

ST-24

- UFSBI (universal fail safe block interface) for D/L

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- **It is non a co-operative , user-friendly type block instrument capable of providing the last vehicle detection in both single line and double line section.**
- **The block panel provided, offer audio and visual indication for all vital information.**

Why Ufsbi

- **The interlocking circuits and input/output through Q-series relays provide galvanic isolation, making the system suitable in both RE & Non- RE sections.**
- **The system is media independent i.e. it works on Copper cable, OFC or microwave without hampering the fail-safety of the operation.**
- **The system is triple modular redundant which means increase in availability. This system also holds the final status using latch relays so that during Power supply or any failure it remains in last operating state.**

Advantage of ufsbi

- **Easy to operate & maintain .**
- **Uses Axle Counter for Block Occ / Free verification & Last Vehicle Check.**
- **Safety level SIL-4.**
- **The system is triple modular redundant which means increase in availability. This system also holds the final status using latch relays so that during Power supply or any failure it remains in last operating state.**
- **The system is media independent i.e. it works on Copper cable, OFC or microwave without hampering the fail-safety of the operation.**
- **Used in RE area as well as non RE AREA.**

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.**

Principle of working (contd.....)

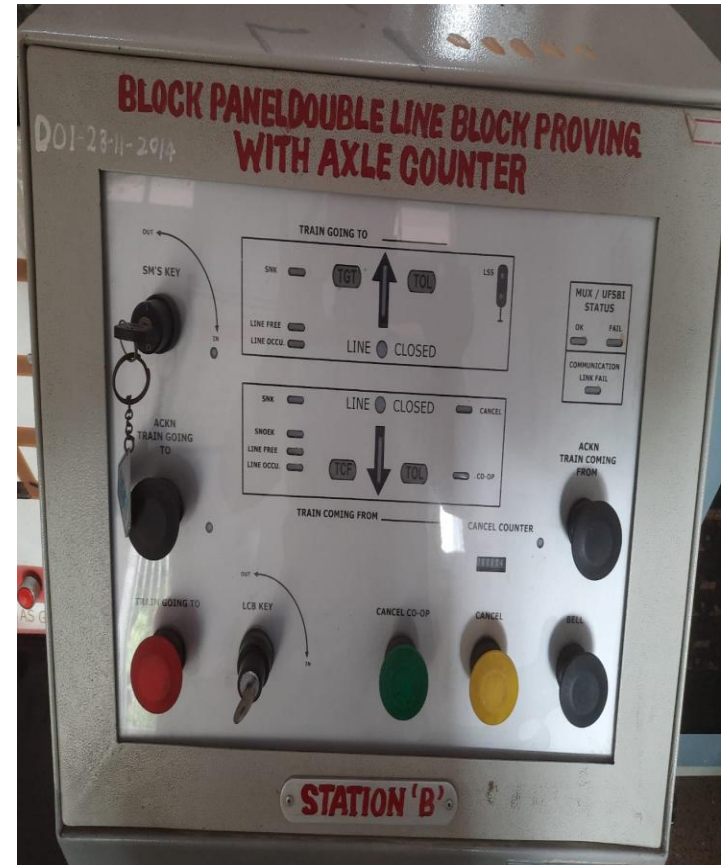
- The Last Stop Signal assumes 'ON' aspect automatically on entry of train into block section and retains this 'ON' position, till a fresh "LINE CLEAR" is obtained.**
- Block section automatically shows "TRAIN ON LINE" on block panel when a train enters into the block section on "LINE CLEAR".**
- Audio – Visual alarms for Train entry/exit, to/ from block section are provided and are to be acknowledged.**
- "LINE CLOSE" feature is automatic after complete arrival of train.**

System Components

- **The System comprises of the following items as per RDSO/SPN/188/2004**
- **BLOCK PANEL (As per drawing no. RDSO/S 32019)
(1 PAIR)**
- **UFSBI (As per RDSO/SPN/147/2005 with ammdt. 1)
(1 PAIR)**
- **RELAY RACK (As per drawing no. RDSO/S 32020)
(1 PAIR)**
- **Block Telephone (As per RDSO/SPN/191/2006) (1 PAIR)**
- **Single Section Digital Axle Counter
(As per RDSO/SPN/177/2003) (1 PAIR)**

INDICATIONS (DL) ON BLOCK PANEL

- LINE CLOSE Indication (UP & DN): **Yellow**
- TRAIN COMING FROM Indication: **Green**
- TRAIN GOING TO Indication: **Green**
- TOL Indication (UP & DN): **Red**
- Cancel CO-OP Indication: **Yellow**
- Cancel Indication: **Yellow**
- SNK Indication (ADVANCE & HOME): **Yellow**
- SNOEK Indication: **Yellow**
- LSS Indication: **Red**
- LSS Indication: **Green**
- LINE FREE Indication (UP & DN): **Green**
- LINE OCCUPIED Indication (UP & DN): **Red**
- MUX / UFSBI Status OK Indication: **Green**
- MUX / UFSBI Status Fail Indication: **Red**
- Communication Link Fail Indication: **Yellow**



PUSH BUTTONS, KEYS & COUNTER (DL) ON BLOCK PANEL

- “Bell” Button: Black
- “Train Going To” Button: Red
- “ACKN” Button (UP & DN): Black
- “Cancel Co-op” Button: Green
- “Cancel” Button: Yellow
- “LCB” Key
- SMs Key
- Counter - Cancellation
- Call attention Buzzer -Intermittent
- Train Entry / Exit Buzzer (SENDING) -Continuous
- Train Entry / Exit Buzzer (SENDING) -Intermittent



UFSBI

- **The UFSBI system is a digital multiplexer used for communicating the status of relay(s) between stations in a fail safe manner. The communication is full duplex.**
- **The medium of communication is voice / data channels on Optical fiber or copper cable.**
- **The multiplexer with its accessories, relays and power supply are housed in a cubicle.**

Parts of UFSBI

- UFSBI consists of the following parts:

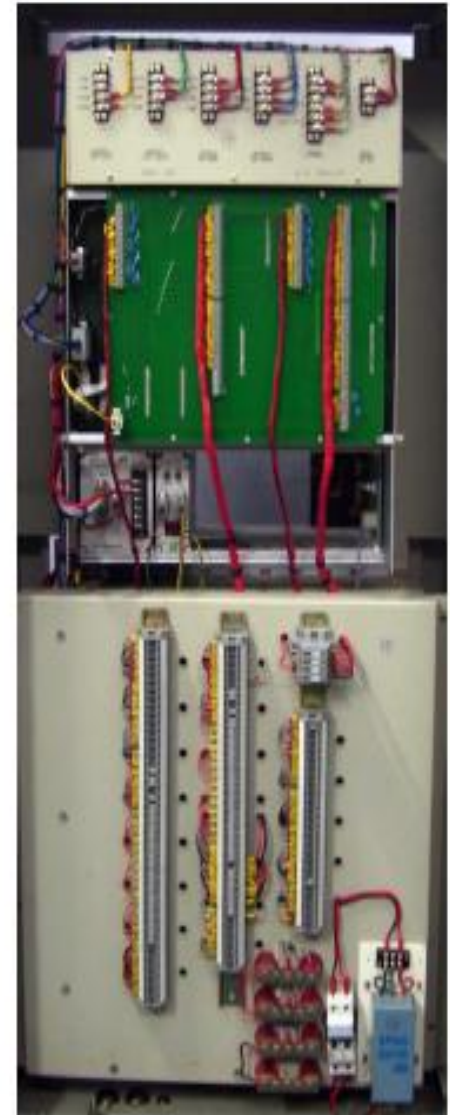
1. DC-DC Converter

2. UFSBI-DS

3. Relay



FRONT VIEW

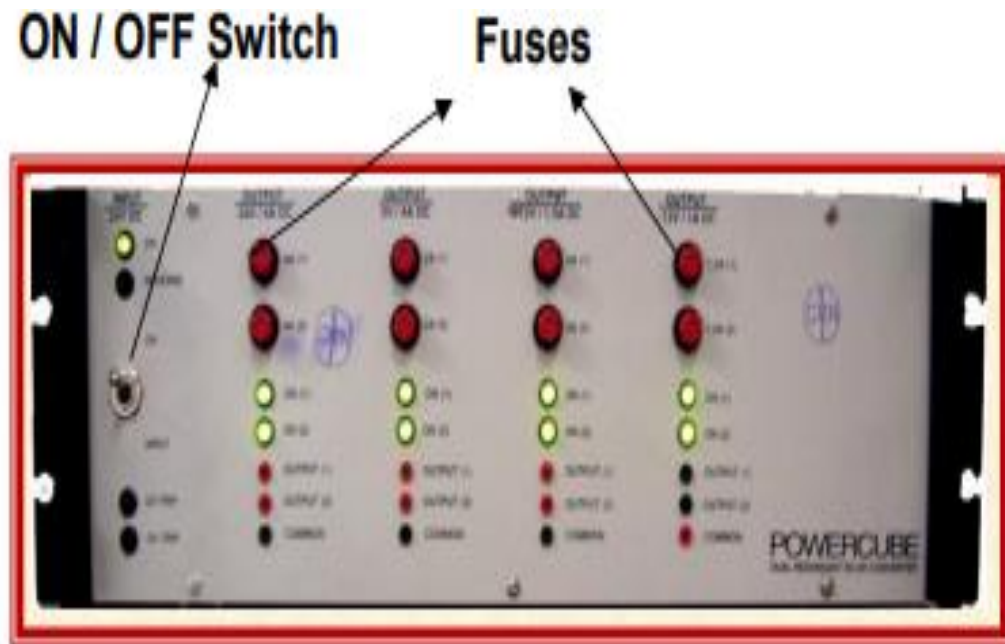


BACK VIEW

DC-DC Converter

**Input 24V DC +20% -
10%,10 Amps Output**

- 1. 24V DC 4 Amps**
- 2. 5V DC 4 Amps**
- 3. +12V DC 1.5 Amps**
- 4. -12V DC 1.5 Amps**



DC - DC CONVERTER FRONT VIEW

Features of the power supply

- Input-output isolation.**
- Input over voltage and under voltage protection.**
- Output short circuit and over load protection.**
- 24V DC output is isolated from other outputs.**
- Ripple is less than 50mv at rated value.**
- Efficiency is more than 70%.**
- Works on “HOT STAND-BY” mode.**
- PSMON(Power Supply Monitoring Unit) is provided to initiate audio visual alarm in SM’s room on UFSBI ALARM PANEL .**

PARTS OF UFSBI

UFSBI-DS consisting of the following parts

- **Input card**
- **CPU card**
- **Control cum Communication Card (CCC)**
- **Output Card**
- **Reset Box.**
- **MODEM.**
- **UFSBI Alarm Panel**

PARTS OF UFSBI

Input Card 1-6 **CPU Card 1-3** **Output Card 1&2** **CC Card**

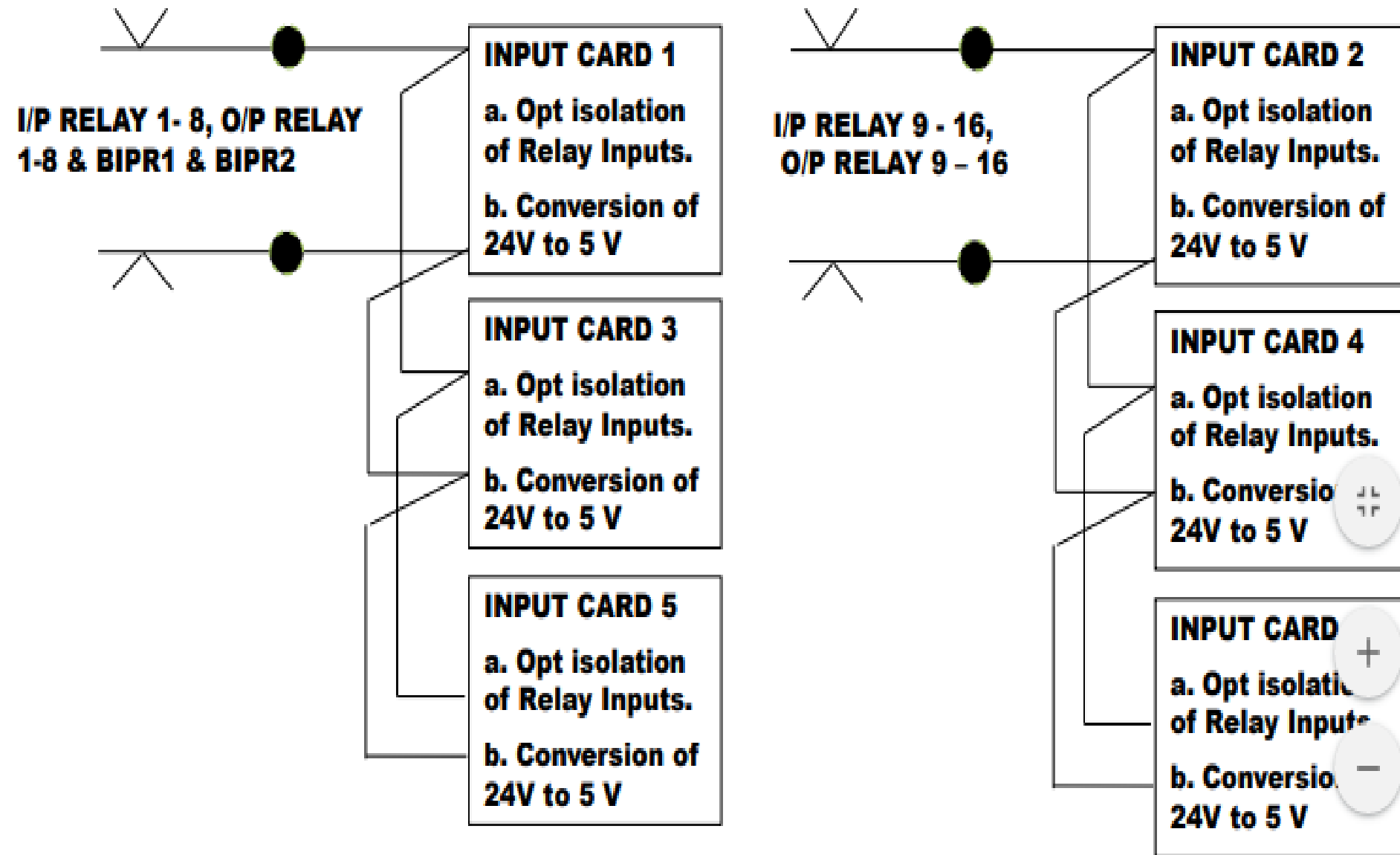


Version Display

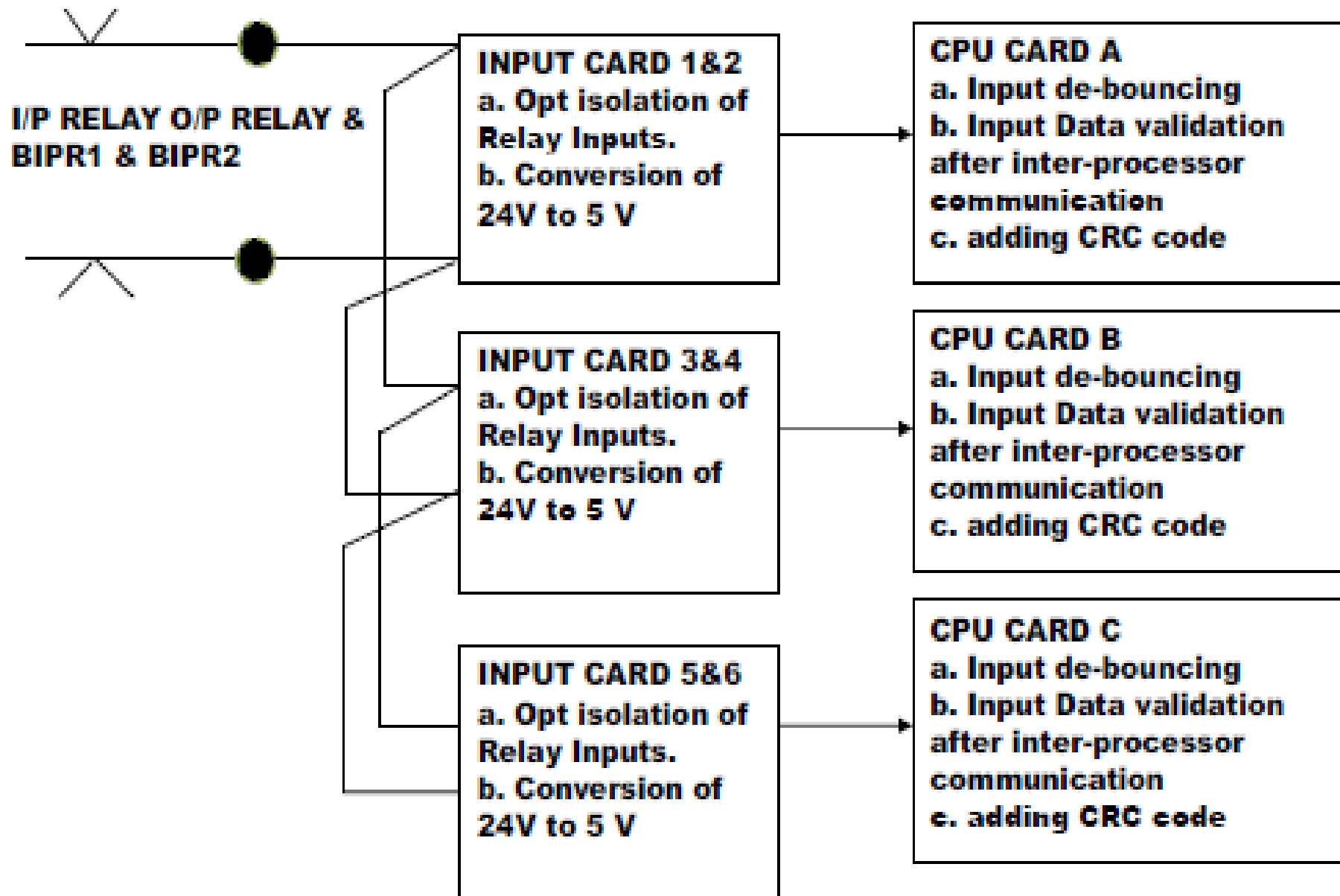
Reset Box

MODEM

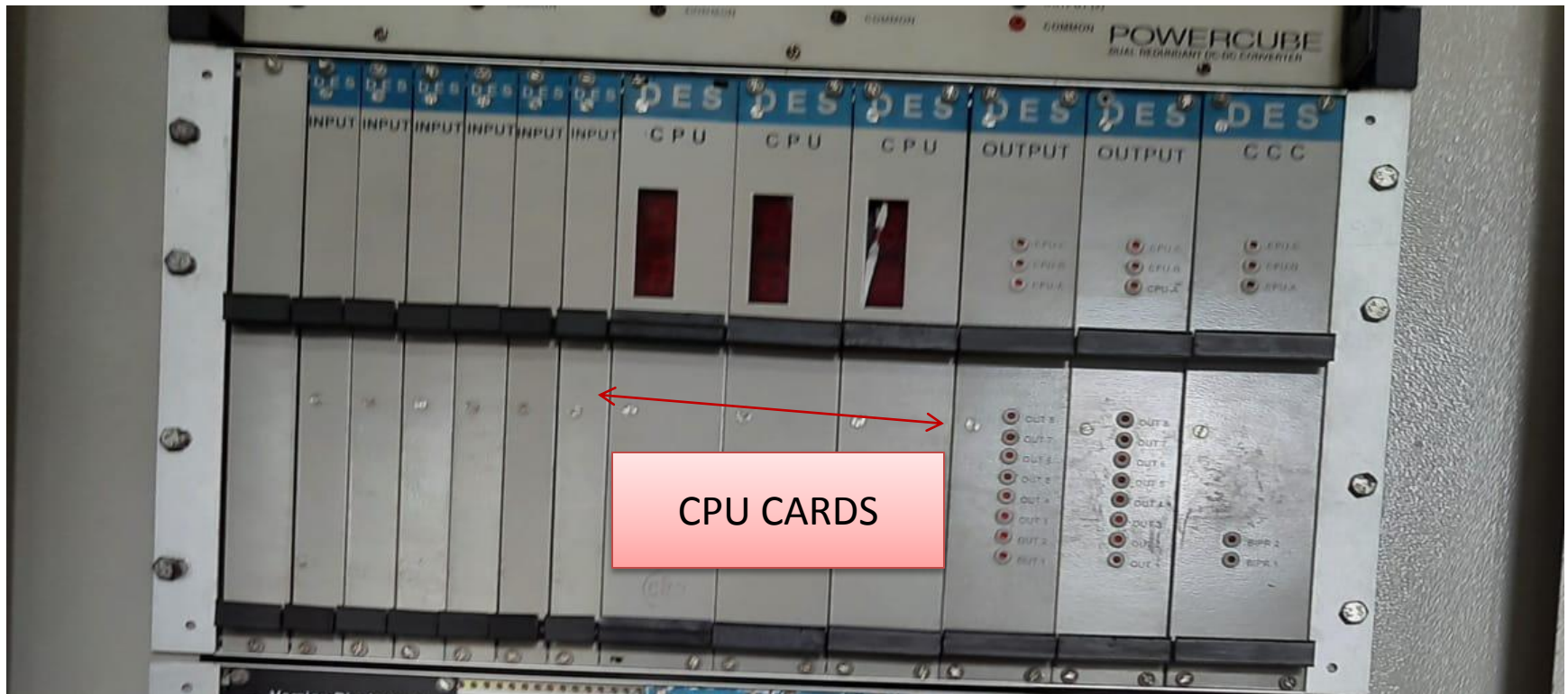
INPUT CARD OF UFSBI



CPU CARD OF UFSBI

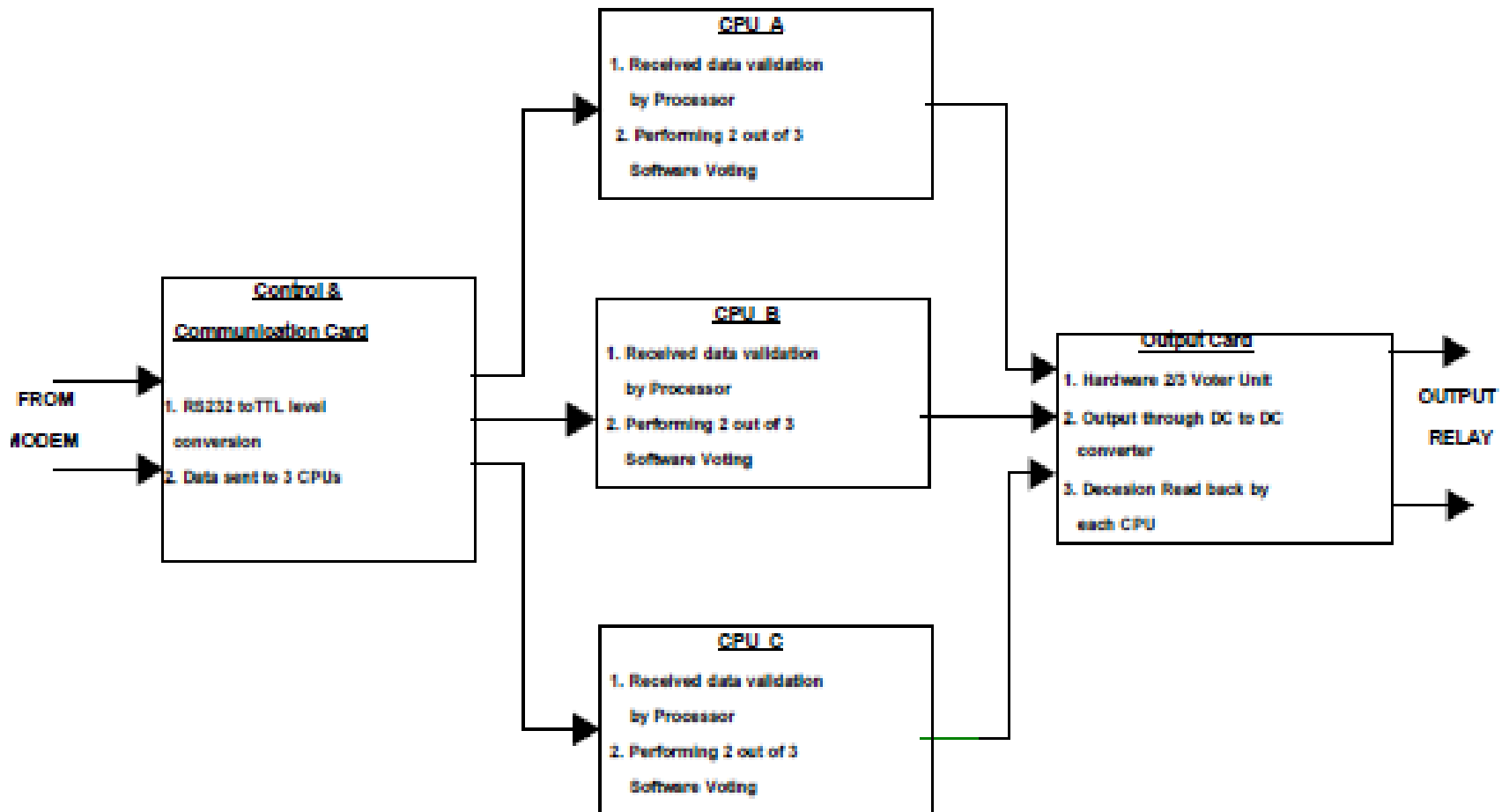


FRONT VIEW OF CPU CARD



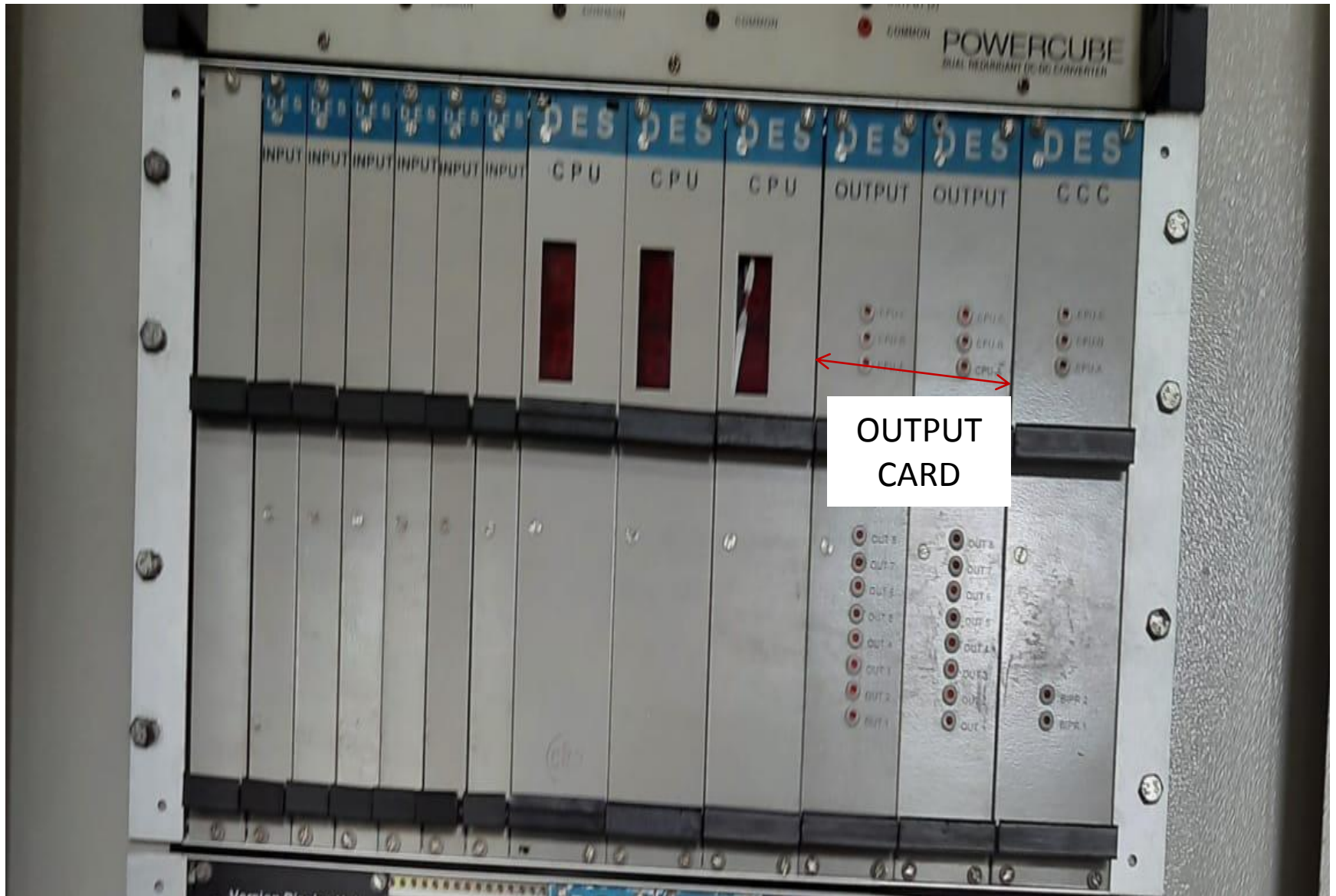
The UFSBI system works on a 2 out of 3 majority voting logic i.e. if one CPU card or its corresponding Input cards goes bad then also system can work. CPU - A reads the Inputs through Input Card 1&2, CPU - B reads the Inputs through Input Card 3&4 & CPU - C reads the Inputs through Input Card 5&6. Thereafter, it validates the data by inter-processor communication, adds CRC code and sends this to CC card for transmission. On the other end, after receiving the data from CC card, it decodes it and sends that to Output card to pick up the Output relay.

OUTPUT CARD OF UFSBI

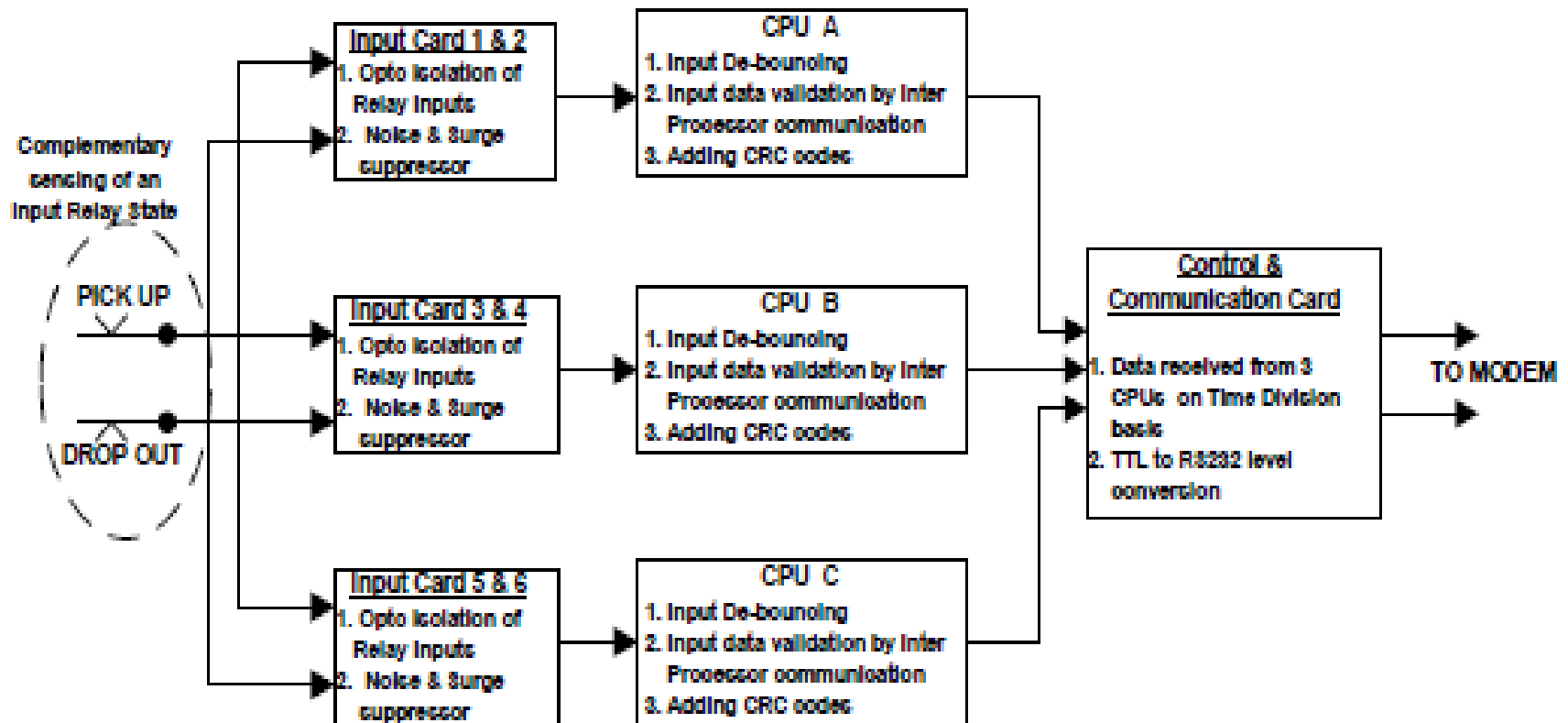


2 numbers of such cards are provided for driving Output relay. 1st Output card drives Output relay 1 to 8 and rest 9 - 16 number output relay is driven by Output card 2.

FRONT VIEW OF OUYPUT CARD



CC CARD OF UFSBI



It drives health check relays (BIPR1 & BIPR 2) and

It converts the data provided by the CPU card as per RS 232 protocol and sends it to the Modem.

FRONT VIEW OF CC CARD



RESET BOX FRONT AND BACK VIEW

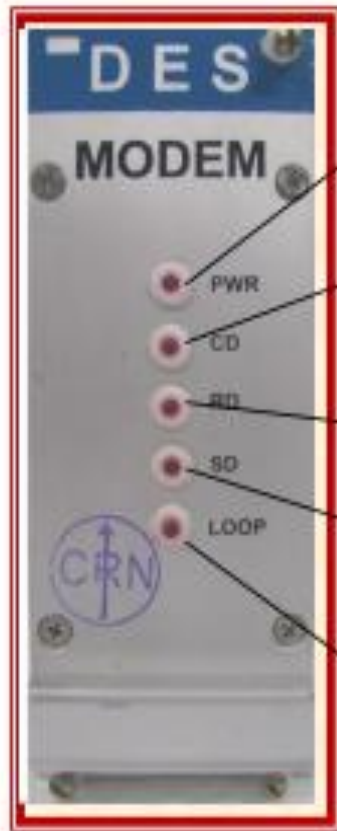


RESET BOX FRONT VIEW



RESET BOX BACK VIEW

MODEM OF UFSBI



Steady Red.
To Indicate the
MODEM Power ON
Condition

Steady Red to Indicate
The Carrier Detect

Flashing Red.
To Indicate the
MODEM receives Data

Flashing Red.
To Indicate the
MODEM Sends Data

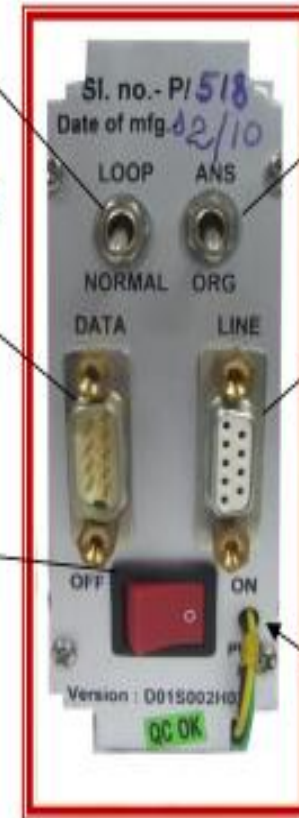
Steady Red when
Modem Put in
LOOP position

MODEM FRONT VIEW

Loop / Normal
Switch
To Test the
Modem

Data Connector
from Mother
Board to
Modem

MODEM
ON/OFF
Switch



ANS / ORG Switch
To Select the
Modem mode

Line Connector
from MODEM to
OFC or QUAD
Cable

PWR
IN

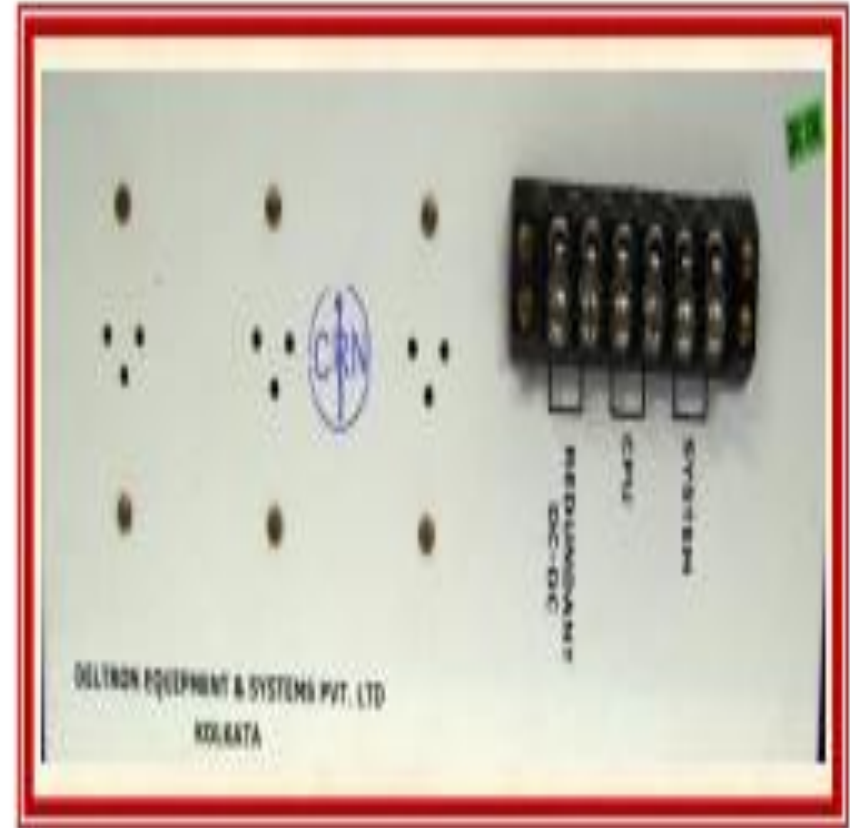
MODEM BACK VIEW

Modem is provided to convert the data as per RS232 to Voice Frequency. The Fig above shows the front and back view of the Modem. Modem works on 4 wire, Asynchronous, 2400 bps mode. Maximum permitted loss between to modem is 30db.

ALARM PANEL OF UFSBI



UFSBI ALARM PANEL FRONT VIEW



UFSBI ALARM PANEL BACK VIEW

RELAY DISPOSITION CHART (DL)

BIPR1 QN1 (8F/8B)	TIMER (120EJ)	TGTXR QN1 (8F/8B)		TGTR QL1 (11F/4B)	ASGNCR QNA1 (8F/8B)	HSGNCR QNA1 (8F/8B)	TCFR QL1 (11F/4B)	FR1 QN1 (8F/8B)
BIPR2 QN1 (8F/8B)	LFR 4R-3-24 (3 CO)	TCFXR QN1 (8F/8B)	TCFCR QN1 (8F/8B)	TGTYR QN1 (8F/8B)	ASGN CPR QN1 (8F/8B)	TGTZR QN1 (8F/8B)	BLR QN1 (8F/8B)	FR2 QN1 (8F/8B)
CAR QN1 (8F/8B)	BTSR QN1 (8F/8B)	TAR2 QN1 (8F/8B)	TAR1 QNA1 (8F/8B)	HSBTPR QNA1 (8F/8B)	HSATPR QNA1 (8F/8B)		[D]AZTR QNA1 (8F/8B)	
CNR QN1 (8F/8B)	TGTNR QN1 (8F/8B)	ASCR QN1 (8F/8B)	120 JPR QN1 (8F/8B)	BPNR QN1 (8F/8B)			[R]AZTR QNA1 (8F/8B)	

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Maintenance of the Instrument

Sr. No.	Description	ESM	JE/SE	SSE
1	Check the Display in all 3 CPU's. It must display flashing 0 (ZERO) 0 (ZERO) indicates that the system is healthy & functioning properly.	F	M	Q
2	Check the working voltage of UFSBI unit. It should not be below 21.6 V & above 28.8 V DC. (ALTHOUGH IT CAN WORK FROM 19.2V TO 31.2V)	F	M	Q
3	Check the various output of DC-DC converter and record all the output supply voltage & output level should be as follows : - (i) 5V [+/- 3%] (ii) +12V [+/- 2%] (iii) -12V [+/- 2%] (iv) 24V [+/- 5%]	F	M	Q
4	Check the working current. A healthy UFSBI should not draw more than 1.8 amp DC.	F	M	Q
5	Check the communication channel (OFC) loss with Telecom staff & it should not be more than 30 db between two modems of UFSBI.	-	HY	Y
6	Check the link parameters with Telecom staff (i) For trans = -05 to -10 db (After removing cable side connection) (ii) For Receive = -12 to -22 db	-	HY	Y
7	Check the surge arrester module working properly with zero voltage drop.	F	M	Q
8	Check the block interface working OK indication (BI.OK.IND) on reset box. This indication is normally on indication (green). It is glows when block interface is in working condition & BIPR1 & BIPR2 are in picked up condition. (NOT REQUIRED as "00" display of CPU's are already checked.)	F	M	Q
9	Check the link fail indication on reset box. This indication (yellow) will normally flicker continuously meaning modem receiving data from remote station modem. Link failure is indicated by steady yellow	F	M	Q
10	Check proper functioning of all push buttons, indications, buzzers,counter & keys provided on ASM block pannel.	F	M	Q
11	Check that all the connectors & PCBs in the 6U rack are inserted properly.	F	M	Q
12	Check that all UFSBI relay contacts are clean and free from pitting.	F	M	Q
13	Check that all fuses provided are of proper capacity	F	M	Q
14	Check that ripple voltages are not more than the specified voltage which are as follows :- i) 5 V DC not more than 40 mv ii) +12 V DC not more than 30 mv iii) -12 V DC not more than 30 mv	F	M	Q

Maintenance of the Instrument

MAINTENANCE SCHEDULE FOR BLOCK PANEL WITH AXLE COUNTER USING UFSBI & SSDAC

	i) If Single CPU fail indication appears on UFSBI alarm panel then check all 3 CPUs cards.If any one is not working, replace defective CPU			
	ii) If redundant DC-DC convertor fail indication appears on UFSBI alarm Panel then check the DC-DC convertor.			
16	iii) If System failure indication (audio & visual) appears on UFSBI alarm panel it would be ON till the UFSBI functioning normally (till BIPR1& BIPR2 picks up) then rest the system. if not resetted then checked error codes shown on the CPU & the LED on the out put cards & the control & communication card & take the recommended actions by manufacturer			
17	Check that all the relay in UFSBI relay rack are properly plugged and holding clips are intact.	F	M	Q
18	Check that all cable terminations are tight and properly connected.	F	M	Q
19	Measure the earth resistance & it should be less than 2 ohm	HY	HY	Y
20	Check the earthing wire & its connectivity for tightness	F	Q	HY
21	Check address jumper of both mother cards of connected UFSBI unit for their correspondence unit.	-	HY	y
22	Check all the parameters of communication link along with telecom staff.	-	HY	Y
23	Check that proper gasketting is provided in the UFSBI cubicle to prevent the ingress of water dust, insects / pests etc.	F	M	Q
24	Check the SM's key is effective.	F	M	Q
25	Check that all the counters on ASM block panel are working properly .	F	M	Q
26	Check that all buzzers on ASM block panel are functioning properly.	F	M	Q
27	Check the Block telephone and its cord for proper functioning	F	M	Q
28	Check that terminations of wires are with a unique number for easy identification.	-	-	Y
29	Wiring of relay rack is properly dressed and laced.	-	-	Y
30	Check that the timer is working and a time delay of 120 Sec for cancellation of line clear is achieved.	-	Hy	Y
31	Ensure that ASM alarm panel indications are extended to ESM's duty room & to the Dataloggers.	-	-	Y
32	Ensure that all potential free contact of UFSBI (power supply monitor , single CPU failure detection & single System failure detection) are wired in Datalooger and extended to ESM's duty room.	-	-	Y

NORMAL POSITION OF RELAY AND INDICATION AT LINE CLOSED POSITION

AT SENDING STATION	AT RECEIVING STATION
<p>The following relays are normally energized in LINE CLOSED</p> <p>ASGNCR↑, AZTR↑, BTSR↑, ASGN CPR↑, SHKR ↑, HSGNCR↑</p> <p>The following indications are ON</p> <p>LINE CLOSED – Yellow, SNK-Yellow, SNOEK-Yellow, LINE FREE – green, Shunt Key Green, Last Stop Signal – Red</p>	<p>The following relays are normally energized in LINE CLOSED</p> <p>BTSR↑, HSATPR↑, HSBTPR↑, HSGNCR↑, AZTR↑, ASGNCR↑, ASGN CPR↑, SHKR ↑</p> <p>The following indications are ON</p> <p>LINE CLOSED –Yellow, SNK-Yellow, SNOEK-Yellow, LINE FREE-Green, Shunt Key Green, Last Stop Signal – Red</p>

Sequence of operation during line clear action taken by sending sm's

1	<p>d) The SM at sending station inserts its SM key and turns to IN position. SM Key – Green.</p> <p>b) Presses BELL button. BPNR↑ and TRAIN GOING TO button. TGTNR↑.</p> <p>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.</p> <p>b) TCFR operates and latches, provided the conditions for granting LINE CLEAR exist.</p> <p>c) 'LINE CLOSED' turns 'OFF'.</p> <p>d) TCFK (G) "TRAIN COMING FROM" indication GREEN turns 'ON'.</p> <p>e) Sends LINE CLEAR granted code.</p>
3	<p>a) TGTNR picks up.</p> <p>b) TGTZR↓.</p> <p>c) TGTR picks up and latches and TGTXR↓.</p> <p>d) "LINE CLOSED" indication turns 'OFF'.</p> <p>e) TGTK (G) "TRAIN GOING TO" indication lights up GREEN.</p> <p>f) Releases BELL and TRAIN GOING TO buttons. BPNR↓ TGTNR↓.</p> <p>g) Advance Starter signal can be taken 'OFF' by SM control. ASGNCR↓, ASCR↑, SNK OFF, LSS – Green.</p>	4	<p>TCFXR↓.</p> <p>ASGNCR↓, SNOKE turns OFF.</p>

Sequence of operation during line clear action taken by sending sm's

AT SENDING STATION		AT RECEIVING STATION	
5	<ul style="list-style-type: none"> a) Train enters Block Section ASCR↓, AZTR↓, BTSR↓. b) LINE OCCUPIED Indication turns RED. c) TGTK (G) Indication changes to TGTK®. LSS – Red. d) SECTION Buzzer sounds with Indication near ACKN button. e) SM presses ACKN to silence the SECTION buzzer and turn 'OFF' aforesaid Indication. f) TGTZR↓. g) Restores all Signal controls to Normal. ASGNCR↑, SNK-Yellow h) Train in section. 	6	<ul style="list-style-type: none"> a) Train enters Block Section. b) AZTR↓, BTSR↓. c) LINE OCCUPIED Indication turns RED. d) TCFK (G) Indication changes to TCFK®. e) SECTION Buzzer sounds with Indication near ACKN button. f) SM presses ACKN to silence the SECTION buzzer and turn 'OFF' aforesaid Indication. g) ASGNCR↓, SNOKE- YELLOW. h) Train in section.
		7	<ul style="list-style-type: none"> a) Train is received by reversing the Home Signal Lever, HSGNCR↓, SNK- 'OFF'. b) Train occupies HSAT, HSATPR↓, TAR1↑ and sticks. c) Train occupies HSBT, HSBTPR↓ and clears HSAT, HSATPR↑ TAR2↑ and sticks. d) TAR1↓. e) AZTR↑, Line Free Green. f) SECTION Buzzer sounds with Indication near ACKN button. g) SM presses ACKN to silence the SECTION buzzer and turn 'OFF' aforesaid Indication. h) FR1 and FR2 operate to give flashing Indications. i) TCFK® changes to TCFK (flashing green).
8.	<ul style="list-style-type: none"> a) AZTR↑. b) LINE FREE Indication turns GREEN. c) FR1 and FR2 operate to give flashing Indications. d) TGTK® changes to TGTK (flashing green). 	9.	<ul style="list-style-type: none"> a) Normalizes all controls to pick up HSGNCR. b) Waits for TGTZR to pick up and on its pick up, de-latches TCFR. c) BTSR↑. d) LINE CLOSED Indication turns ON. e) TCFK (flashing green) turns OFF.

Sequence of operation during line clear action taken by sending sm's

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.		