PRPVING WITH AXLE COUNTER USING UFSBI	
		DWG. NO. RDSO/S 32019/SH.NO.20F3	
		DT. 08/10/2004	



NOTES:-

- 1) SM'S AND MAINTAINER'S LOCK WITH SEALING ARRANGEMENT SHALL BE PROVIDED AT REAR OF PANEL.
- 2) THE TELEPHONE BRACKET TO BE PROVIDED ON EITHER SIDE OF PANEL AS MARKED "B".
- 3) CABLE GLAND WITH SEAL TO BE PROVIDED AT EITHER SIDE OF THE PANEL AS MARKED "A".
- 4) THE PANEL SHOULD BE MADE OF 18 SWG CRC MS-SHEET, POWDER COATED OF SIEMENS GRAY COLOUR.
- 5) PANEL SHALL HAVE HOLES IN THE BASE TO FIX THE PANEL ON THE TABLE.
- 6) FACE PLATE TO BE OF ALUMINIUM SHEET OF MINIMUM 0.5 MM THICKNESS TOTALLY SUPPORTED BY A MS SHEET OF 16 SWG.
- 7) FACE PLATE TO BE COVERED BY 4MM THICK TRANSPARENT ACRYLIC SHEET.
- 8) ALL DIMENSIONS ARE IN MM.
- 9) TONE & SPEECH CONTROL UNIT OF BLOCK BELL & BLOCK TELEPHONE TO BE KEPT HERE OF DEPTH APPROX. 150 M.M. MARKED AS 'C'.

MANUFACTURED BY	RDSO
DELTRON EQUIPMENT & SYSTEMS PVT. LTD.	BLOCK PROVING WITH AXLE COUNTER USING UFSBI
BLOCK PANEL (SINGLE LINE)	DWG.NO. RDSO/S 32019SH.NO.30F3
	DT. 25/08/2004

MODIFIED ON 26.12.20005

BIPR1 (QNI)	ELECTRONIC TIMER 120EJ	TGTXR (QNI)	SHKR (QNI)	TGTR (QL1)	ASGNCR (QNA1)	HSGNCR (QNA1)	TCFR (QL1)	FR1 (QNI)
BIPR2 (QNI)		TCFXR (QNI)	TCFCR (QNI)	TGTYR (QNI)	ASGNCR (QNI)	TGTZR (QNI)	BLR (QNI)	FR2 (QNI)
CAR (QNI)	BTSR (QNI)	TAR2 (QNI)	TAR1 (QNA1)	HSBTPR (QNA1)	HSATPR (QNA1)	TGTPR (QNI)	AZTR (QNA1)	
CNR (QNI)	TGTNR (QNI)	ASCR (QNI)	120JPR (QNI)	BPNR (QNI)	TCFZR (QNI)			

TOTAL NO. OF RELAYS:

- 1) QNI-22
 - 2) QNA1 -6
 - 3) QL1 -2
 - 4) ELECTRONIC FAIL SAFE TIMER - 1
- TOTAL - 31 NOS.

MANUFACTURED BY		RDSO
DELTRON EQUIPMENT & SYSTEMS PVT. LTD.		BLOCK PROVING WITH AXLE COUNTER USING UFSBI
RELAY RACK LAYOUT FRONT VIEW (SINGLE LINE)		DWG.NO. RDSO/S 32020SH.NO. 20F11 DT. 08.10.2004

(MODIFIED ON DT.26.12.2005)

CONTACT ANALYSIS CHART (SINGLE LINE)

SL. NO.	RELAY NAME	TYPE	COIL	CONFIG.	A								B								C								D							
					1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
1.	BIPR1	QN1	1 1	8F/8B	2 2	2 2		1 1	2 2									1 2	2 2							2 1		1 2								
			R1,R2		W44 (MUX)	RESET BOX	RESET BOX	RESET BOX	RESET BOX	W44 (MUX)	RESET BOX	RELAY IND.	W36 (MUX)																							
			6C		6C	6C		6C	6C								6C	6C							11		6C									
2.	BIPR2	QN1	1 1	8F/8B	1 1			1 1									1 2	1 1							2 1	1 1	1 1									
			R1,R2		RESET BOX	RESET BOX	W35 (MUX)	RESET BOX	RELAY IND.	RESET BOX	W37 (MUX)																									
			6C		6C			6C	6C								6C	6C							11	6C	6C									
3.	TGTXR	QN1	1 2	8F/8B			2 1																			1 1	2 1									
			R1,R2		IN2' (W11)	RELAY IND.	IN2 (W3)																													
			8				6A		11																8	6A										
4.	SHKR	QN1	2 1	8F/8B	1 1	1 1	2 2	2 1	2 1	1 1							1 2	1 1	2 1	2 1	2 1	1 2			2 1	1 2										
			R1,R2		TGTXR	TGTRY	IN 3' (W12)	IN 4' (W13)	SHK IN (G)	ASC R	IN 3 & 5 (W4 & 6)	IN 4 (W5)	IN 5' (W14)	SHK OUT(R)	RELAY IND.	SHKR																				
			8		8	8	6A	6A	7	9						6A	6A	6A	7	11	8															
5.	TGTR	QL1	1 2	11F/4B	1 1	1 1	1 1	2 2	1 1	2 2						2 2									2 1		2 1	1 1								
		R1,R2	ASC R		ASC R	IN4 (W5)	TGTXR	FR1	TGTK (G)	IN4' (W13)	RELAY IND.	TGTPR	TCFR																							
		8	R3,R4		9	9	6A	8	8	7					6A										11		8	8								
6.	TGTPR	QN1	1 2	8F/8B	1 1	2 1																			2 1											
			R1,R2		LCK (Y)	BTSR	RELAY IND.																													
			8		7	8																			11											
7.	AS GNCR	QNA1	1 1	8F/8B	1 1	1 1	2 2	2 2	2 1	1 1	2 2					1 1									2 1											
			R1,R2		TGTRY	[D] SNK (G)	IN3' (W12)	IN4' (W13)	IN3 (W4)	CAR	IN5' (W14)	IN4 (W5)	RELAY IND.																							
			9		8	7	6A	6A	6A	8	6A				6A										11											
8.	HS GNCR	QNA1	1 1	8F/8B			2 2									2 1	2 1								1 1	1 1										
			R1,R2		IN6' (W15)	RELAY IND.	[D] SNK (G)	IN6 (W7)	TGTRY	CAR																										
			9				6A		11						7	6A									8	8										

NOTE :

- 1. Back Contacts are denoted /
- 2. Continued on Sheet.no.3A

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**BLOCK PROVING WITH AXLE COUNTER
USING UFSBI**

DWG. NO. RDSO/S 32020 SH.NO.-3 of 11

DATE: 08.10.2004

CONTACT ANALYSIS CHART (SINGLE LINE)

SL. NO	RELAY NAME	TYPE	COIL	CONFIG.	A								B								C								D							
					1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
9.	TCFR	QL1	1 2	11F/4B	2 1	1 1	1 1	2 1	2 1									2 2	2 1						2 1			2 2	1 1							
			R1,R2		IN 4 (W5)	TAR1	IN6 (W7)	TCFZR	TCFK												CAR	IN6' (W15)						RELAY IND.		IN4' (W13)	TGTXR					
		8	1 2		6A	9	6A	8	7									8	6A						11		6A	8								
10.	FR1	QN1	2 2	8F/8B	1 1		2 2	2 1	2 1																2 1											
			R1,R2		FR2	TCFK (G)	120 JK (G)	TGTK (G)																			RELAY IND.									
		8	1 1																																	
11.	FR2	QN1	2 2	8F/8B														1 2	1 2						2 1		1 2	2 2								
			R1,R2																	120 JK (G)	TGTK (G)					RELAY IND.		FR1	TCFK (G)							
		8	1 1															7	7						11		8	7								
12.	TCFXR	QN1	1 1	8F/8B	1 1		1 1	1 2	2 1					1 1	1 2													1 2								
			R1,R2		TCFR	TGTXR	TGTRY	RELAY IND.				TCFRY	W19																W27							
		6B	1 1																																	
13.	TCFCR	QN1	1 1	8F/8B					2 1									1 2							1 1	2 1	1 2									
			R1,R2					RELAY IND.												W20						CAR	CANOK (Y)	W28								
		6B	1 1																																	
14.	TGTYR	QN1	1 1	8F/8B	1 1	1 1	1 1		1 1	1 1	1 1	1 1	1 1	1 2	2 2										2 1		1 2									
			R1,R2		TGTR	TGTK (G)	TGTRY	ASCR	ASCR	IN4 (W5)	FR1	W21	IN4' (W13)														RELAY IND.		W29							
		6B	1 1																																	
15.	AS GNCPR	QN1	1 1	8F/8B	1 1	2 1			1 1					1 2											2 1		1 2									
			R1,R2		TGTRY	SNOEK (Y)		CAR																			RELAY IND.		W30							
		6B	1 1																																	
16.	TGTZR	QN1	1 1	8F/8B					2 1					1 2											1 1	2 1	1 2									
			R1,R2					RELAY IND.																			TGTRY	CAR	W31							
		6B	1 1																																	

NOTE :

- 1. Back Contacts are denoted /
- 2. Continued on Sheet.no.4

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**BLOCK PROVING WITH AXLE COUNTER
USING UFSBI**

DWG. NO. RDSO/S 32020 SH.NO.-3A of 11

DATE:08.10.2004

CONTACT ANALYSIS CHART (SINGLE LINE)

SL. NO	RELAY NAME	TYPE	COIL	CONFIG.	A								B								C								D							
					1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
17.	BLR	QN1	1 1 R1,R2 6B	8F/8B	1 1 BLOCK BUZZ					2 1 RELAY IND.					1 2 W24													1 2 W32					6B			
18.	CAR	QN1	2 2 R1,R2 8	8F/8B	2 1 CANCEL Z					2 1 RELAY IND.				2 1 120 JR	2 1 120 JK (G)					1 1 CAR	1 1 TCFRY	1 1 BTSR	1 2 TGTRY													
19.	BTSR	QN1	2 2 R1,R2 8	8F/8B	1 1 BTSR	1 1 TCFR	2 2 TAR2	2 1 FR1	1 1 IN4 (W5)	1 1 TGTXR				2 2 IN4' (W13)	1 1 TCFK (G)					2 1 RELAY IND.																
20.	TAR2	QN1	1 2 R1,R2 8	8F/8B					2 1 RELAY IND.					1 1 TCFRY					1 2 TAR2		1 1 TAR1	1 2 TGTRY														
21.	TAR1	QNA1	2 2 R1,R2 9	8F/8B	2 2 TAR1			1 1 TGTRY	1 1 TAR2									2 1 RELAY IND.																		
22.	HS ATPR	QNA1	1 1 R1,R2 9	8F/8B	1 1 TAR2	1 1 TCFR		1 2 TAR1										2 1 RELAY IND.																		
23.	HS BTPR	QNA1	1 1 R1,R2 9	8F/8B					2 1 RELAY IND.					1 1 TCFR					1 1 TAR1									1 1 TAR2								
24.	AZTR	QNA1	1 1 R1,R2 10	8F/8B	2 1 LCK (Y)	1 1 TGTK (G)	2 1 ACTK (R)	1 1 TGTK (R)	2 1 TGTRY	2 1 FR1			2 1 ACUK (G)	2 1 CAR					1 2 ASCR	2 1 TCFK (G)		1 1 TCFK (R)														

NOTE :

- 1. Back Contacts are denoted /
- 2. Continued on Sheet no. 4A

**Deltron Equipment & Systems
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FOR DG/ Sig.

RDSO

**BLOCK PROVING WITH AXLE COUNTER
USING UFSBI**

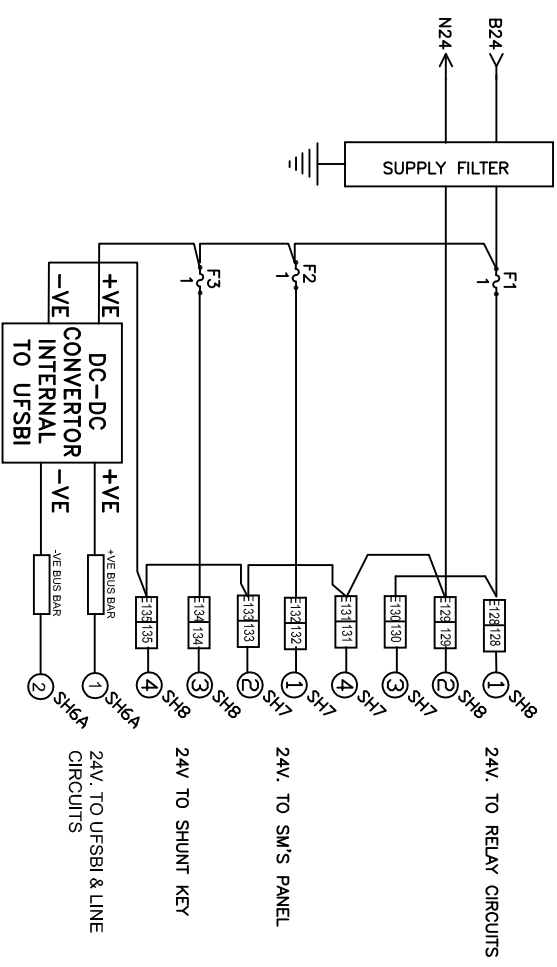
DWG. NO. RDSO/S 32020 SH.NO.-4 of 11

DATE:08.10.2004

CONTACT ANALYSIS CHART (SINGLE LINE)

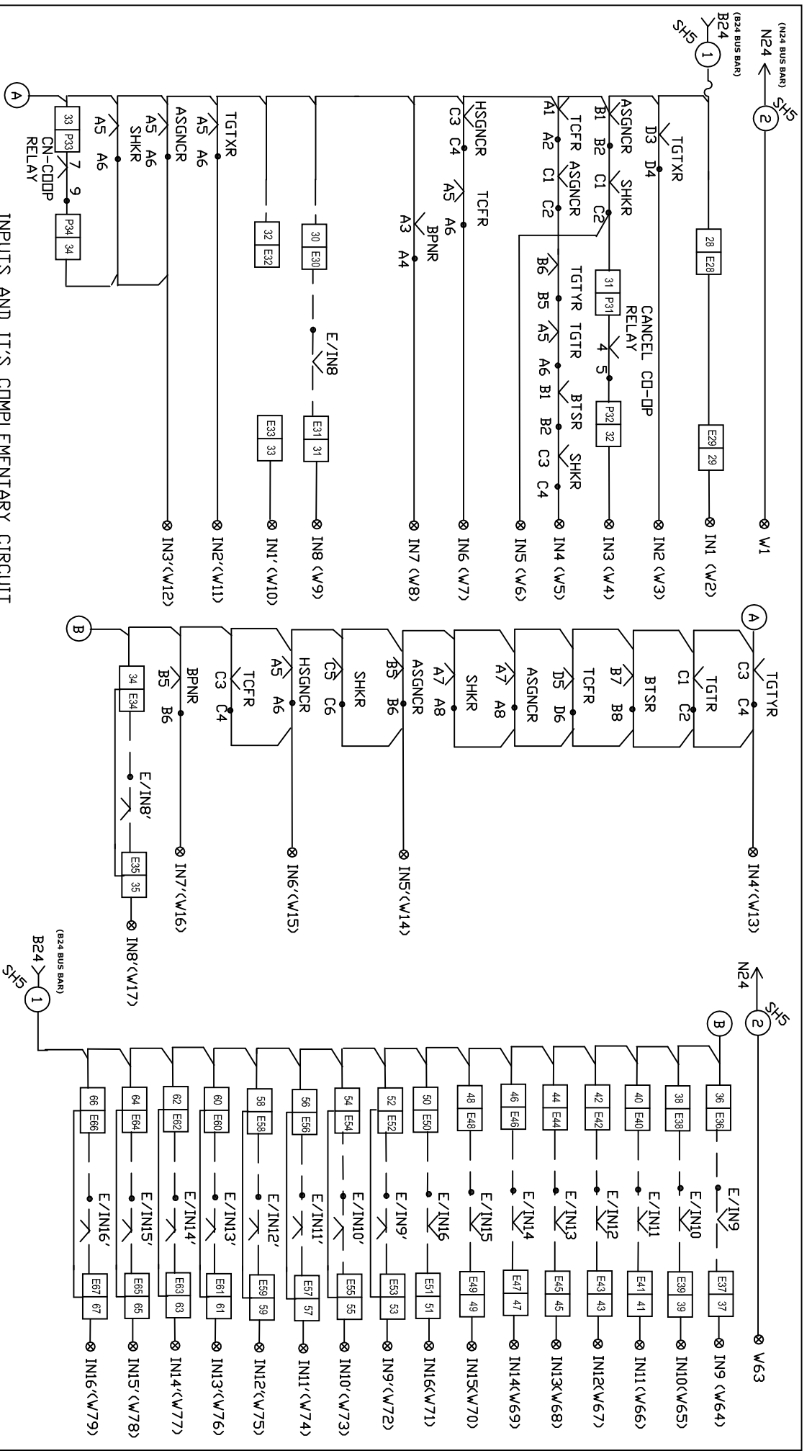
SL. NO	RELAY NAME	TYPE	COIL	CONFIG.	A								B								C								D							
					1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
25.	CNR	QN1	1 1 R1,R2 7	8F/8B						2 1 RELAY IND. 11																			1 1 CAR			1 1 TGTRY	1 2 TGTRN			
26.	TGTRN	QN1	2 1 R1,R2 7	8F/8B	1 1 TGTXR			1 2 TGTRY							1 1 CNR													2 1 RELAY IND. 11								
27.	ASCR	QN1	1 1 R1,R2 9	8F/8B	1 1 ASCR	1 1 ASDR		1 1 AS RECR	1 1 ASCR	1 1 ASDR				1 1 AS GNCR	2 1 AS DECR	1 2 AS DECR			1 1 AS GNCR	1 1 TGTK G	2 2 SH. EKT	1 1 SH. EKT	1 1 AS RECR													
28.	120 JPR	QN1	1 2 R1,R2 8	8F/8B						2 1 RELAY IND. 11								1 1 120 JK (G)									1 2 TCFRY									
29.	BPNR	QN1	2 1 R1,R2 7	8F/8B	1 2 BPNR	2 1 IN7 (W8) 6A		1 1 TGTRY	1 1 TGTXR	1 1 CAR	2 1 IN7 (W16) 6A			1 1 BLOCK TELE												2 1 RELAY IND. 11										
30.	TCFZR	QN1	1 2 R1,R2 8	8F/8B		1 1 BTSR				1 1 RELAY IND. 11								1 1 SH. EKT									1 1 LCK (Y)									
31.	120 EJ	ELEC TRO NIC	1 2 R1,R2 8		1 TIMER OUT 8																															

NOTE :		S.E. Sig.	ADE / Sig.	FOR DG / Sig.	RDSO
1. Back Contacts are denoted /	Deltron Equipment & Systems Pvt. Ltd., Kolkata Modified on dt. 26.12.2005				BLOCK PROVING WITH AXLE COUNTER USING UFSBI
					DWG. NO. RDSO/S 32020 SH.NO.-4A of 11
					DATE:08.10.2004



(MODIFIED ON DT.26.12.2005)

MANUFACTURED BY	RDSO
DELTRON EQUIPMENT & SYSTEMS PVT. LTD.	BLOCK PROVING WITH AXLE COUNTER
POWER SUPPLY ARRANGEMENTS (SINGLE LINE)	USING UFSBI
	DWG.NO. RDSO/S 3202d SH.NO.5 of 11
	DT. 08.10.2004



INPUTS AND IT'S COMPLEMENTARY CIRCUIT

SPARE INPUTS: INPUT NOS. 1,8,9,10,11,12,13,14,15 AND 16 ARE KEPT AS SPARE. THESE ARE NOT CONNECTED, AS SHOWN IN THE DRAWING. THESE CAN BE USED IN FUTURE. FOR USING nth INPUT FOR SENDING A RELAY STATUS FROM ONE STATION TO OTHER A "FRONT CONTACT" AND A "BACK CONTACT" SHOULD BE CONNECTED AT E/IN n AND E/IN n' RESPECTIVELY(AFTER REMOVING THE STRAP AT E/OUT n).

LEGENDS USED :-

W : WAGO TERMINAL

MANUFACTURED BY

DELTRON EQUIPMENT & SYSTEMS PVT. LTD.

RDSO

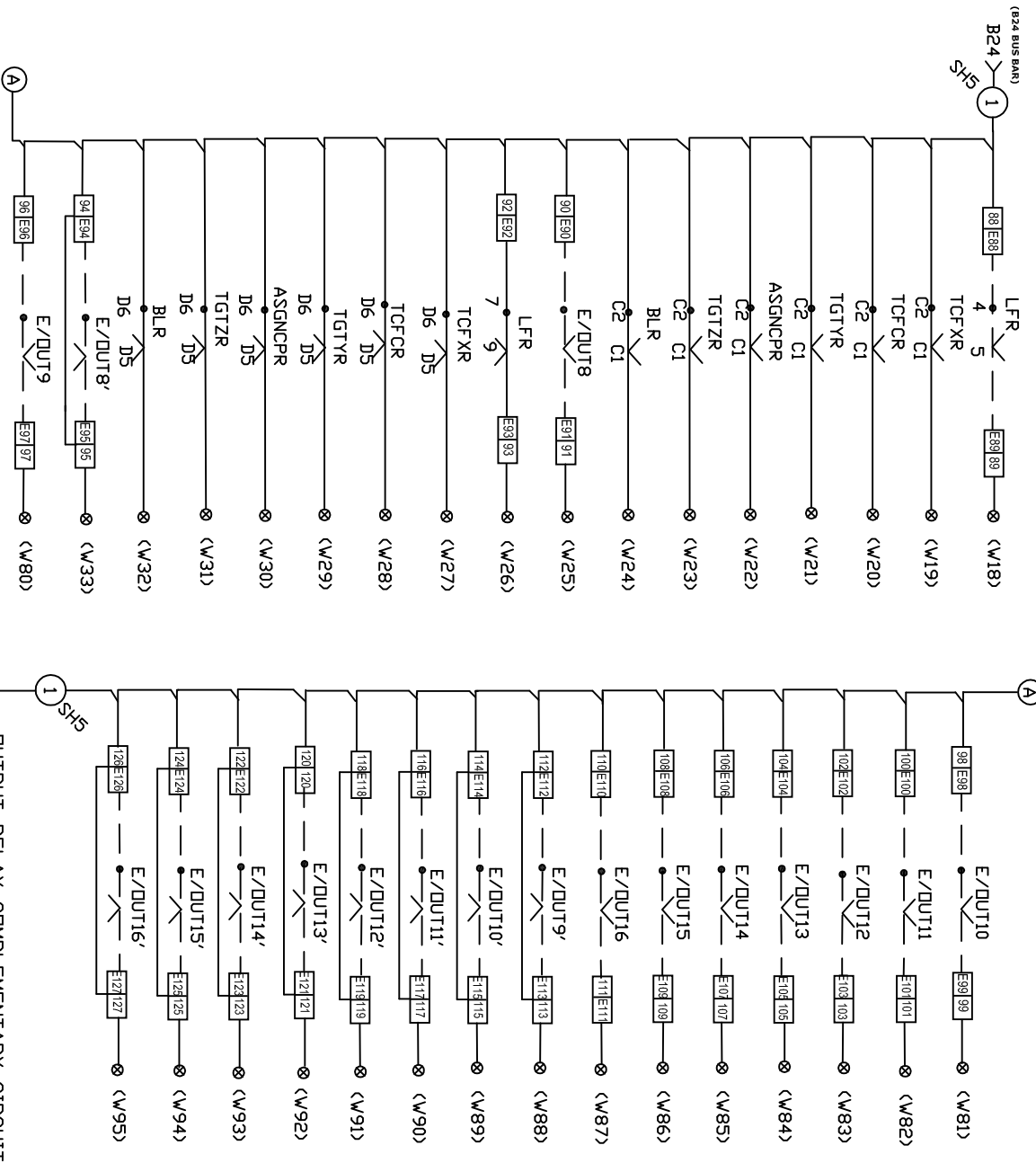
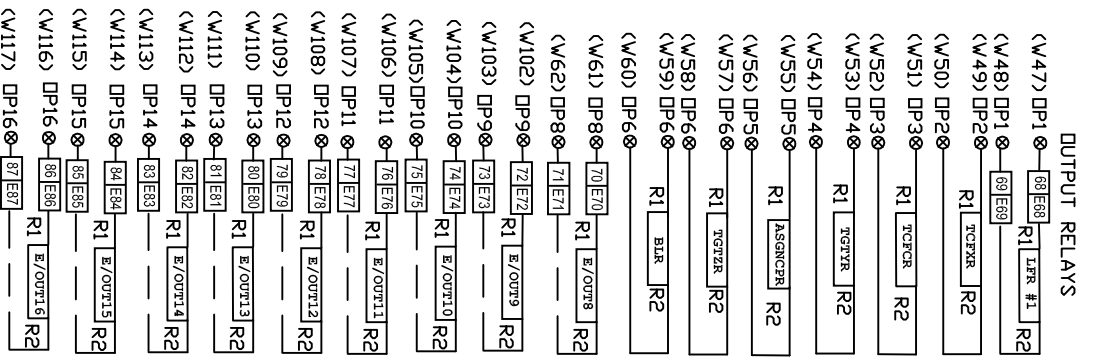
BLOCK PROVING WITH AXLE COUNTER USING UFSBI

LINE CIRCUITS (SINGLE LINE)

DWG.NO. RDSO/S 32020/SH.NO.6Aof11

DT. 08.10.2004

(MODIFIED ON DT.26.12.2005)



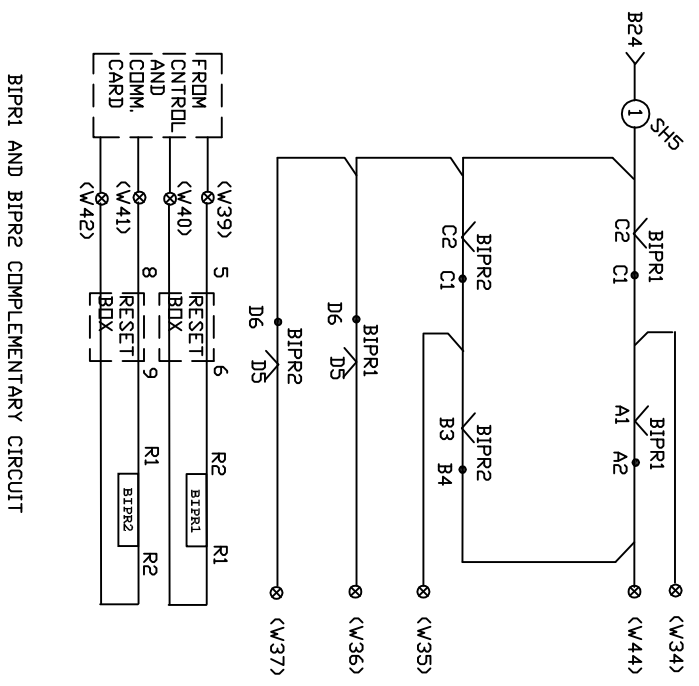
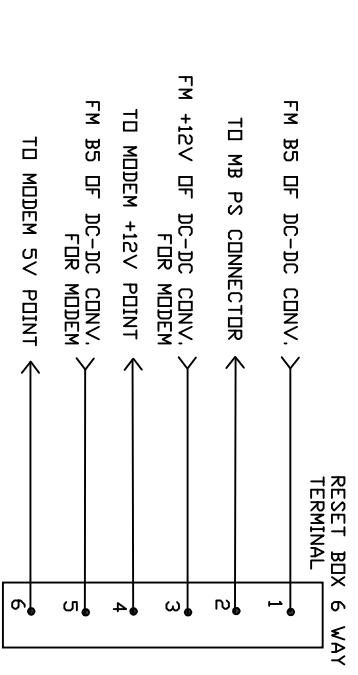
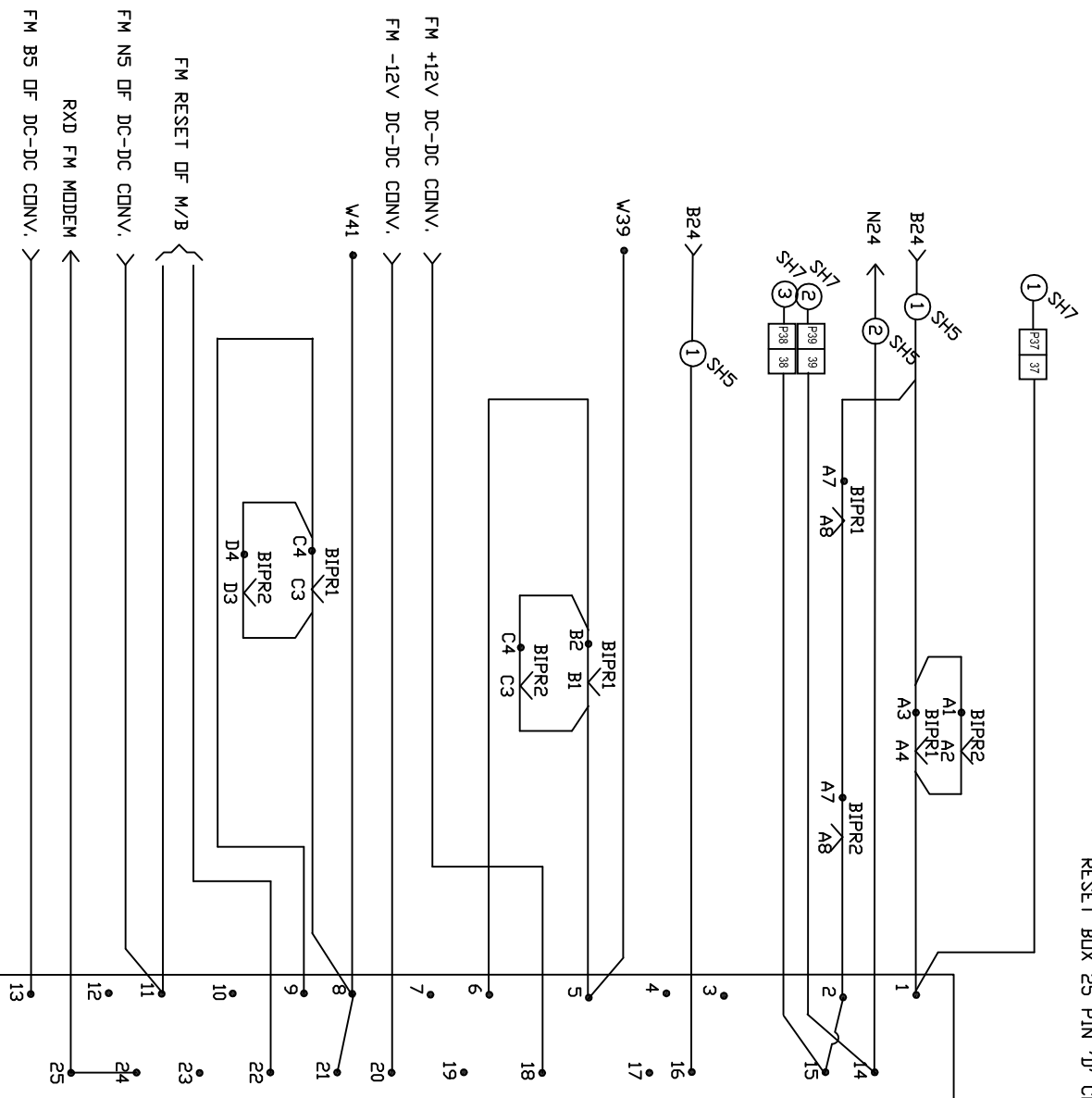
#1 LFR Relay is OEN (4R-3-24) type as this Output relay is used in a non vital i.e link fail indication only.

SPARE OUTPUTS: OUTPUT NOS. 1,8,9,10,11,12,13,14,15 AND 16 ARE KEPT AS SPARE. THESE ARE NOT CONNECTED AS SHOWN IN THE DRAWING. THESE CAN BE USED IN FUTURE. FOR GETTING AN OUTPUT FOR RECEIVING A RELAY STATUS FROM OTHER STATION THROUGH MUX THE RELAY COIL SHOULD BE CONNECTED AS SHOWN IN E/OUT n. A "FRONT CONTACT" AND A "BACK CONTACT" SHOULD BE CONNECTED AT E/OUT n AND E/OUT n' RESPECTIVELY(AFTER REMOVING THE STRAP AT E/OUT n).

(MODIFIED ON DT.26.12.2005)

MANUFACTURED BY	RDSO
DELTRON EQUIPMENT & SYSTEMS PVT. LTD.	BLOCK PROVING WITH AXLE COUNTER USING UFSBI
LINE CIRCUITS (SINGLE LINE)	DWG. NO. RDSO/S 32020 SH. NO. 6Boft11
	DT. 08.10.2004

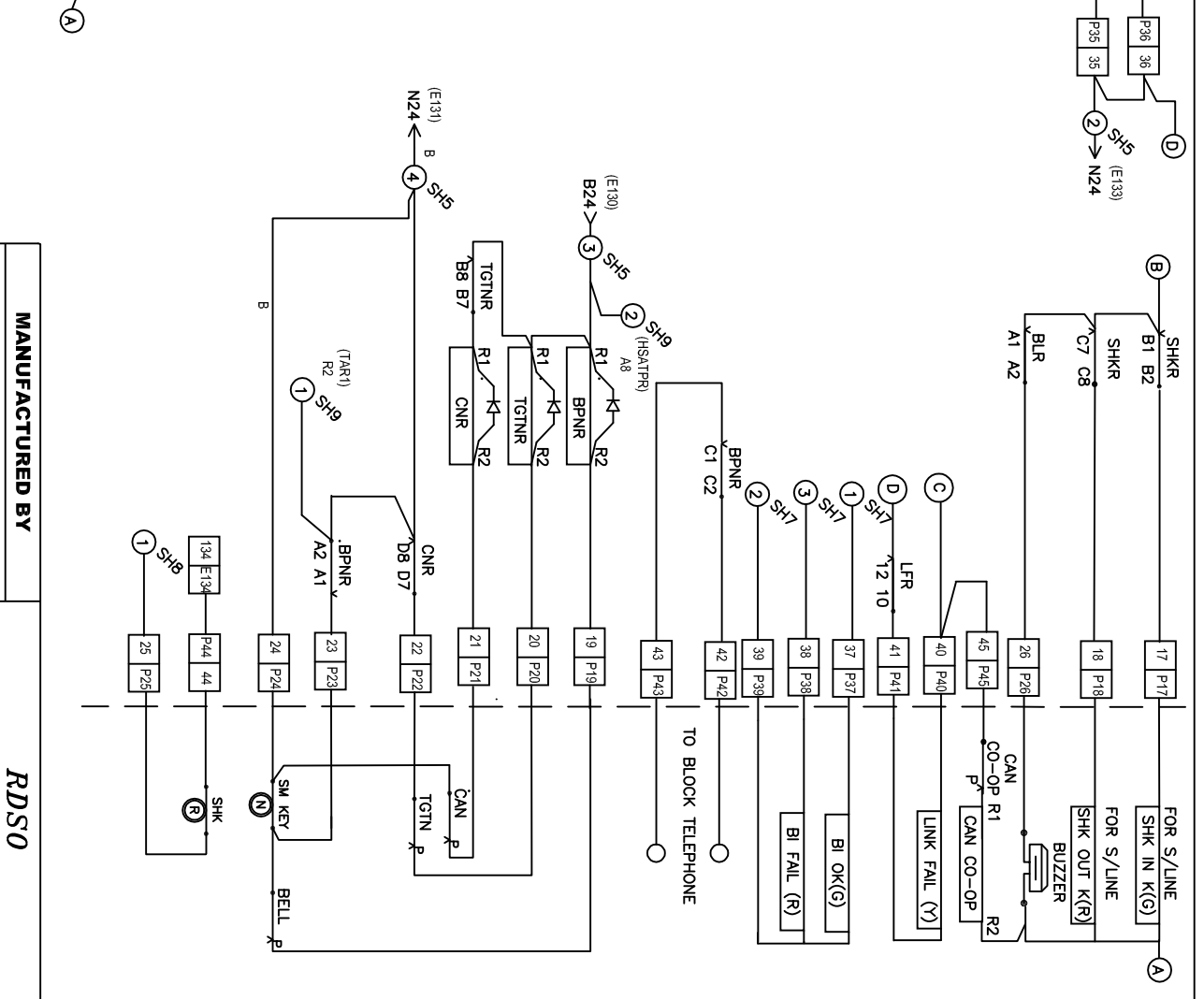
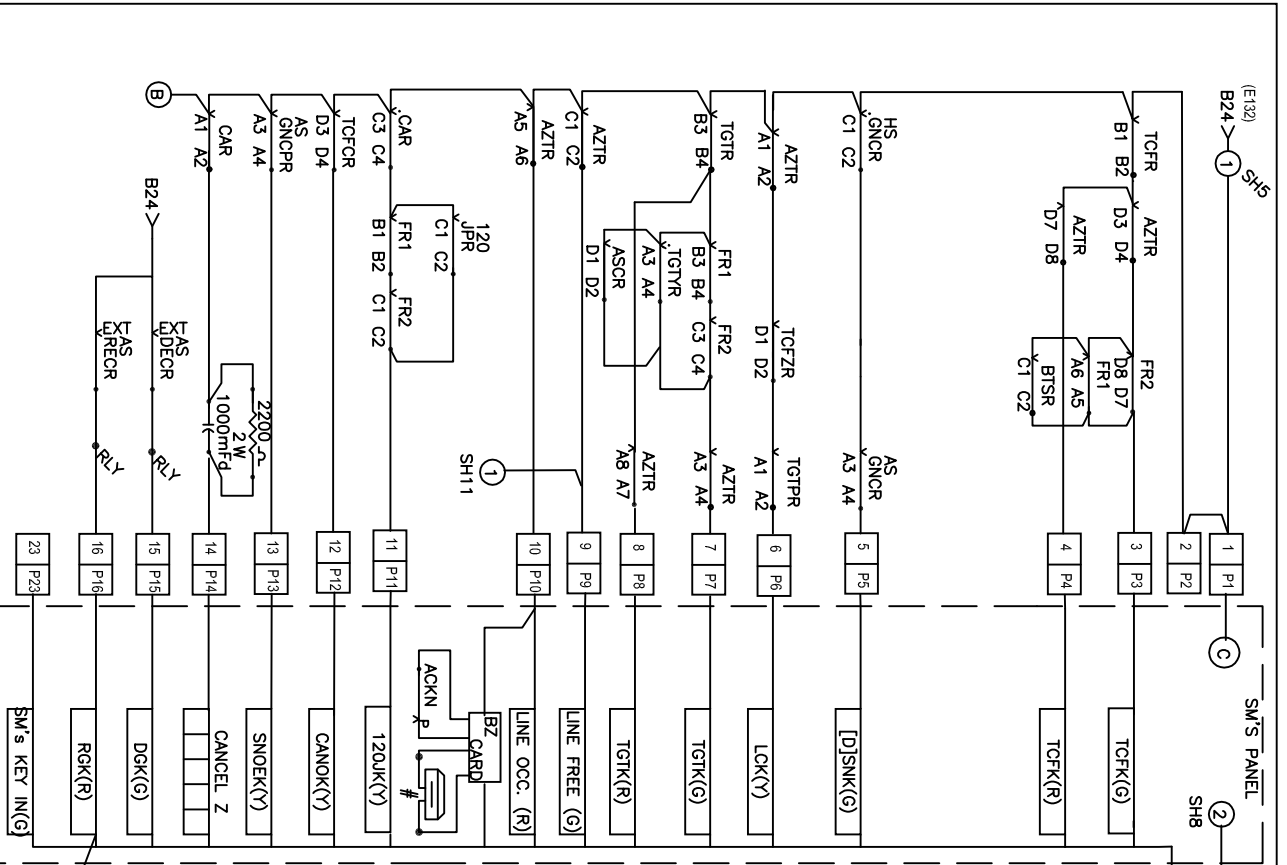
RESET BOX 25 PIN 'D' CONNECTOR



BIPR1 AND BIPR2 COMPLEMENTARY CIRCUIT

(MODIFIED ON DT.26.12.2003)

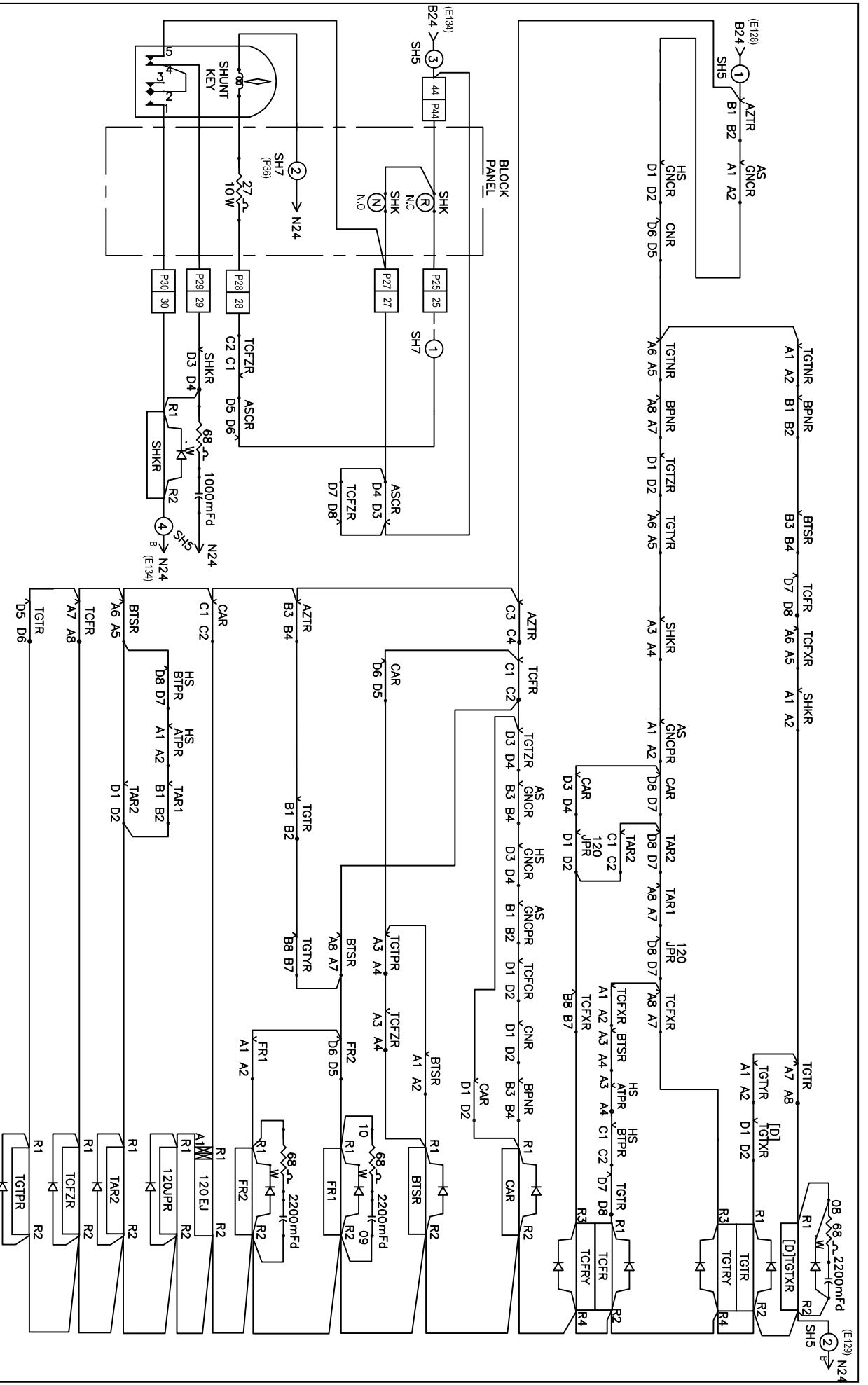
MANUFACTURED BY DELTRON EQUIPMENT & SYSTEMS PVT. LTD.		RDS0 BLOCK PROVING WITH AXLE COUNTER USING UFSBI	
LINE & RESET BOX CIRCUITS (SINGLE LINE)			
DWG. NO. RDS0/S 32020/SH.NO.6Co111 DT. 08.10.2004			



1. # INDICATES BUZZER & INDICATION YELLOW

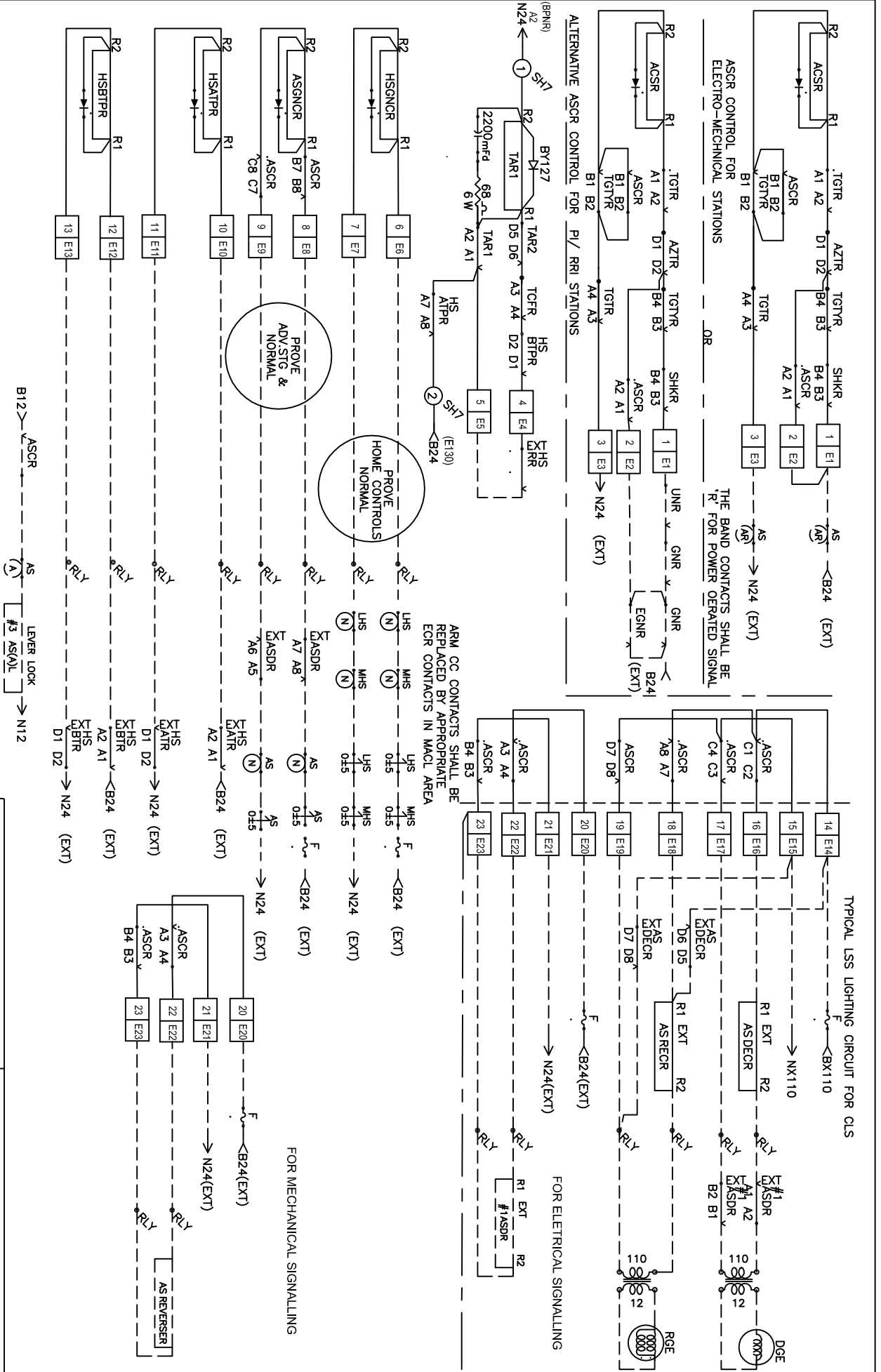
(MODIFIED ON DT.26.12.2005)

MANUFACTURED BY		RDSO	
DELTRON EQUIPMENT & SYSTEMS PVT. LTD.		BLOCK PROVING WITH AXLE COUNTER	
PUSH BUTTON & INDICATION CIRCUITS (SINGLE LINE)		USING UFSBI	
DWG.NO. RDSO/S 32020		SH.NO.76111	
DT. 08.10.2004			



(MODIFIED ON DT.26.12.2005)

MANUFACTURED BY		RDSO	
DELTRON EQUIPMENT & SYSTEMS PVT.LTD.		BLOCK PROVING WITH AXLE COUNTER	
RELAY LOGIC CIRCUITS (SINGLE LINE)		USING UFSBI	
DWG.NO.RDSO/S 32028SH.NO.80F11		DT. 08/10/2004	



TYPICAL LSS LIGHTING CIRCUIT FOR CLS

- #3. LEVER LOCK ON LSS MAY NOT BE PROVIDED WHEN LSS IS POWER OPERATED
- 2. EXT MEANS EXTERNAL TO RELAY RACK
- #1. REQUIRED ONLY WHERE SIGNAL IS BEYOND 2200 IN UNSCREENED AND 600M IN SCREENED CABLE

(MODIFIED ON DT.26.12.2005)

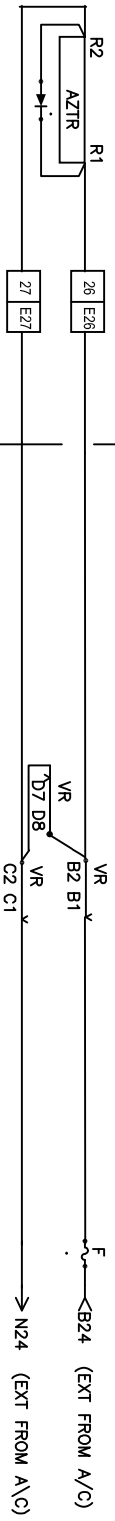
MANUFACTURED BY	RDSO
DELTON EQUIPMENT & SYSTEMS PVT. LTD.	BLOCK PROVING WITH AXLE COUNTER
EXTERNAL CIRCUITS (SINGLE LINE)	USING UFSBI
	DWG.NO. RDSO/S 32020/SH.NO.90F11
	DT. 08.10.2004

FOR MECHANICAL SIGNALLING

FOR ELECTRICAL SIGNALLING

RELAY ROOM

LAST STOP SIGNAL LOCATION

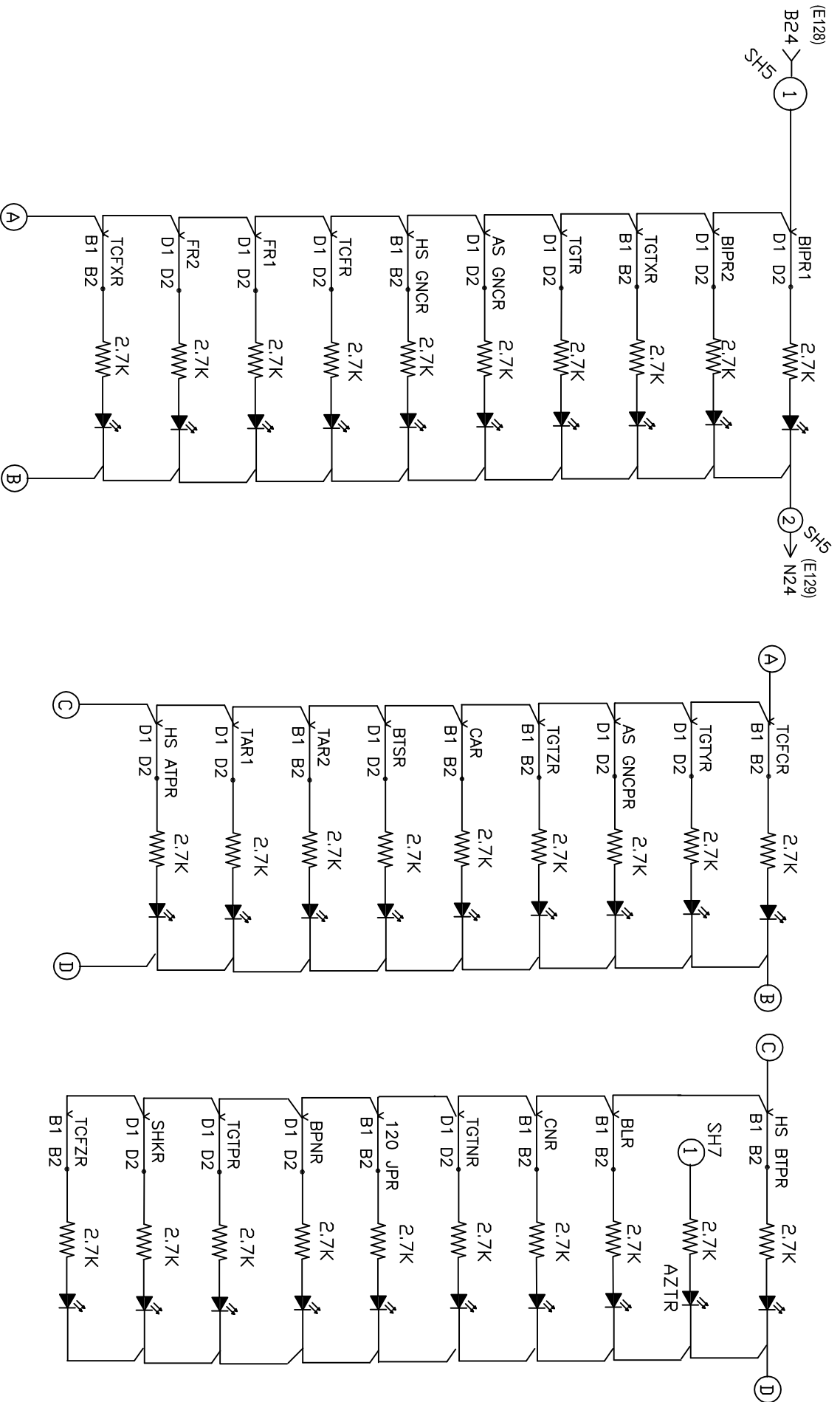


NOTES:
VR-VITAL RELAY OF AXLE COUNTER FIELD UNIT.

(MODIFIED ON DT.26.12.2005)

MANUFACTURED BY	RDSO
DELTRON EQUIPMENT & SYSTEMS PVT. LTD.	BLOCK PROVING WITH AXLE COUNTER
DIGITAL AXLE COUNTER PROVING RELAY CIRCUIT (SINGLE LINE)	USING UFSBI
	DWG.NO. RDSO/S 3202QSH.NO.100F11

DT. 08.10.2004

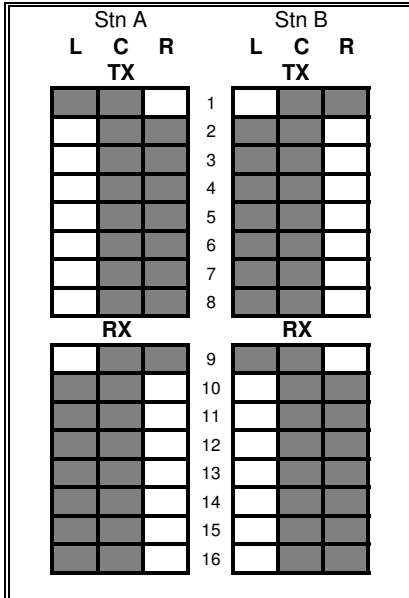


MANUFACTURED BY		RDSO	
DELTRON EQUIPMENT & SYSTEMS PVT. LTD.		BLOCK PROVING WITH AXLE COUNTER	
RELAY INDICATION CIRCUIT WITH		USING UFSBI	
SSDAC RELAY RACK (S/L)		DWG.NO. RDSO/S 32020 SH.NO.110F11	

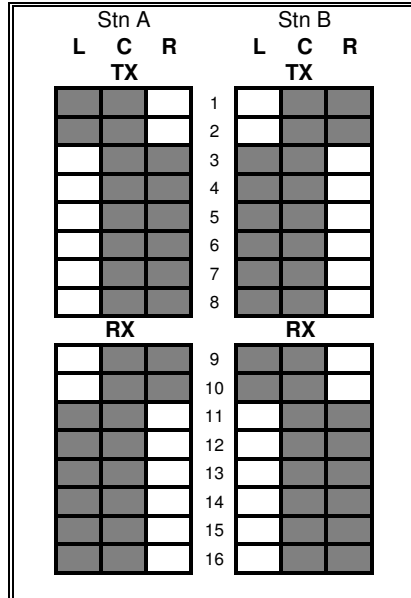
modified on dt.26.12.2005

ANNEXURE - A
ADDRESS CONFIGURATION JUMPERS

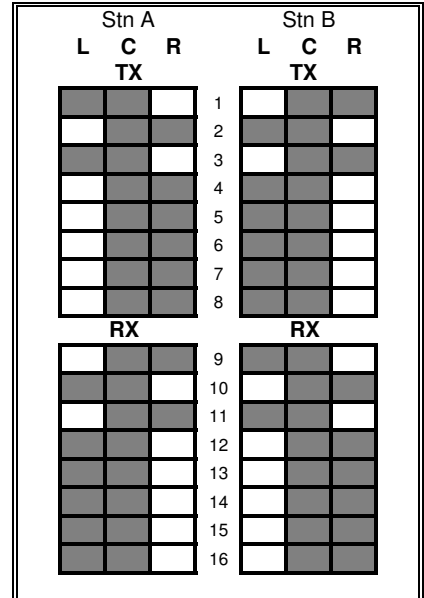
Address Set 1



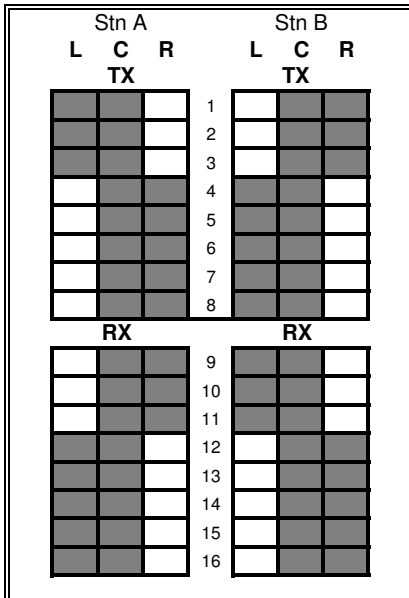
Address Set 2



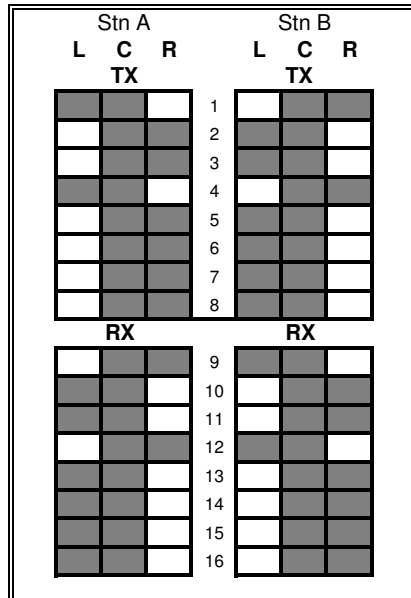
Address Set 3



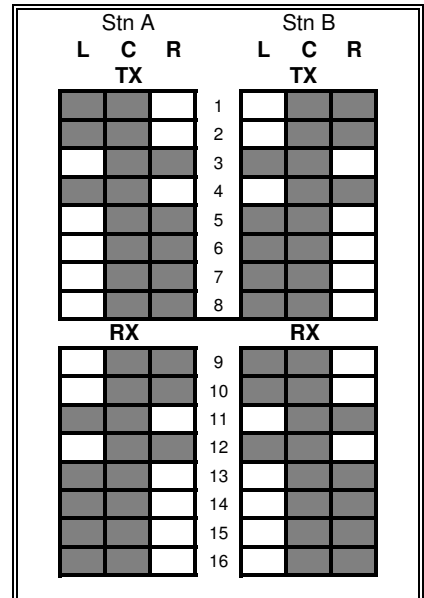
Address Set 4



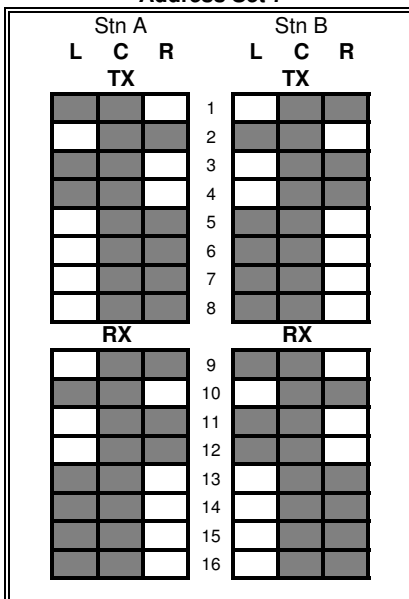
Address Set 5



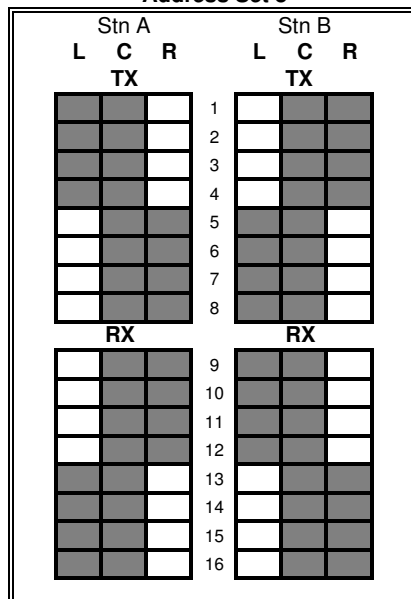
Address Set 6



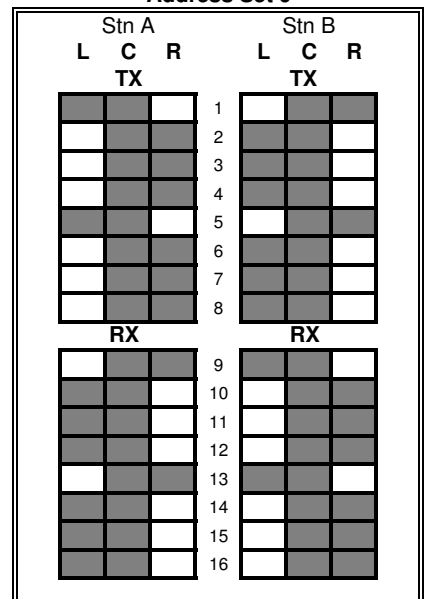
Address Set 7



Address Set 8



Address Set 9



ANNEXURE B**PRE COMMISSIONING CHECK-LIST FOR BLOCK WORKING WITH AXLE COUNTER
USING UFSBI (AS PER RDSO/SPN/188/2004)**

Block working between stations: _____ & _____

Railway: _____ Division: _____

Axle Counter Working on : OFC / Quad Cable

UFSBI Working on : OFC / Quad Cable

Date of installation: _____

Date of commissioning: _____

Sl. No.	Description	Specified Value / nos.	Obtained Value / Nos. (if any)	Ok / Not Ok
1.	Environment	Spacious, Clean, Dry, Well ventilated room preferably with a fan/ exhaust fan.		
2.	Battery	24 V / 120 AH		
3.	Battery Charger	<p>i) Good Quality low ripple battery charger (Axle Counter type) as per IRS: S-86/2000 or IPS module as per RDSO/SPN/165/2004 Nominal Voltage – 24 V/10A (-10% to +20%) at The Output voltage at following 2 conditions must be within 21.6V to 28.8V:</p> <ul style="list-style-type: none"> • Charger ON & UFSBI ON • Charger OFF (for 15 min) & UFSBI ON <p>(Note: The output voltage must be measured at the terminals E128 & E129 of the Instrument. For details of terminals refer drg. No. RDSO/S/32018 Sh No.5 of 12)</p> <p>lii) Separate Power Supply provided for each of BPAC, SSDAC & Block Telephone as stated in Cl. 3.6.1, Cl. 3.6.2 & Cl. 3.6.3 of RDSO/SPN/188/2004.</p>	<p>_____ V</p> <p>_____ V</p>	
4.	Earthing	Value of Earth resistance: < 2Ω		
5.	Lightning Arrestor	Good lightning protection system with proper connection with earth provided from any of the following firms:- M/s Phoenix Contacts or M/s Cape Electric Corpn. or M/s MCML Systems Pvt. Ltd. or M/s Adhunik Power Systems		
6.	Communication Channel	4 wire Voice Channel on OFC (2400 bps , asynchronous) <ul style="list-style-type: none"> • S/N ratio: At least 20 dB • Max. Tx Signal: -7 dBm to -5 dBm • Min. Rx. Level: -12 dBm to -14dBm • BER: Better than 10⁻⁵ 	<p>_____ dB</p> <p>_____ dBm</p> <p>_____ dBm</p>	
7.	Communication Cable	Jelly filled Quad Cable as per specn: IRS: TC 30-05 <ul style="list-style-type: none"> • Length of quad cable : • The cable insulation (must be better 	_____ Km	

		<p>than 10 MΩ /Km when tested with 500V Megger):</p> <ul style="list-style-type: none"> • Loop resistance (should be less than 55 Ω/Km): • Signal loss (should be less than 30 dB at 2.5 KHz): • Near End Cross talk (should be better than 55dB/Km at a frequency of 150 KHz): • Far End Cross talk (should be better than 67.8 dB/Km at a frequency of 150 KHz) : • The armour of the cable must be properly earthed. • The cable shall be terminated as stated in Annexure D 	<p>_____ MΩ</p> <p>_____ Ω</p> <p>_____ dB</p> <p>_____ dB</p> <p>_____ dB</p>	
8.	External Terminals (Centre Link Open type)	All inputs from the Field and the Relay room shall be terminated with proper identification in a separate location to connect to the UFSBI terminals		

Details of the Block Panel, Relay Interlocking Circuit & UFSBI Installed:

Sl. No. & Date of manufacture the UFSBI unit:

Sl. No. of Input Cards: _____

Sl. No. of Output Cards: _____

Sl. No. of CCC Cards: _____

Sl. No. of CPU Cards: _____

Sl. No. of Mother Board: _____

Sl. No. of Reset Box: _____

Sl. No. & Date of manufacture of DC-DC Converter: _____

Sl. No. of Modem: _____

Details of the Relay Interlocking Circuit (all 24V relays):

No. of QN1 Relays: _____

No. of QNA1 Relays: _____

No. of QL1 Relays: _____

No. of Electronic Timer Relays: _____

Initial count of the Reset Counter: _____

Address Code Configuration Jumper

TX

RX

...

...

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CHECKED BY: _____ (Railway Representative)

_____ (Company Representative)

DATE OF INSPECTION: _____

ANNEXURE C**Error code list & Recommended actions for Block Working With UFSBI & DAC in case of Faults/Errors****NOTE: BEFORE TAKING OUT OR INSERTING A CARD, ALWAYS TURN-OFF THE POWER SUPPLY**

Codes	Failure Cause	Recommended Actions
00	NORMAL MODE.	<p>a) Flashing '00' indicates that the system is healthy & functioning properly.</p> <p>b) If this code becomes steady in certain CPU and an error code of '37', '38' or '39' appears (according to the stuck CPU) on the other CPU's try "RESETTING" the system as stated in item no. II.16.</p> <p>c) In case the problem persists change the CPU showing the steady code.</p>
01	Output Latch 1 Read-back bad	a) If the code is displayed simultaneously in more than 1 CPU: Then check if the CCC card is inserted properly in the slot. If the problem still persists replace the CCC card.
02	Output Latch 2 Read-back bad	b) If the code comes on a single CPU: i) First swap the faulty CPU with another slot. ii) If the code shifts with the CPU to the new slot, change the CPU card else change the Output card
05	UFSBI source address mismatch in receive message	Check Address jumpers of both mother cards of connected UFSBI units for their correspondence refer page 33. If the fault is in one CPU card only (unlikely) replace the CPU card.
06	UFSBI destination address mismatch in receive message	Check Address jumpers of both mother cards of connected UFSBI units for their correspondence refer page 33. If the fault is in one CPU card only (unlikely) replace the CPU card.
07	TXENABLE-A/B/C signal produced by Inter-block data selector logic in CCC not matching with Inter-block phase.	If this occurs in all the CPUs, change the CCC Card. This can also happen when the UFSBI is working in 2/2 mode and a further failure occurs. This is not a serious problem and will go up on "RESET".
08	CPU failed to transmit	a) Swap the CPU with another slot, if the problem shifts with the CPU, then change the CPU card.
0A	Clear input to U9 low	b) Check the system, if the fault persists in the same slot, change the CCC card.
0B(Ob)	Ready to accept 'start' command after POST	<p>a) Press "BI-ON" button to start the system within 30 sec. If the button is not pressed in time then all the three CPUs will display "99" code and go to shutdown. To recover from this problem the power supply is to be turned off and the on. After the POST process all the CPUs will display "Ob" again.</p> <p>b) In case any one CPU is showing steady 0B, while others are running with 37, 38 or 39, try "RESETTING" the system as stated in item no. II.16.</p>
0C	PS monitor test in progress in POST	Wait for all CPUs to display "Ob".

10	IN1 complementary failure (Ckt ref. W2 & W10)	<p>Manually RESET the system following the same process as stated in item no. II.15. If the problem persists then</p> <p>i) In case the Error Code is appearing in 1 of the 3 CPU's,</p> <p>a) Swap the Input Card 1 with another Input Card 1 for Error Codes "10" to "1F", observe the outcome</p> <p>b) Swap the Input Card 2 with another Input Card 2 for Error Codes "20" to "2F", observe the outcome.</p> <p>In case (i)-a,b fails to solve the problem,</p> <p>c) Change Input Card 1 for Error Codes "10" to "1F"</p> <p>d) Change Input Card 2 for Error Codes "20" to "2F"</p> <p>Manually RESET the system and observe its operation</p> <p>ii) If the Error codes are appearing in at least 2 of the 3 CPU's simultaneously then check voltages at the respective relay contacts and wago terminals as per circuit diagram <u>Sh. 6A and 6B of 12 of RDSO/S/32018</u> (attached in the Manual) for the inputs <u>IN1-IN7 (Wago W2-W8) and inputs IN1'-IN7' (Wago W10-W15)</u>. For other inputs like <u>IN8, IN9-IN16 (Wago W9, W64-W71) and IN8', IN9'-IN16' (Wago W17, W72-W79)</u> check the looping as per circuit referred above. Manually RESET the system and observe its operation</p> <p>iii) If the problem still persists check the flat cable connections between the wago board and motherboard as per dig. 2.1. Manually RESET the system and observe its operation</p> <p>iv) In case the error still persists, replace-</p> <p>a) Input Card 1 for Error Codes "10" to "1F"</p> <p>b) Input Card 2 for Error Codes "20" to "2F"</p> <p>Manually RESET the system and observe its operation</p>
11	IN2 complementary failure (Ckt ref. W3 & W11)	
12	IN3 complementary failure (Ckt ref. W4 & W12)	
13	IN4 complementary failure (Ckt ref. W5 & W13)	
14	IN5 complementary failure (Ckt ref. W6 & W14)	
15	IN6 complementary failure (Ckt ref. W7 & W15)	
16	IN7 complementary failure (Ckt ref. W8 & W16)	
17	IN8 complementary failure (Ckt ref. W9 & W17)	
18	OUT1 complementary failure (Ckt ref. W18 & W26)	
19	OUT2 complementary failure (Ckt ref. W19 & W27)	
1A	OUT3 complementary failure (Ckt ref. W20 & W28)	
1B	OUT4 complementary failure (Ckt ref. W21 & W29)	
1C	OUT5 complementary failure (Ckt ref. W22 & W30)	
1D	OUT6 complementary failure (Ckt ref. W23 & W31)	
1E	OUT7 complementary failure (Ckt ref. W24 & W32)	
'1' (1F)	OUT8 complementary failure (Ckt ref. W25 & W33)	
20	IN9 complementary failure (Ckt ref. W64 & W72)	<p>Manually RESET the system following the same process as stated in item no. II.15. If the problem persists then</p> <p>In case the Error Code is appearing in 1 of the 3 CPU's,</p> <p>a) Swap the Input Card 1 with another Input Card 1 for Error Codes "10" to "1F", observe the outcome</p> <p>b) Swap the Input Card 2 with another Input Card 2 for Error Codes "20" to "2F", observe the outcome.</p> <p>In case (i)-a,b fails to solve the problem,</p> <p>c) Change Input Card 1 for Error Codes "10" to "1F"</p> <p>d) Change Input Card 2 for Error Codes "20" to "2F"</p> <p>Manually RESET the system and observe its operation</p> <p>If the Error codes are appearing in at least 2 of the 3 CPU's simultaneously then check voltages at the respective relay contacts and wago terminals as per circuit diagram <u>Sh. 6A and 6B of 12 of RDSO/S/32018</u> (attached in the Manual) for the inputs. Manually RESET the system and observe its operation</p> <p>i) If the problem still persists check the flat cable connections between the wago board and motherboard as per dig. 2.1. Manually RESET the system and observe its operation</p> <p>ii) In case the error still persists, replace-</p> <p>a) Input Card 1 for Error Codes "10" to "1F"</p> <p>b) Input Card 2 for Error Codes "20" to "2F"</p> <p>Manually RESET the system and observe its operation</p>
21	IN10 complementary failure (Ckt ref. W65 & W73)	
22	IN11 complementary failure (Ckt ref. W66 & W74)	
23	IN12 complementary failure (Ckt ref. W67 & W75)	
24	IN13 complementary failure (Ckt ref. W68 & W76)	
25	IN14 complementary failure (Ckt ref. W69 & W77)	
26	IN15 complementary failure (Ckt ref. W70 & W78)	
27	IN16 complementary failure (Ckt ref. W71 & W79)	
28	OUT9 complementary failure (Ckt ref. W80 & W88)	
29	OUT10 complementary failure (Ckt ref. W81 & W89)	
2A	OUT11 complementary failure (Ckt ref. W82 & W90)	
2B	OUT12 complementary failure (Ckt ref. W83 & W91)	
2C	OUT13 complementary failure (Ckt ref. W84 & W91)	
2D	OUT14 complementary failure (Ckt ref. W85 & W92)	

2E	OUT15 complementary failure (Ckt ref. W86 & W93)	
'2' (2F)	OUT16 complementary failure (Ckt ref. W87 & W94)	
30	BIPR1 complementary failure	Take similar steps as in the case for other relays.
31	BIPR2 complementary failure	
33	Link Fail (SSB mode)	<p>If the error code appears in any one of the CPU card: i) Swap it with other slot. If the error shifts with the card Change the CPU card.</p> <p>If the error code appears in any one of the CPU card: i) Check the communication link from crone box, terminal, to modem RJ11 jack. If external communication link is confirmed OK change the CCC Card. ii) If the problem still persists, Switch off the Modem , and then restart it after 60s. iii) If the problem still persists perform Power-On Reset of the System and observe its operation</p>
34	RSSB mode	This mode indicates that the UFSBI on the other side is not receiving data. Try by checking the channel, modem and communication in that order as stated for error code '33'. Ensure that the other side System is working and showing error code '33' only.
37	CPU A bad	i) Change corresponding CPU Cards in which the static error code is showing. Manually RESET the system and observe its operation. ii) If this indication is on all the CPU cards then change the CCC (Communication) Card. Manually RESET the system and observe its operation
38	CPU B bad	
39	CPU C bad	
3A	Inter-processor communication channel failure (common mode)	If occurs in all the CPUs, change the communication card. Manually RESET the system and observe its operation
40	OUT1 forced pickup (LFR Non-vital relay)	<p>Manually RESET the system following the same process as stated in item no. II.15. If the problem persists then For codes "40" to "4F" check the corresponding relays as follows</p> <p>i) Check if the relay is properly plugged and the retaining clip is place correctly. Also ensure that all its receptacles are rightly placed and locked in the plug board. Manually RESET the system and observe its operation.</p> <p>ii) Check the corresponding relays to see if the front contacts somehow got voltage or back contacts got broken or if the relay has got picked up out of sequence by some stray feed given externally. Manually RESET the system and observe its operation.</p> <p>iii) Check the wago terminals for unwanted shorting between terminals other than those showed in circuit. In case any such short circuits found please remove the same. Manually RESET the system and observe its operation.</p>
41	OUT2 forced pickup (TCFXR vital relay)	
42	OUT3 forced pickup (TCFCR vital relay)	
43	OUT4 forced pickup (TGTYR vital relay)	
44	OUT5 forced pickup (ASGN CPR vital relay)	
45	OUT6 forced pickup (TGTZR vital relay)	
46	OUT7 forced pickup (BLR vital relay)	
47	OUT8 forced pickup	
48	OUT9 forced pickup	
49	OUT10 forced pickup	
4A	OUT11 forced pickup	
4B	OUT12 forced pickup	<p>v) Check the corresponding relays to see if the front contacts somehow got voltage or back contacts got broken or if the relay has got picked up out of sequence by some stray feed given externally. Manually RESET the system and observe its operation.</p> <p>vi) Check the wago terminals for unwanted shorting between terminals other than those showed in circuit. In case any such short circuits found please remove the same. Manually RESET the system and observe its operation.</p>
4C	OUT13 forced pickup	
4D	OUT14 forced pickup	
4E	OUT15 forced pickup	
4F	OUT16 forced pickup	

50	IN1 jitter	Jittery contacts of the relay may occur when a particular relay does not stabilize, i.e. it `chatters`. This may happen due to <u>low coil voltage</u> , <u>faulty receptacles</u> (coil or contacts) or <u>improper plugging of the relays</u> without retaining clips. The following actions are suggested: a) Check the setting in the plug board for proper plugging b) Check firmness of the contacts and all connections from output connector coil (for output relays). c) Check coil and contact voltage for each input paths from the circuit. Try removing and re-plugging each relay in the circuit path separately ensuring that it is fitted firmly to the plug board and the retaining clip is in the right place d) For output relays, try to measure the coil voltage at the corresponding wago terminal as well as the relay coil R1-R2. Note that this voltage is available for less than ½ sec, so using an analog voltmeter is preferred. It is advisable to try by changing the corresponding output card. Manually RESET the system and observe its operation.
51	IN2 jitter	
52	IN3 jitter	
53	IN4 jitter	
54	IN5 jitter	
55	IN6 jitter	
56	IN7 jitter	
57	IN8 jitter	
58	OUT1 jitter (LFR Non-vital relay)	
59	OUT2 jitter (TCFXR vital relay)	
5A	OUT3 jitter (TCFCR vital relay)	
5B	OUT4 jitter (TGTYR vital relay)	
5C	OUT5 jitter (ASGN CPR vital relay)	
5D	OUT6 jitter (TGTZR vital relay)	
5E	OUT7 jitter (BLR vital relay)	
5F	OUT8 jitter	
60	IN9 jitter	
61	IN10 jitter	Jittery contacts of the relay may occur when a particular relay does not stabilize, i.e. it `chatters`. This may happen due to <u>low coil voltage</u> , <u>faulty receptacles</u> (coil or contacts) or <u>improper plugging of the relays</u> without retaining clips. The following actions are suggested: a) Check the setting in the plug board for proper plugging b) Check firmness of the contacts and all connections from output connector coil (for output relays). c) Check coil and contact voltage for each input paths from the circuit. Try removing and re-plugging each relay in the circuit path separately ensuring that it is fitted firmly to the plug board and the retaining clip is in the right place d) For output relays, try to measure the coil voltage at the corresponding wago terminal as well as the relay coil R1-R2. Note that this voltage is available for less than ½ sec, so using an analog voltmeter is preferred. It is advisable to try by changing the corresponding output card. Manually RESET the system and observe its operation.
62	IN11 jitter	
63	IN12 jitter	
64	IN13 jitter	
65	IN14 jitter	
66	IN15 jitter	
67	IN16 jitter	
68	OUT9 jitter	
69	OUT10 jitter	
6A	OUT11 jitter	
6B	OUT12 jitter	
6C	OUT13 jitter	
6D	OUT14 jitter	
6E	OUT15 jitter	
6F	OUT16 jitter	
70	BIPR1 jitter	
71	BIPR2 jitter	
73	Shut down relay phase generator failure (phase not changing within 30 minutes)	If this indication is on a single CPU card change the CPU card. If all the 3 CPUs show this code then change the communication card.
75	Timer2 input bad	RESET the system by pressing RESET button and then BI-OK button in a sequential manner. If problem persists change corresponding CPU card.
78	Data bus check failed	
79	EPROM Checksum failed	
7A	BIPR1 input to GAL stuck at low	RESET the system by pressing RESET button and then BI-OK button in a sequential manner. If problem persists change corresponding CPU card. If the problem still remains change CCC Card. When all CPUs show the code, change CCC.
7B	BIPR2 input to GAL stuck at low	
7C	BIPR1 command output not matching with shutdown relay phase.	RESET the system by pressing RESET button and then BI-OK button in a sequential manner. If problem persists change corresponding CPU card.
7D	BIPR1 command output not matching with shutdown relay phase.	

80	OUT1 failed to pick up	Check the LEDs in the output card. If LED corresponding to that relay does not glow then change output card, else check the relay connections for corresponding relays following the circuit diagrams. Note: Indications in the output card – Indication 1, 2, and 3 from the top are indications for CPU-C, CPU-B and CPU-A respectively. The next eight indications (from the top)are for output relays “M16 – M2” in case of Output Card1 and “M32 – M18” in case of Output Card2.
81	OUT2 failed to pick up	
82	OUT3 failed to pick up	
83	OUT4 failed to pick up	
84	OUT5 failed to pick up	
85	OUT6 failed to pick up	
86	OUT7 failed to pick up	
87	OUT8 failed to pick up	
88	OUT9 failed to pick up	
89	OUT10 failed to pick up	
8A	OUT11 failed to pick up	
8B	OUT12 failed to pick up	
8C	OUT13 failed to pick up	
8D	OUT14 failed to pick up	
8E	M15 failed to pick up	
8F	M16 failed to pick up	
90	BIPR1 or BIPR2 or both picked up before POST initialization	At power-on, before performing the RESET operation by pressing “BI-OK” button, the relays should not pick-up and the voltage at the contacts should correspond. a) If the error code appears on a single CPU: Check whether Input Card 1 corresponding to that CPU are plugged-in properly. b) If all the 3 CPU show the same error code then: Check the contacts of BIPR1 & BIPR2 and see that the retaining clip is at its right position. Check up the voltage at WAGO terminal pins 34, 35, 36, 37 & 44 as per Sh No. 6C of 12 of Drg. No. RDSO/S/32018.
92	UFSBI address bad	Check address jumpers at the back panel and see if they are connected tightly and in proper place as instructed in Pg. XX of Users Manual.
93	Output voter (GAL) differential output complementary mismatch (run-time).	a) If the fault comes in single CPU: i) Swap the CPU from the slot showing the error code with another . If the error shifts with the CPU, then change the CPU, and observe the outcome ii) If the error does not shift with the faulty card, then change the Output cards , one by one and observe the outcome. b) If the fault occurs in more than 1 CPU: Change the output cards one by one and observe the outcome.
95	GAL complementary mismatch in output card1 (POST checking)	Same as error code 93 but here change only Output Card 1.
96	GAL complementary mismatch in output card2 (POST checking)	Same as error code 93 but here change only Output Card 2.
99	'Start' not pressed within 30 sec. of power on.	RESET the system by turning the POWER-off and then ON and then pressing the RESET button and BI-OK button. 1. Observe that the feed for both BIPR1 & BIPR2 are established in the CCC Card (indicated by two LEDs at the bottom. Indication1 is for BIPR2 & Indication 2 is for BIPR1). If these two indications are missing than change CCC Card else, check the following: i) 24V output of DC-DC converter. ii) Check connector no. SN1 and CN4 as per fig. 2.1 (two pin connector with yellow wire). iii) Change the CCC Card. 2. If BIPR1 & BIPR2 feed are O.K, check terminal connections at the back of reset box. 3. Check 10 core cable in connectors CN3 & CN11 as per interconnectivity did. In page 35/62

A0	X-ACTIVE and X-ACTIVE/ signals found mismatched in WDT check.	<p>a) If the fault comes in single CPU:</p> <p>i) Swap the CPU from the slot showing the error code with another . If the error shifts with the CPU, then change the CPU, and observe the outcome</p> <p>ii) If the error does not shift with the faulty card, then change CCC card and observe the outcome.</p> <p>b) If the fault occurs in more than 1 CPU:</p> <p>Change the CCC card and observe the outcome.</p>
A1	Active signal bad detected in wdt check (stuck_at_high)	
A2	OUTEN signal stuck_at_high	
A3	Output latches detected non-zero during in wdt checking	
A4	Active signal bad in wdt2_check (stuck_at_high)	
A5	IPC phase sequence bad	
A6	IPC phase sequence bad	
A7	IPC phase sequence bad	
A8	IPC phase sequence bad	<p>RESET the system by pressing RESET button and then BI-OK button in a sequential manner. If problem persists change CCC Card.</p>
AA	Relay check in progress in POST / output latch1 detected bad in zero test	
AB	Latch2 bad in zero test	<p>This is not a fault code when displayed during the POST mode. But during the functioning of the system if this code somehow appears this is treated as a fault.</p> <p>a) If the fault comes in single CPU:</p> <p>i) Swap the CPU from the slot showing the error code with another . If the error shifts with the CPU, then change the CPU, and observe the outcome</p> <p>ii) If the error does not shift with the faulty card, then change Output card 1 and observe the outcome.</p> <p>b) If the fault occurs in more than 1 CPU:</p> <p>Change the Output card 1 and observe the outcome.</p>
B0	Stack check failed	<p>a) If the fault comes in single CPU:</p> <p>i) Swap the CPU from the slot showing the error code with another . If the error shifts with the CPU, then change the CPU, and observe the outcome</p> <p>ii) If the error does not shift with the faulty card, then change Output card 2 and observe the outcome.</p> <p>b) If the fault occurs in more than 1 CPU:</p> <p>Change the Output card 2 and observe the outcome.</p>
B1	Rapid address check fail	
B4	Register check fail	
B5	BIPR2 (LFR) relay picked up out of phase	<p>a) If the fault comes in single CPU:</p> <p>e) Swap the Input card from the slot showing the error code with another working slot.</p> <p>ii) If the error does not shift with the faulty card, then change CPU card and observe the outcome.</p> <p>b) If the fault occurs in more than 1 CPU:</p> <p>Change the CCC and observe the outcome.</p>
B6	BIPR1 relay picked up out of phase	
B7	Backup check fail	<p>RESET the system by pressing RESET button and then BI-OK button in a sequential manner. If problem persists change CCC Card.</p>
B8	Neighbour shutdown fail for A	
B9	Neighbour shutdown fail for B	
BA	Neighbour shutdown fail for C	<p>RESET the system by pressing RESET button and then BI-OK button in a sequential manner. If problem persists change corresponding CPU card. If the problem still remains change CCC Card.</p>
BD	BIPR1 dropped out of phase	
BE	BIPR2 (LFR) dropped out of phase	
C1	IPC phase timer out of range/not working	
C6	Sustained mismatch between self parallel input and neighbour parallel input	
C9	Data bus error	
CA	Inter block phase sequence error	

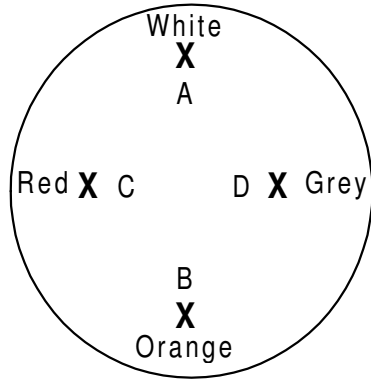
D0	GAL 1 illegal high	Manually RESET the system following the same process as stated in item no. II.15. If the problem persists then change Output Card1
D1	GAL 2 illegal high	
D2	GAL 3 illegal high	
D3	GAL 4 illegal high	
D4	GAL 5 illegal high	
D5	GAL 6 illegal high	
D6	GAL 7 illegal high	
D7	GAL 8 illegal high	
D8	GAL 9 illegal high	Manually RESET the system following the same process as stated in item no. II.15. If the problem persists then change Output Card 2
D9	GAL 10 illegal high	
DA	GAL 11 illegal high	
DB	GAL 12 illegal high	
DC	GAL 13 illegal high	
DD	GAL 14 illegal high	
DE	GAL 15 illegal high	
DF	GAL 16 illegal high	
E0	TXAEN signal from CPU improper (stuck at high/low)	RESET the system by pressing RESET button and then BI-OK button in a sequential manner. If problem persists change corresponding CPU card. If the problem still persists change CCC.
E1	TXBEN signal from CPU improper (stuck at high/low)	
E2	TXCEN signal from CPU improper (stuck at high/low)	
E8	GAL output complementary mismatch for BIPR1	RESET the system by pressing RESET button and then BI-OK button in a sequential manner. If problem persists change corresponding CPU card. If the problem still remains change CCC Card.
E9	GAL output complementary mismatch for BIPR2	
EB	Watchdog test by pulse withdrawal failed	
EC	PULSEN signal stuck at high (in wat check)	
ED	BIPR2 feed to gal not low in BIPR1 phase	
F1	Configuration failure (output card1 absent)	RESET the system by pressing RESET button and then BI-OK button in a sequential manner. If problem persists change corresponding CPU card. If the code comes in more than 1 CPU, check that all the cards are mated correctly to motherboard
F2	Configuration failure (output card2 absent)	
F5	CPU_ID failure	RESET the system by pressing RESET button and then BI-OK button in a sequential manner. If problem persists change corresponding CPU card.
F8	FRSNESS pulse stuck at high	
F9	Vcc monitoring latch Q output stuck at 0 (POST checking)	
FA	BIPR gal inputs not going low during zero test (any of BIPR1 and BIPR2 or both)	
FB	BIPR1 or BIPR2 feed from U28 stuck at high in zero test/	RESET the system by pressing RESET button and then BI-OK button in a sequential manner. If problem persists change CCC Card.
FC	ST pulse stuck at low	RESET the system by pressing RESET button and then BI-OK button in a sequential manner. If problem persists change corresponding CPU card.
FD	FRSNESS pulse stuck at high	RESET the system by pressing RESET button and then BI-OK button in a sequential manner. If problem persists change corresponding CPU card. If the problem still remains change CCC Card.
FE	ST pulse stuck at high	RESET the system by pressing RESET button and then BI-OK button in a sequential manner. If problem persists change corresponding CPU card.

NOTE: AFTER EACH PROCESS, PERFORM THE RESET OPERATION TO RESTART THE MUX.

ANNEXURE D

DETAILS OF QUAD CABLE CONNECTION

Details of One Quad Colour:

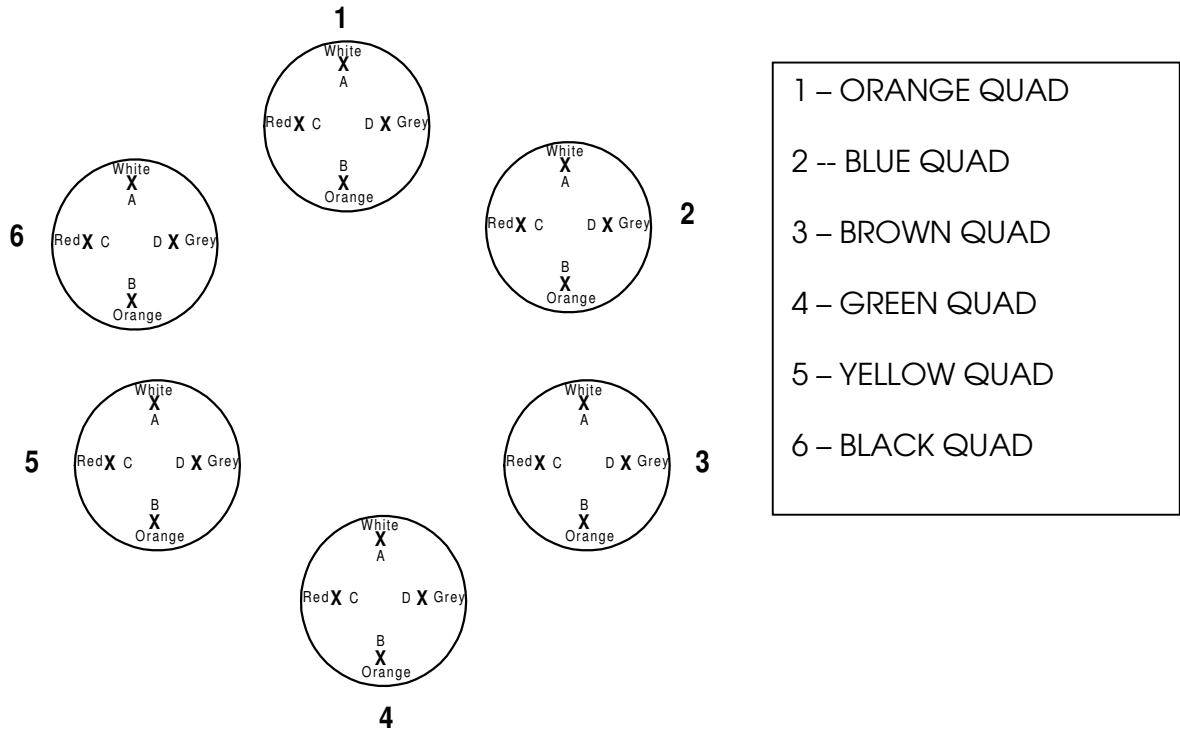


Pair 1: White & Orange colour i.e. 'A' wire and 'B' wire of designated colour quad.

Pair 2: Red & Grey colour i.e. 'C' wire and 'D' wire of designated colour quad.

Each Quad is binded by the respective quad colour "BINDER"

Quad Position in the cable:



Quadding arrangement of cable:*Table 1*

Colour scheme of PE insulated Quads					
Quad Colour	Quad Number	Colour of Conductor Insulation			
		'A' wire	'B' wire	'C' wire	'D' wire
Orange	1	White	Orange	Red	Orange
Blue	2	White	Blue	Red	Blue
Brown	3	White	Brown	Red	Brown
Green	4	White	Green	Red	Green
Yellow	5	White	Yellow	Red	Yellow
Black	6	White	Black	Red	Black

Wire 'A' & 'B' shall form a pair and 'C' & 'D' shall form another pair of quad colour.

Precautions to be taken during wiring / connections of Axle Counter systems during Installation or maintenance

- In a quad of each colour, the designated pair of quad (mentioned in Table 1) should be used for circuits.
 'A' wire & 'B' wire : Pair 1 of each colour of quad
 'C' wire & 'D' wire : Pair 2 of each colour of quad
- No parallel signaling / other cable should be connected to the quad cable for the circuit operation
- If any wire of the pair of quad is broken / non-functional, then use fresh pair of other quad colour
- Do not make the two different wires of different quad pairs (colour) for making a pair to run a circuit operational.